Belief in a Just World and Redistributive Politics

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Abstract

International surveys reveal wide differences between the views held in different countries concerning the causes of wealth or poverty and the extent to which people are responsible for their own fate. At the same time, social ethnographies and experiments by psychologists demonstrate individuals' recurrent struggle with cognitive dissonance as they seek to maintain, and pass on to their children, a view of the world where effort ultimately pays off and everyone gets their just deserts. This paper offers a model that helps explain: i) why most people feel such a need to believe in a "just world"; ii) why this need, and therefore the prevalence of the belief, varies considerably across countries; iii) the implications of this phenomenon for international differences in political ideology, levels of redistribution, labor supply, aggregate income, and popular perceptions of the poor. The model shows in particular how complementarities arise endogenously between individuals' desired beliefs or ideological choices, resulting in two equilibria. A first, "American" equilibrium is characterized by a high prevalence of just-world beliefs among the population and relatively laissez-faire policies. The other, "European" equilibrium is characterized by more pessimism about the role of effort in economic outcomes and a more extensive welfare state. More generally, the paper develops a theory of collective beliefs and motivated cognitions, including those concerning "money" (consumption) and happiness, as well as religion.

Keywords: ideology, cognitive dissonance, inequality, welfare state, social mobility, religion, self-control, willpower, memory, psychology.

JEL Classification: D31, D72, D80, E62, P16, Z12.

"Individuals have a need to believe that they live in a world where people generally get what they deserve." (M. Lerner, *The Belief in a Just World: A Fundamental Delusion* (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. Similarly, experimental psychologists have documented the fact that most individuals feel 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 theory 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 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 imperfect willpower, people 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. In such circumstances, maintaining somewhat rosy beliefs about the fact that everyone will ultimately get their "just deserts" can be very valuable. If enough people thus end up with the view that economic success is highly dependent on effort they will represent a pivotal voting block, and set a low tax rate. Conversely, when people anticipate that society will carry out little redistribution, the costs of a deficient motivation to effort or human capital investment 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 individuals' desired beliefs or ideological choices induced by the political outcome, there can be two equilibria. A first, "American" equilibrium

is characterized by a high prevalence of just-world beliefs among the population (a high degree of denial of dissonant news), and a relatively laissez-faire public policy. The other, "European" equilibrium is characterized by more "realistic pessimism" (less denial, leading to a more cynical majority) and a more extensive welfare state, which in turn reduces the value to individuals of investing in optimistic beliefs. In this equilibrium there is also less stigma borne by the poor, in the sense that fewer agents are likely to blame poverty on a lack of effort or willpower. Aggregate effort and income, however, are also lower.

More generally, this paper proposes a mechanism for the emergence and persistence of *collective beliefs* and society-wide cognitive distortions. Three other main applications are thus developed. The first concerns perceptions of the link between "money and happiness" and the related dichotomy observed between consumerist and leisurist societies. The second is the affective (anxiety-reducing) dimension of just-world beliefs, which we show can play a similar role to that of the functional, motivation-related one. The third is religion, that is, beliefs about the likelihood of an afterlife and the nature of its rewards and punishments.

2 Self-reliance and redistribution: 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 across otherwise very comparable societies, such as the United States and Europe? More generally, 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 or the true determinants of earnings and social mobility (Hirschman (1973), Piketty (1995, 1998), Bénabou and Ok (2001), Rotemberg (2002), Fong (2001), Alesina and La Ferrara (2001)). The present paper directly relates to this literature but with a new, explicitly psychological perspective on the formation of beliefs. A second strand of work stresses history-dependence in the joint dynamics of the income distribution and redistributive policies, from which welfare states and laissez-faire societies arise as multiple steady-states under common politico-economic fundamentals (Bénabou (2000, 2004), Saint-Paul (2001), Hassler et al. (2002), Desdoigts and Moizeau (2004)). Finally, a third line of explanation invokes historical differences in political institutions (e.g., a centralized versus a federal state, proportional versus majoritarian representation) or, given that institutions are ultimately also chosen, points to exogenous sources of variation in political "technology" or preferences, such as land area or ethnic heterogeneity (Alesina, Glaeser and Sacerdote (2001), Alesina and Glaeser (2004)).

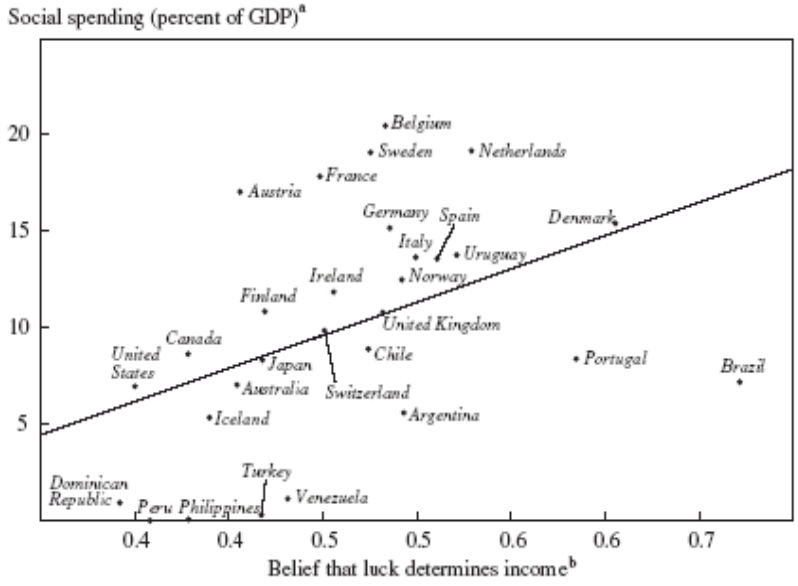

Figure 1: Beliefs and policies (source: Alesina, Glaser and Sacerdote (2001))

While differences in beliefs are thus not required to explain divergent social contracts, considerable evidence suggests that citizens' attitudes with respect to the sources of wealth or poverty (self-reliance versus societal factors) do play a major role. Data from the World Values Survey (Alesina et al. (2001), Keely (2002)) show 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 about twice as likely as Europeans to think that the poor "are lazy or lack willpower" (60% versus 26%) and that "in the long run, hard work usually brings a better life" (59% versus 34-43%; Ladd and Bowman (2001)). Large differences in attitudes also exist within Europe, especially between OECD and Eastern European countries (Suhrcke (2001)). While it is not clear whether interviewees answer questions in a "pretax" or "posttax" sense –that is, whether they are describing the functioning of the market, the state, or both (our model will in fact highlight the interaction of these two perceptions), such enormous differences cannot be ignored.

This is all the more true since, as shown on Figure 1 (reproduced from Alesina et al. (2001)) there is a strong correlation between such beliefs and actual redistributive policies. The standard interpretation of this relationship is one where popular beliefs determine policy outcomes, and indeed it is the case that individual voters' beliefs about the extent to which people control their own fate are major determinants of their attitudes towards inequality and redistribution –swamping in particular the effects of own income and education (Fong (2001)). But it could also be that the nature of the social contract shapes people's beliefs, and our model will in fact emphasize that causality runs in both directions. In any case, one needs to explain the sources

of the variations observed across advanced democracies in people's perceptions of how the world functions.

The traditional Marxist view 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.[1] 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" manner: 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. The evidence from ethnographic surveys, however, paints a very 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. The 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 statement by Maria, a very poor 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 <u>is</u> 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 <u>are</u> deserving of it"».[2]

This kind of cognitive conflict and belief manipulation also has an important intergenerational dimension, and both are found at all income and educations levels:

"My mom always told me that hard work, loyalty and respect for others will bring me success, wrote J. K., who was let go from Credit Suisse in late October. That's why I came back to CSFB after business school... and did all that other stuff. Apparently, it doesn't always work that way." (New York Times, December 1st, 2002).

[1] We take up the issue of propaganda in Section 4.5. A related 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.

[2] To perhaps also experience some cognitive dissonance, the reader should update the figure to $60,000,000 and think of CEO compensation.

One can also note at this point the parallel discrepancy that exists between the common and persistent perception of the United States as an exceptionally mobile society (especially in the minds of Americans themselves) and the actual evidence on intergenerational income mobility, which, on average, shows no significant difference with European welfare states.[3]

The second key finding of the ethnographic literature on the working poor is the overarching importance of *willpower* –what Lamont (2000) terms "the disciplined self". The main 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. They are frequently reminded, and constantly scared of, the fate of those who do give up: welfare dependency, homelessness, drugs, etc. The harsh judgements they pass on the non-working poor and welfare recipients (especially 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".*[4]

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

Many experiments thus show how individuals systematically construe what they observe so as to preserve this belief –ignoring, distorting, forgetting or explaining away any information that threatens it. 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 the largest payment. Another well-known set of experiments shows that when confronted with a person 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

[3] Some rank somewhat below the United States (cf. Rustichini et al. (1999) on Italy), others quite similarly (cf. Lefranc and Trannoy (2004) on France), others yet above (cf. Björklund and Jäntti (1997a,b) on Scandinavian countries or Couch and Dunn (1997) on Germany, who examine both income and education mobility).

[4] It is also notable that the question about "the poor" in the World Values Survey is whether the respondent agrees or disagrees that they "are lazy or lack willpower".

but nonetheless common case is that of self-blame by the victims themselves. Naturally, different individuals subscribe to different degrees to the just-world view, and the scale devised by Peplau and Tyler (1975) 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 victims (e.g., in a 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 and a lower propensity to social and political activism. 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).[5]

These findings lead us to investigate 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 is such wide cross-country variations in the extent to which people subscribe to this ideology, and examine some of the main political economy implications. In line with the experimental and ethnographical evidence, our theory incorporates : a) a "demand side" for motivated beliefs, arising either from imperfect willpower (present-biased preferences) or from anticipatory utility, with respect to this world or the next; b) a "supply side", taking the form of self-deception via selective recall or awareness, or that of parental indoctrination; c) general equilibrium interactions between individuals' cognitive investments, mediated by the collective policy choice.

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, wishful thinking and the like (e.g., Akerlof and Dickens (1982), Carrillo and Mariotti (2000), Bénabou and Tirole (2002, 2004), Köszegi (2000) and Landier (2001)). In stressing the links between individual beliefs about self-determination and equilibrium redistributive policies, our paper is also closely related to Piketty (1995, 1998) and to recent work by Esteban and Kranich (2002) and especially Alesina and Angeletos (2005). These last authors are also concerned with explaining the coexistence of low- and high-redistribution societies, each associated with different beliefs about the sources of economic disparities. Their model centers on a very different mechanism, based on concerns of social fairness, and the regimes to which it gives rise correspond to multiple rational-expectations equilibria for the share of national income inequality that is due to variations in effort. In our model they correspond instead to divergent yet self-sustaining perceptions of the *same* reality –that is, to different ideologies.

[5] 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.

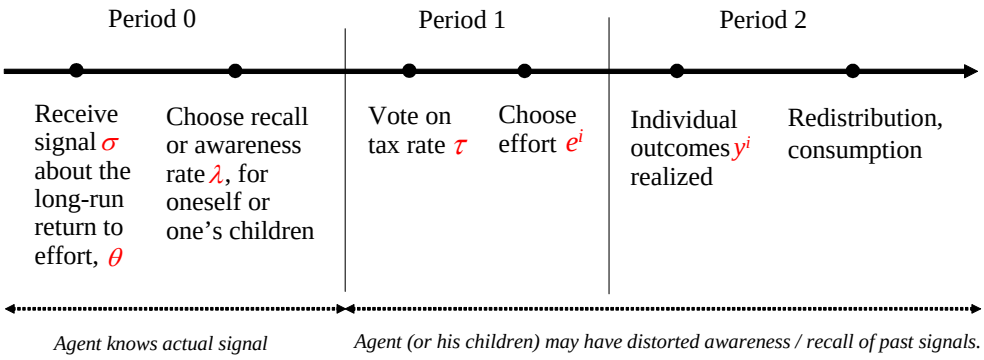

Figure 2: Timing of signals and actions

3 A model of ideology

3.1 Technology and preferences

The economy is populated by a continuum of agents, $i \in [0,1]$, whose actions take place according to the timeline on Figure 2. Each individual produces period-2 output with the technology

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

where e^i is the level of effort (or human capital investment) he chose in period 1 and π^i reflects his social background –resources or social capital inherited from one's parents, discrimination, etc.[6] For a minority $\varphi < 1/2$ of agents π^i takes a high value π_1, while for the remaining majority it is $\pi_0 \leq \pi_1$; we shall refer to these two classes as advantaged and disadvantaged, or simply rich and poor. We let $\bar{\pi} \equiv \varphi\pi_1 + (1-\varphi)\pi_0$ and similarly denote by $\bar{e}$ and $\bar{y} = \bar{\pi} + \theta\bar{e}$ the (endogenous) average levels of effort and output.

At the start of period 1, agents vote over a linear tax rate $\tau \leq 1$ that determines how market incomes will be redistributed in period 2. As there is no reason to exclude regressive policies a priori, we allow $\tau < 0$. Imposing $\tau \in [0,1]$ would not alter the results.

The true extent to which effort is rewarded in the long term, θ, is unknown. We shall consider three possible sources of "demand" for just-world beliefs: *functional, affective, and religious.* In this and the next section, demand for a positive outlook on θ will arise endogenously (though not necessarily consciously) from the fact that it helps motivate oneself, or one's children, towards the pursuit of long-term goals. In Section 5 we will show that similar results obtain when people simply derive comfort from thinking that they live in a world where the aftertax return to effort is high (because such a world is more "fair" or more predictable), as well as when they are

[6] The specification (1) is similar to that of Piketty (1995). All our results also obtain with a linear production function, $y^i = \pi^i + \theta e^i + \varepsilon$ (where $E[\varepsilon] = 0$), however, except for those in Section 4.4.

concerned about potential rewards in the afterlife.

We now focus on the motivation-based specification, which fits closely with both the ethnographic evidence mentioned earlier and Lerner's (1982, p. 9) opening description of the "belief in a just world": *"These assumptions... are central to the ability to engage in long-term goal-directed activity. In order to plan, work for and obtain things they want, and avoid those which are frightening or painful, people must assume that there are manageable procedures which are effective in producing the desired states".*

Agents' preferences are subject, at the time effort is exerted, to a "salience of the present" effect. The expected utility perceived by individual i at $t = 0, 1$ is thus

$$U_t^i \equiv E\left[(1-\tau)y^i + \tau\bar{y} - \frac{\left(e^i\right)^2}{2a\beta_t}\middle|\,\Omega_t^i\right], \tag{2}$$

where τ is the tax rate he will face in period 2, Ω_t^i his date-t information set, $\beta_0 \equiv 1$ and $\beta_1 \equiv \beta < 1$. Due to imperfect willpower ($\beta < 1$), the effort choice e^i will tend to be too low, compared to the ex-ante desirable level. A formally equivalent interpretation of (2) is that U_0^i represents parental preferences over their offspring's level of human capital investment (e.g., effort in school), whereas U_1^i describes the preferences of children themselves.

3.2 Signals and beliefs

At $t = 0$ each agent receives a binary signal about the return to effort, θ. For simplicity, we take these signals to be perfectly correlated, reflecting for instance some aggregate information.[7] Thus, with probability $1 - q$ everyone receives bad news, $\sigma^i = L$, and with probability q they receive no news, $\sigma^i = \emptyset$. This "no news is good news" assumption serves only to simplify the analysis and is inessential to the main results (see Section 4.2). The expected return to effort in each state is denoted

$$\theta_L \equiv \mathsf{E}\left[\theta \,|\, \sigma = L\right] < \mathsf{E}\left[\theta \,|\, \sigma = \emptyset\right] \equiv \theta_H, \tag{3}$$

and the difference is $\Delta\theta \equiv \theta_H - \theta_L$. Just after receiving the date-zero signal $\sigma^i \in \{L, \varnothing\}$, agent i's information set is Ω_0^i. Later on, however, when voting on taxes and choosing effort, he may no longer be aware of, or reliably recollect, the initial news. Equivalently, his parents may have learned σ^i but withheld the information. Agent i's information set Ω_1^i at $t = 1$ is thus based instead on a recollection (or parental account) of the original signal, which we denote as $\hat{\sigma}^i \in \{L, \varnothing\}$.

Figure 3 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".

[7] The case where they represent conditionally independent draws from a common distribution that depends on θ leads to similar results. By focusing on exogenous signals, we are also abstracting from the possibility that the equilibrium tax rate τ may reveal some information about θ. As explained in Section 4.2, however, one can easily choose parameters so that it does not.

Formally, the probability

$$\lambda \equiv \Pr\left[\hat{\sigma} = L \,|\, \sigma = L\right] \tag{4}$$

that any piece of news will later on be recalled can be increased or decreased, at some cost $M(\lambda)$. These costs may involve real resources (eliminating hard evidence, avoiding certain cues and social interactions), time (searching for and rehearsing reassuring information, for instance through political activism or religious participation), psychic (stress from repression), or reputational (misleading one's children, who may eventually find out). A typical cost function will have a U-shape, with the minimum occurring at some "natural" rate of recall $\bar{\lambda} \leq 1$; see Figure 3b.

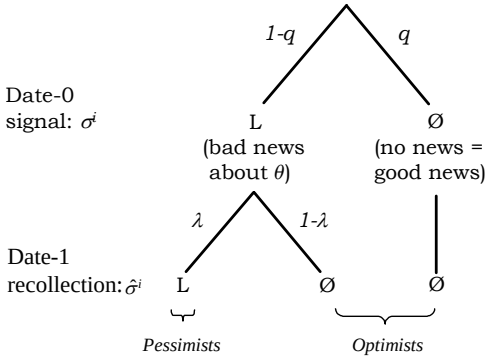

Fig. 3a: The determination of beliefs

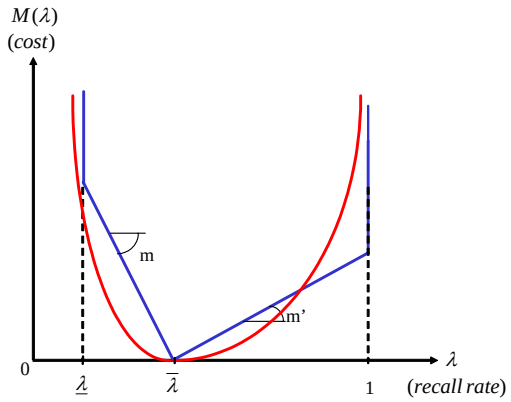

Fig. 3b: The awareness technology

In equilibrium, the optimal recall rate λ will be determined jointly with the political outcome τ and be the same for all agents. For the moment, the only important features of the belief mechanism are that: i) λ may be less than 1; ii) individuals are aware, to some extent, that they and others may have a systematic tendency to see or present the world in a "positive" light. Consequently, they do not take the absence of adverse recollections ($\hat{\sigma}^i = \varnothing$), or their parents' exhortations that effort pays and crime does not, at face value. Instead, they assess the reliability of a "no bad news" message, $\hat{\sigma}^i = \varnothing$, as

$$r = \frac{q}{q + \chi(1-q)(1-\lambda)} \equiv r^*(\lambda \,|\chi), \tag{5}$$

where λ denotes the rate of information transmission used by everyone in equilibrium. The parameter $\chi \in [0,1]$ measures agents' degree of cognitive sophistication, allowing the model to cover the whole range between full *Bayesian rationality* ($\chi = 1$) and complete *naiveté* ($\chi = 0$). Agents' posterior beliefs

$$\mu^i \equiv \Pr\left[\sigma^i = \varnothing \mid \Omega_1^i\right] \tag{6}$$

when they vote and work are thus $\mu^i = 0$ for the λ "pessimists" who recall $\hat{\sigma}^i = L$ and $\mu^i = r$ for the $1 - \lambda$ (qualified) "optimists" for whom $\hat{\sigma}^i = \varnothing$.

Throughout the paper we shall maintain the parallel interpretations of our model as describing either: (a) adult individuals who strive to maintain a certain view of the world and engage in costly *dissonance-reduction* when they encounter a piece of data that does not fit with it; or (b) a mechanism for the *intergenerational transmission* of beliefs and "values", with parents devoting time and resources to shielding their children's belief in a just world, where effort is ultimately rewarded, from evidence that life may not be so fair after all.[8]

3.3 On motivated cognition

The intergenerational interpretation of our model involves only standard forms of communication (within the family, but also via schools and churches) and permits an entirely "classical" reading of the paper. The intrapersonal interpretation corresponds to a more psychological view, in which agents engage in a form of self-deception. There is ample evidence of such malleability of beliefs. A first source comes the vast literatures on cognitive dissonance, self-esteem and overconfidence, in which the role played by the selective recall or "accessibility" of past experiences and data in maintaining valued beliefs is well documented.[9] A second source is the previously discussed work of Lerner and followers, showing how people selectively or even counterfactually construe reality so as to preserve a just-world view. Third, recent experiments demonstrate a similar malleability in beliefs that directly pertain to distributional issues. Thus, Kay and Jost (2003) show that simply reading a vignette about fictional (poor, rich)×(happy, unhappy) or (poor, rich)×(honest, dishonest) characters has significant effects on subjects' beliefs concerning the justice of the US economic and political system. Some studies also suggest that the same psychological mechanisms may be involved as in the repression of other unwanted thoughts. In surveys of MBA and undergraduate students at several US universities, Jost et al. (2003) find subjects' scores on a personal self-deception scale to be robust predictors of their stated adherence to the view that the market system is fair and efficient.[10] Similarly, among students in Hungary those scoring high on the self-deception scale, but not those scoring low, showed an increased tendency to endorse the free-market system following a question critical of either capitalism or the previous socialist regime.

Finally, Di Tella et al. (2004) exploit a rare "natural experiment", involving an attempt by the Argentinian government to redistribute land towards a group of very poor households, to show how the beneficiaries of a pure wealth windfall responded by adopting a more pro-market

[8] The belief-manipulation "technology" described above, introduced in Bénabou and Tirole (2002), has been applied in an intergenerational context by Kopczuk and Slemrod (2004) and in an intergenerational one by Dessi (2004). An alternative approach focuses on the parental transmission of *preferences* (Bisin and Verdier (2000)).

[9] For discussions and references, see Bénabou and Tirole (2002). More recently, the idea that people can (imperfectly) repress or block the recall of certain memories, which had fallen out of favor together with Freudian theory, is receiving renewed support from advances in neuroscience and brain imaging (e.g., O'Connor (2004)).

[10] The scale used is Paulhus's (1984) Self-Deceptive Enhancement scale, which measures, through an anonymous questionnaire, subjects' unwillingness to acknowledge "shameful" but common thoughts and feelings concerning aggression, anger, sexual fantasies, bodily functions, selfishness, cruelty, etc.

worldview. More generally, their findings demonstrate how beliefs often adapt more to changes in needs and goals than to changes in information.[11]

3.4 Effort or investment decisions

We now proceed to solve the model, working backwards from the last period. Knowing the redistributive environment he will face, each agent chooses effort optimally as a function of his beliefs concerning the expected return:

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

$$\theta(\mu^i) \equiv E[\theta \mid \Omega_1^i] = \mu^i\theta_H + (1-\mu^i)\theta_L. \tag{8}$$

An agent's policy preferences, on the other hand, depend not just on his own beliefs concerning θ but also on his *beliefs about other agents' beliefs,* as these determine the tax base from which transfers will be financed:

$$E[\bar{y} \mid \Omega_1^i] = \bar{\pi} + E[\theta\bar{e} \mid \Omega_1^i] = \bar{\pi} + a\beta(1-\tau)\Gamma(\mu^i \mid \lambda, r),$$

where

$$\Gamma(\mu^i \mid \lambda, r) \equiv E\left[\theta \cdot \int_0^1 \theta(\mu^j)\, dj \,\middle|\, \Omega_1^i\right] = \mu^i\theta_H\theta(r) + (1-\mu^i)\theta_L\left[\lambda\theta_L + (1-\lambda)\theta(r)\right]. \tag{9}$$

Indeed, in state $\sigma = \varnothing$ everyone has the same posterior $\mu^j = r$, whereas in state $\sigma = L$ a fraction λ of the population have $\mu^j = 0$ and the remaining $1-\lambda$ have $\mu^j = r$, where λ is the equilibrium awareness rate and $r = r^*(\lambda \mid \chi)$. When no confusion results, the dependence of Γ on the equilibrium (r, λ) will be kept implicit and we shall simply write $\Gamma(\mu^i)$. The same convention will apply to all functions derived from Γ, such as agents' welfare levels and preferred tax rates.

Substituting (7)-(9) into (2) yields agent i's expected utility U_1^i at the time effort is chosen. Prior to that moment his preferences are the same, except that the cost of effort is not yet magnified by the salience parameter $1/\beta$. Defining

$$\begin{aligned} V(\tau, \pi^i, \mu^i) \equiv\ & (1-\tau)\left[\pi^i + a\beta(1-\tau)\theta(\mu^i)^2\right] \\ & +\tau\left[\bar{\pi} + a\beta(1-\tau)\Gamma(\mu^i)\right] - \frac{a\beta^2}{2\gamma}(1-\tau)^2\theta(\mu^i)^2 \end{aligned} \tag{10}$$

allows us to capture ex ante ($\gamma = 1$) as well as ex post ($\gamma = \beta$) preferences, thus covering both the case where voters use tax policy to remedy the time-consistency problem ($\gamma = 1$) and that

[11] Di Tella et al. (2004) study 313 households who had been squatting land outside Buenos Aires for 10 to 16 years when about half of them received property rights to the land, with the selection being essentially random due to the combined vagaries of the judicial and political processes. This "treatment group" showed significant increases, compared to their less lucky neighbors, in beliefs that one can succeed on one's own, that money is important for happiness, and that others can be trusted. There was, however, no significant increase in the belief that people who put in effort end up better than those who do not, which seems at odds with the first result.

where they do not ($\gamma = \beta$), for instance because τ and e^i are chosen simultaneously.[12]

3.5 Social status, beliefs, and political attitudes

Assuming for the moment an interior optimum, agents i's ideal tax rate is given by the solution to $\partial V^i(\tau, \pi^i, \mu^i)/\partial\tau = 0$, namely

$$T(\pi^i, \mu^i) \equiv 1 - \frac{1 + \left(\pi^i - \bar{\pi}\right) / \left[a\beta\Gamma(\mu^i)\right]}{2 - (2 - \beta/\gamma)\,\theta(\mu^i)^2/\Gamma(\mu^i)}. \tag{11}$$

This expression embodies three intuitive effects. First, in the numerator, a lower relative endowment $\pi^i - \bar{\pi}$ predictably increases the desired tax rate. Whether progressive or regressive, such redistributive goals must be traded off against distortions to the effort-elastic component of the tax base, which is proportional to $\Gamma(\mu^i)$ and thus becomes more of a concern when effort is expected to productive. Second, and most important, the denominator of (11) shows how subjective prospects of upward mobility (POUM) reduce the desired tax rate: an optimistic individual plans on working hard and thus expects to move up in the income distribution, relative to low-effort pessimists.[13] This is most apparent when $\pi^i = \bar{\pi}$, in which case T decreases with the ratio $\theta(\mu^i)^2/\Gamma(\mu^i)$ between the agent's own expected output from effort and the average he expects others to produce with their labor. This ratio is higher for an optimist ($\mu^i = r$) than for a pessimist ($\mu^i = 0$), implying that the former desires less redistribution. The last determinant of T relates to time preference: when agents use fiscal policy to correct for the suboptimality of effort ($\gamma = 1$), T is lower (perhaps even negative, representing a subsidy to labor supply) than when they do not ($\gamma = \beta$).[14]

The following conditions ensure that voters' preferences over τ are single-peaked and that, as the poor become more optimistic about the return to effort, the combination of the POUM effect and increased concern about tax distortions reduces their desired level or redistribution.

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

In equilibrium, agents are either pessimists ($\mu^i = 0$) or optimists ($\mu^i = r$), depending on their recollected signal. Accordingly, we define the functions

$$T_{pess}(\pi) \equiv T(\pi, 0) \quad \text{and} \quad T_{opt}(\pi) \equiv T(\pi, r). \tag{12}$$

[12] For simplicity (and probably realism) we assume that voters do not condition their choice of τ on turning out to be pivotal (as they do in Feddersen and Pesendorfer (1997)).

[13] See Bénabou and Ok (2001) for an analysis of the POUM effect in the context of exogenous, known mobility processes, and Alesina and La Ferrara (2001) for empirical evidence of its importance in determining voters' attitudes towards redistribution. Note that $T(\cdot)$ also depends, through $\Gamma(\cdot)$, on the equilibrium (λ, r). We shall again leave this dependence implicit when no confusion results.

[14] Both this third effect and that of relative endowments are best seen when there is no heterogeneity in beliefs: if $\theta_L = \theta_H = \bar{\theta}$, implying $\Gamma(\mu) = \theta(\mu)^2 = \bar{\theta}^2$ for all μ, then $T(\pi^i) \equiv 1 - (\gamma/\beta)\left[1 + \left(\pi^i - \bar{\pi}\right)/(a\beta\bar{\theta}^2)\right]$.

Proposition 1 *Under Assumption 1, each agent's preferences* $V(\tau, \pi^i, \mu^i)$ *are strictly concave in* τ *and his ideal policy is* $\tau^i = T_{pess}(\pi^i)$ *when he is aware of an adverse signal* ($\hat{\sigma}^i = L$), *and* $T_{opt}(\pi^i)$ *when he is not* ($\hat{\sigma}^i = \varnothing$). *These preferred tax rates are decreasing in the initial endowment* π^i *and ordered as follows:*

$$T_{opt}(\pi_1) \leq T_{opt}(\pi_0) < T_{pess}(\pi_0) < 1,$$

with strict inequality when $\pi_0 < \pi_1$. *Moreover,* $T_{opt}(\pi_1) < 0$ *and, if* $(\bar{\pi} - \pi_0)/\beta a > (1 - \beta/\gamma)\,\theta_L^2$, *then* $T_{pess}(\pi_0) > 0$.

These results are in line with empirical studies such as Fong (2001) and Alesina and La Ferrara (2001), which show that beliefs in self-determination reduce individuals' demand for redistribution[15] and that both believers and skeptics are found in every social class.

We next consider how these political preferences are aggregated through voting. In the *no-information* state of the world, $\sigma = \varnothing$, things are quite simple: everyone has posterior $\mu = r$, so with the poor forming a majority the equilibrium tax outcome is $T_{opt}(\pi_0)$. Consider now the *informative* state of the world, $\sigma = L$. By Proposition 1, the pessimistic poor always want the highest tax rate, $T_{pess}(\pi_0)$. If the equilibrium awareness rate λ is high enough that $(1-\varphi)\lambda > 1/2$, they will be a majority and impose their choice. When $(1-\varphi)\lambda < 1/2$, on the other hand, some group with less extreme preferences will be pivotal. Two cases may occur.

Case 1: if $T_{pess}(\pi_1) \leq T_{opt}(\pi_0)$, then $\max\{T_{pess}(\pi_1), T_{opt}(\pi_1)\} < T_{opt}(\pi_0) < T_{pess}(\pi_0)$. Since individuals with $\pi = \pi_0$ are a majority the pivotal group is now that of the *optimistic* poor, who set the tax rate $T_{opt}(\pi_0)$.

Case 2: if $T_{pess}(\pi_1) > T_{opt}(\pi_0)$, then $T_{opt}(\pi_1) < T_{opt}(\pi_0) < T_{pess}(\pi_1) < T_{pess}(\pi_0)$. 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 $T_{opt}(\pi_0)$. If $\lambda > 1/2$, on the other hand, the pivotal group is that of the pessimistic rich, who set the tax rate $T_{pess}(\pi_1)$.

Corollary 1 *As* λ *falls below* $\lambda^* \equiv 1/[2(1-\varphi)] \in (1/2, 1)$, *the pivotal vote switches from the pessimistic poor to a group that desires a lower tax rate.*

This result is illustrated by the "Political Equilibrium" locus on Figure 4. Of course each agent's awareness rate is endogenous, resulting from his (or his parents') previous ideological choices. We now turn to the determination of these motivated beliefs.

[15] Strictly speaking, the proposition shows this result only for the poor ($\pi = \pi_0$), who are the majority group. Under additional conditions one can ensure it for the rich ($\pi = \pi_1$) as well, but this is not required for our analysis. Note also that, by introducing a public good, one could ensure that tax rates are always positive.

3.6 Ideology as a cognitive investment

Consider now agent i's decision problem at $t = 0$. Given the informational structure, the only state in which he has a choice with respect to his own or his offspring's worldview is when $\sigma^i = L$. Is it better to acknowledge the bad news, or to try and maintain an optimistic outlook? An individual who ends up with belief μ^i will exert effort $e^i = \beta a(1-\tau)\theta(\mu^i)$, where τ is the tax rate that will predictably emerge from the majority vote, given the cognitive strategy (λ, r) played by everyone else. Substituting into (2), his (ex-ante) intertemporal utility if he ends up with belief μ^i will be

$$U_0^i = (1-\tau)\pi^i + \tau\bar{\pi} + a\beta\tau(1-\tau)\theta_L\left[\lambda\theta_L + (1-\lambda)\theta(r)\right] + \tilde{U}_L(\tau, \mu^i), \tag{13}$$

where

$$\tilde{U}_L(\tau, \mu^i) \equiv a\beta(1-\tau)^2\theta(\mu^i)\left[\theta_L - (\beta/2)\,\theta(\mu^i)\right]. \tag{14}$$

Several points are worth noting. First, the agent's forecast of aggregate output in (13) reflects the predicted return to effort θ_L and belief distribution $(\lambda, 1-\lambda)$ based on the true $\sigma = L$; it is thus independent of μ^i, in contrast to his prediction of $\bar{y}$ at $t = 1$. Similarly, the agent recognizes that while his effort will be based on a possibly different belief μ^i, its productivity will still be θ_L; see (14). Finally, at $t = 0$ the effort cost is not subject to the salience-of-the present effect.

An individual who recalls $\hat{\sigma}^i = L$ will have $\mu^i = 0$, whereas for $\hat{\sigma}^i = \varnothing$ he will have $\mu^i = r$. From (14), the cognitive optimization problem following the signal $\sigma^i = L$ is thus

$$\max_{\lambda' \in [0,1]} \left\{ \beta a(1-\tau)^2 \left[\lambda' \left(1 - \frac{\beta}{2}\right)\theta_L^2 + (1-\lambda')\left(\theta_L - \frac{\beta}{2}\theta(r)\right)\theta(r) \right] - M(\lambda') \right\}, \tag{15}$$

where $M(\lambda')$ is the cost of achieving a rate of recall or intergenerational transmission equal to λ', as discussed in Section 3.2. Two key effects are apparent in this expression:

• *The role of time inconsistency:* let $M \equiv 0$. When $\beta \approx 1$, agents always choose $\lambda' = 1$: information is always valuable. Conversely, when $\beta \approx 0$ they always choose $\lambda' = 0$, reflecting the fact that sustaining motivation is critical.[16]

• *The role of taxes:* assume that β is low enough that dissonance reduction is valuable, but now also costly ($M' > 0$). Then, the lower is τ, the greater is each individual or parent's incentive to *invest* in a just-world ideology –that is, to choose a low λ'. This general-equilibrium feedback is a source of endogenous complementarity between individual's ideological choices.

To simplify the problem, we shall take the awareness-cost function to be piecewise linear, with natural (costless) rate of recall $\bar{\lambda} \leq 1$, a minimum rate of recall $\underline{\lambda} < \bar{\lambda}$ (or maximum degree of repression $1 - \underline{\lambda}$), and linear marginal costs $m > 0$ and $m' > 0$ for information suppression and rehearsal respectively; see Figure 3b.

[16] Both claims follow from the fact that the term multiplying λ' in (15) is proportional to $(\beta/2)(\theta(r) + \theta_L) - \theta_L$.

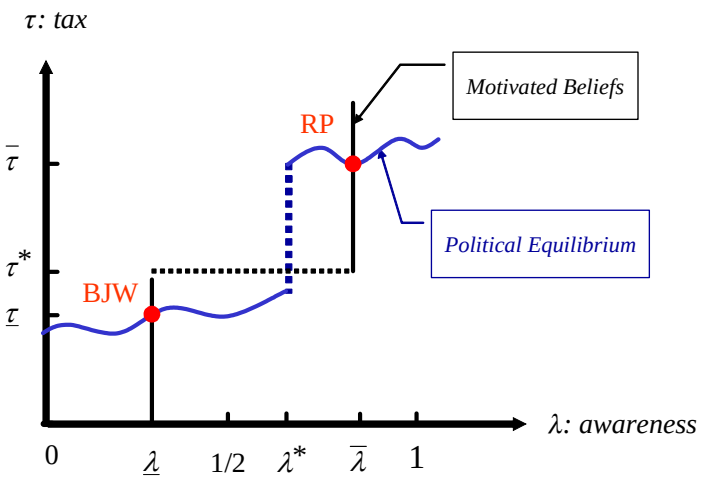

Figure 4: Ideological choices, political choices, and the set of equilibria (BJW: Belief in a Just World; RP: Realistic Pessimism).

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* $\lambda \geq \bar{\lambda}$, *where* $0 \leq \underline{\lambda} < \bar{\lambda} \leq 1$.

With this specification, the solution to (15) is "bang-bang": the optimal awareness rate is either $\underline{\lambda}$ or $\bar{\lambda}$,[17] depending on whether τ is above or below some (easily computed) threshold τ^*. This is illustrated by the "Motivated Beliefs" locus on Figure 4.

4 American "Belief in a Just World" vs. European "Pessimism"

"I have never met in America a citizen so poor as not to cast a glance of hope and envy on the enjoyments of the rich or whose imagination did not possess itself by anticipation of those good things that fate still obstinately withheld from him." (De Tocqueville, (1835)).

4.1 Equilibrium outcomes

A politico-economic equilibrium is a triple (λ, r, τ) such that, in state L,

$$\lambda \in \arg\max_{\lambda' \in [0,1]} \left\{ \lambda' \tilde{U}_L(\tau, 0) + (1-\lambda')\tilde{U}_L(\tau, r) - M(\lambda') \right\}, \tag{16}$$

$$r = \frac{q}{q + \chi(1-q)(1-\lambda)}, \tag{17}$$

$$\tau : \text{ is the majority tax rate, given the distribution of beliefs induced by } (\lambda, r), \tag{18}$$

and in state $\sigma = \varnothing$ the majority tax rate is $T_{opt}(\pi_0)$, given by (11)-(12) as a function of (λ, r).

[17] In general, it could also be $1 > \bar{\lambda}$. This case (rehearsing bad news) will be ruled out later on, however.

Under conditions that we shall identify, the political and the psychological mechanisms embodied in these equations and illustrated on Figure 4 give rise two equilibria –one broadly descriptive of Western Europe, the other of the United States.

1. Realistic Pessimism / Welfare State. When agents have a high recall rate ($\lambda = \bar{\lambda} > \lambda^*$), enough of the poor end up with pessimistic beliefs $\mu^i = 0$ to constitute a majority and impose a high tax rate, $\bar{\tau}$. The expectation of substantial redistribution ($\bar{\tau} > \tau^*$) and therefore a low net return to effort, in turn, generates only weak incentives to deny that θ is low. So agents indeed make no effort at dissonance reduction, choosing the natural awareness rate $\bar{\lambda}$.

2. Belief in a Just World / Laissez Faire. When agents try hard to ignore discouraging news about the efficacy of individual effort ($\lambda = \underline{\lambda} < \lambda^*$), enough people end up with relatively optimistic beliefs $\mu^i = \bar{r}$ to make the poor among them the pivotal group: $1 - \underline{\lambda} > 1/2$.[18] The expectation of a relatively low tax rate ($\underline{\tau} < \tau^*$), in turn, generates strong incentives to believe that θ is high. So people indeed make significant efforts at maintaining such a worldview, implying that a high fraction $1 - \bar{\lambda}$ of them do forget the dissonant information, or minimize it to their children.

In what follows we formally establish the existence of the BJW and RP equilibria.[19] Readers who wish to skip this step may go directly to the next subsection.

We start from the parameters $\bar{\lambda}$ and $\overline{\lambda}$ of the awareness technology in Assumption 2, then define $\underline{r} \equiv r^*(\underline{\lambda}; \chi)$ and $\bar{r} = r^*(\bar{\lambda}; \chi)$ from the updating rule (17), and $\theta(\underline{r})$ and θ ($\bar{r}$) from (8).

Assumption 3 *Let: (i)* $\underline{\lambda} < 1/2 < (1-\varphi)\bar{\lambda}$ *and (ii)* $(1 - \underline{\lambda}\,\underline{r}) / [1 + \underline{r}\,(\Delta\theta/2\theta_L)] \leq \beta/\gamma$.

The first condition ensures that the pivotal group switches from the pessimistic poor to the optimistic poor as λ declines from $\bar{\lambda}$ to $\underline{\lambda}$. The second one (which is automatically satisfied when $\gamma = \beta$) will be used below. Next, we use (11) to compute

$$\bar{\tau} \equiv T_{pess}(\pi_0 \,|\bar{\lambda}, \bar{r}) = T(\pi_0\,, 0|\bar{\lambda}, \bar{r}), \tag{19}$$

$$\underline{\tau} \equiv T_{opt}(\pi_0 \,|\underline{\lambda}, \underline{r}) = T(\pi_0, \underline{r}\,|\underline{\lambda}, \underline{r}), \tag{20}$$

making here explicit the dependence of an agent's preferred policy on the beliefs of others (through $\Gamma(\mu^i\,|\lambda, r)$; see (9)). A first issue is whether it is indeed the case that $\underline{\tau} < \bar{\tau}$. This is far from obvious, since knowing that others 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 poor agents want to tax more. We show, however, that this tax-base effect is dominated (comparing across potential equilibria) by their concerns over tax distortions and their own mobility prospects.

[18] Allowing for the possibility that the pessimistic rich may instead become pivotal (by assuming only $(1-\varphi)\underline{\lambda} < 1/2$) would not change the main results, since this group also wants less redistribution than the pessimistic poor. Letting $\underline{\lambda} < 1/2$ reduces the number of cases to consider and yields other desirable properties, discussed below.

[19] In addition to these extremal equilibria, there may also be an (unstable) equilibrium where the first-order condition for (17) holds with equality at some $\lambda \in (\underline{\lambda}, \bar{\lambda})$.

Proposition 2 *Under Assumption 3(ii), the tax rates defined by (19)-(20) are such that* $\underline{\tau} < \bar{\tau}$.

The last requirement for multiplicity is that the incentive to forget or repress bad news about θ, net of the cost required, be positive in a low-tax environment but negative in a high-tax one:

$$\tilde{U}_L(\bar{\tau}, \bar{r}) - \tilde{U}_L(\bar{\tau}, 0) < m < \tilde{U}_L(\underline{\tau}, \underline{r}) - \tilde{U}_L(\underline{\tau}, 0). \tag{21}$$

If $\bar{\lambda} < 1$, it must also be that no one wants to rehearse bad news (to avoid overconfidence):

$$\tilde{U}_L(\bar{\tau}, 0) - \tilde{U}_L(\bar{\tau}, \bar{r}) < m', \tag{22}$$

while the analogue of (22) for $(\underline{\lambda}, \underline{r})$ follows from (21). Clearly, if

$$\max\left\{\tilde{U}_L(\bar{\tau}, \bar{r}\,) - \tilde{U}_L(\bar{\tau}, 0), 0\right\} < \tilde{U}_L(\underline{\tau}, \underline{r}) - \tilde{U}_L(\underline{\tau}, 0), \tag{23}$$

the fixed-point conditions given by (21) will be satisfied for all $m > 0$ in the appropriate range. Assumption 4, given in the appendix, provides conditions on the model's parameters that are sufficient for (22)-(23) to hold, leading to our main result.

Proposition 3 *Let Assumptions 1–4 be satisfied. For a range of values of the denial cost* m *(and for all* $m' > 0$*), there exist two politico-economic equilibria, such that:*
1) Agent's awareness rate in the informative state ($\sigma = L$) *is* $\underline{\lambda}$ *in the BJW equilibrium and* $\bar{\lambda}$ *in the RP equilibrium, with associated tax rates* $\underline{\tau}$ *and* $\bar{\tau}$*, such that* $\underline{\lambda} < \bar{\lambda}$ *and* $\underline{\tau} < \bar{\tau}$*. Average effort and output are higher in the BJW equilibrium.*
2) In the no-information state ($\sigma = \varnothing$) *the rankings of tax rates, effort and output across the two equilibria depend on parameters. If* $\pi_1 - \pi_0$ *and* χ *are small enough, in particular, there exist values of* $\underline{\lambda}$ *and* $\bar{\lambda}$ *such that these rankings remain the same as in the informative state.*

4.2 Implications and robustness

1. Ideology, redistribution, and national income. Our central results pertain to the state of the world in which agents actually receive a signal, namely here the not-so-just world ($\sigma = L$). This is the most relevant one, as only then are individuals faced with an actual cognitive decision, allowing in particular the key issue of dissonance reduction to arise. (The state $\sigma = \varnothing$ is discussed below, however). Proposition 3 shows that both awareness and redistribution are then lower in the BJW equilibrium than in its RP counterpart. 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 "European" equilibrium. On the welfare side, it improves agents' effort motivation (or time-inconsistency problem) and causes less distortions to the tax base; it also leads them to incur greater cognitive costs, however, which

reduces these gains.[20] Its net value to the poor is much more ambiguous, since they receive less transfers and, as explained below, are more likely to be stigmatized.

2. Social mobility and savings. As mentioned in the introduction, the widespread perception (especially in the United States itself) of the American society as exceptionally mobile is notably at odds with the empirical evidence: comparative studies of intergenerational mobility show, on average, no significant difference with European countries. Our model is consistent with these findings. In any equilibrium (λ, r) and state $\sigma \in \{L, \varnothing\}$, the transition matrix between the advantaged / disadvantaged and the economic success / failure social classes is

$$M_\sigma(\lambda, r) \equiv \begin{bmatrix} 1-\pi_0-\Phi_\sigma(\tau\,|\lambda,r) & \pi_0+\Phi_\sigma(\tau\,|\lambda,r) \\ 1-\pi_1-\Phi_\sigma(\tau\,|\lambda,r) & \pi_1+\Phi_\sigma(\tau\,|\lambda,r) \end{bmatrix}, \tag{24}$$

with $\Phi_L(\tau\,|\lambda,r) \equiv a\beta(1-\tau)\theta_L\left[\lambda\theta_L + (1-\lambda)\theta(r)\right]$ and $\Phi_H(\tau\,|\lambda,r) \equiv a\beta(1-\tau)\theta_H\theta(r)$. It is easy to check that the eigenvalues are always 1 and $\pi_1 - \pi_0$, implying that standard measures of mobility are independent of $(\sigma, \tau, \lambda, r)$.[21] This invariance of *relative* mobility may be contrasted to the ranking of *absolute* mobility, namely the probability of achieving $y^i = 1$ rather than $y^i = 0$, which is both truly higher, as people work harder, and overestimated (as fewer agents are aware that $\sigma = L$) in the US-type equilibrium.

Finally, while our model does not explicitly have agents investing in financial assets (in addition to human capital, which is one possible interpretation of e^i) it is clear that, with such an extension, the steeper lifetime earnings profile which they anticipate (in part, correctly) would lead them to save less in the BJW than in the RP equilibrium. In addition to trans-Atlantic differences in policy, labor supply and per capita income, our model can thus also shed some light on the lower American savings rate.

3. Sophistication or naivete? In a world where people receive no signal ($\sigma = \varnothing$), the ranking of tax rates across equilibria is generally less clear. This ambiguity is due to the "rational skepticism" of Bayesian agents, who are aware of their own (or their parents') systematic tendency to censor bad news. The lower the probability λ with which such news are transmitted, the lower their posterior confidence $r^*(\lambda;\chi)$ that none were indeed received. Thus, voters' expectations of their own productivity $\theta(r)$ and the product of others' efforts $\Gamma(r)$ are now lower in the BJW equilibrium ($\lambda = \underline{\lambda}$) than in its RP counterpart ($\lambda = \bar{\lambda}$). This effect vanishes in the limit as $\chi \to 0$: when agents "forget that they forget", $\underline{r} = \bar{r} = 1$; tax rates following $\sigma = \varnothing$ then ex-

[20] The *ex-ante* welfare calculus is more complex, and the outcome generally ambiguous. In state $\sigma = L$, agents' greater optimism and the lower tax rate under the BJW equilibrium lead to a net welfare gain, for the two reasons mentioned above. In state $\sigma = \varnothing$, however, the Bayesian "self-doubt" effect discussed below may (see Proposition 3) result in lower effort in the BJW equilibrium, and this is particularly costly since $E\left[\theta\,|\,\sigma = \emptyset\right] = \theta_H > \theta_L = E\left[\theta\,|\,\sigma = L\right]$. The net welfare outcome thus depends on parameters, and in particular on agents' degree of Bayesian sophistication, χ.

[21] Cross-sectional inequality, by contrast, does vary with the equilibrium and the realized state, but in a non-monotonic way, as it is proportional to $\left[\bar{\pi} + \Phi_\sigma(\tau\,|\lambda,r)\right]\left[1 - \bar{\pi} - \Phi_\sigma(\tau\,|\lambda,r)\right]$.

actly coincide in the two equilibria, and the overall correlation structure is entirely determined by what happens when $\sigma = L$.[22] When $\chi > 0$, the effect on the equilibrium of doubting one's recall (or parents) may go either way, but one can identify sufficient conditions (such as those in the proposition) for the results to remain the same as in the informative state.[23]

4. Who is "right"? 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 really matters is that their worldview (in the state of the world where there is information) be more *optimistic* –whether *rightly or wrongly.* Indeed, instead of $\sigma \in \{L, \varnothing\}$, assume now that "no news are bad news": $\sigma \in \{H, \varnothing\}$. Agents' cognitive decision in the informed state $\sigma = H$ is then how much to invest in reminding themselves, and conveying to their children, that the world is just (which it is). There will be more investments of that type (raising λ above $\bar{\lambda}$) in the US-like equilibrium than in the European one, and this again will be mutually sustaining with lower redistribution.

5. Learning from taxes? One may worry that sophisticated agents could 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". Note first that with $\underline{\lambda} < 1/2$, the BJW tax rate is the same in both states ($\underline{\tau} = T(\pi_0, \underline{r}\,|\underline{\lambda}, \underline{r})$) and thus *uninformative.* In the RP equilibrium it differs across states, but since agents are not investing in beliefs ($\lambda = \bar{\lambda}$) no cognitive decisions are affected. If we let $\bar{\lambda} = 1$, this additional source of information is irrelevant for effort and voting as well. A more important and general point is that *any* information agents might retrieve about θ (e.g., from observing output realizations, the fact that opinions differ, or the political choices of other countries) is of the very same type as the original signal σ (and in our simple model, perfectly correlated with it), so that they have *exactly the same incentives* to forget or deny it as they had for σ.

4.3 Technological change and ideological shifts

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

Such a skill-biased technological shift has two effects, illustrated on Figure 5. First, the equilibrium policy locus shifts down. Indeed, as X rises everyone increases their effort in proportion, $e^i = aX\beta(1-\tau)\theta(\mu^i)$; each voter's ideal tax rate is thus given by the same formula as in (11), but with a now scaled up to aX. Over the relevant range where the poor (whether optimistic

[22] Note also that, with naive agents ($\chi \to 0$) the state $\sigma = \varnothing$ could occur with probability q arbitrarily close to zero.

[23] As shown by (11), $T(\pi_0, r\,|\lambda, r)$ depends negatively on $(\bar{\pi} - \pi_0)/\Gamma(r)$ through the tax base effect and on $\theta(r)/\Gamma(r)$ through the POUM effect. The first force tends to make T decline with r, but becomes small when endowments do not differ much. The second one can go either way, depending on whether θ or Γ responds more.

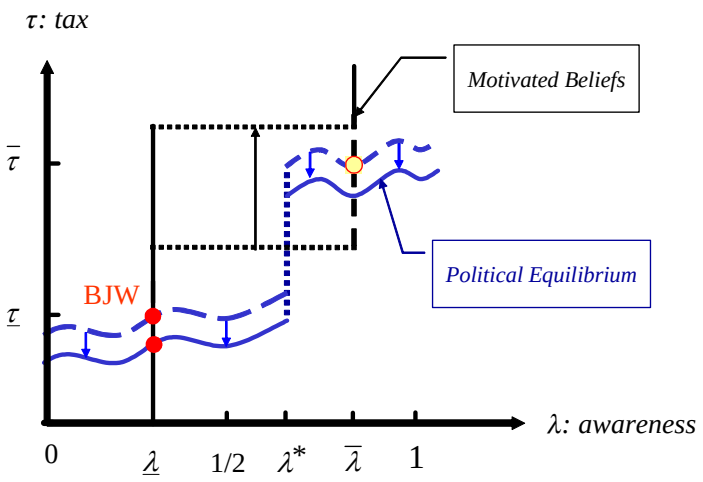

Figure 5: Skill-biased technological progress and induced ideological shifts

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 $\sigma^i = L$ becomes

$$\max_{\lambda' \in [0,1]} \left\{ \beta a X^2 (1-\tau)^2 \left[\lambda' \left(1 - \frac{\beta}{2} \right) \theta_L^2 + (1-\lambda') \left(\theta_L - \frac{\beta}{2} \theta(r) \right) \theta(r) \right] - M(\lambda') \right\}. \tag{25}$$

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 λ decreases for any given τ, as shown on Figure 5; furthermore, this shift is larger than that of the other curve (as can be seen from (25) and (11)).

Putting both effects together yields the most interesting point. Whereas, by itself, a rise in X, such as a higher skill premium, would lead 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 θ has not changed at all! This, in turn, can cause the RP-Welfare State equilibrium to become *unsustainable,* leaving only the BJW-Laissez Faire outcome. This result may help understand 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 retrenchment of redistributive policies.[24]

[24] Other models where skill-biased technical change can undermine –through very different channels that do not

4.4 The lazy poor

Suppose now that a fraction x of the population are "lazy", by which we mean that they have no willpower with respect to effort $\beta = 0$.[25] 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 these agents does not affect any of the political equilibria constructed before (or perhaps they do not even vote).

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

$$p^i \equiv \Pr\left[\beta^j = 0 \mid y^j = 0, \Omega_1^i\right] = \frac{(1-\bar{\pi})x}{(1-\bar{\pi})x + (1-x)\left[(1-\bar{\pi} - a\beta(1-\tau)\Gamma(\mu^i)\right]}. \tag{26}$$

Focussing again on the informative state of the 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, implying a greater incentive to work for any non-lazy person; this tends to make people view those with $y^j = 0$ as less likely to have worked. Second, with $\underline{\lambda} < 1/2$ the majority of agents in the BJW equilibrium are optimists, whose estimate of the average contribution of effort to success is higher than that of the pessimists who constitute a majority in the RP equilibrium ($\Gamma(\underline{r}) > \Gamma(0)$).

There is thus a *greater prevalence of stigma* on the (ex-post) poor in a BJW equilibrium, especially among the politically pivotal classes. This prediction is in line with the international survey evidence cited in the introduction (e.g., Alesina et al. (2001)), the ethnographic interviews conducted by Lamont (2000) in the United Sates and France, and Gilens' (1999) study of American's perceptions of welfare recipients. The negative inference attached to poverty is likely to trigger emotional reactions such as resentment, anger, etc. Furthermore, there is strong evidence that people are *selectively* altruistic or empathic, in the sense that they want to help only "those who help themselves", namely the non-lazy poor (e.g. Fong (2001), Kangas (2003), Bowles et al. (2005)). Incorporating such social preferences into the model would thus clearly imply that the BJW-induced stigma will translate into lower transfers.[26,27]

involve ideology– the sustainability of the Welfare State include Hassler et al. (2003) and Bénabou (2004).

[25] 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".

[26] For a model of redistribution with a related type of preference for fairness, see Alesina and Angeletos (2005). In the US context, a central role in the stigma associated with poverty and welfare recipiency is also played by racial stereotypes (Gilens (1999), Alesina et al. (2001)), a phenomenon from which we abstract here.

[27] A related mechanism arises when agents do not know the 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 θ. If the pivotal group maintains a BJW ideology ($\hat{\sigma} = \varnothing$), they will compute a higher estimate of x than if they are "pessimists" ($\hat{\sigma} = L$). They will then provide less transfers to those who failed, and the resulting lower required tax rate will again increase the incentive to maintain a Just-World outlook.

4.5 Propaganda

Our model is one where agents only influence their own and their children's beliefs, yet it also provides insights into society-wide propaganda and even an initial framework for a model of this phenomenon.

The pervasiveness of American-dream, land-of-opportunity "boosterism" in the media, education and culture of the United States throughout its history has been documented by many authors, most recently Hochschild (1996) and Alesina and Glaeser (2004). The latter also point to the converse role played by unions and the educational system in the dissemination of socialist ideas in Europe, to which one may add the influence of prominent "public intellectuals". At the same time, one can not simply view public beliefs as passively molded by a top-down supply of propaganda, as in the traditional Marxist explanation for American workers' "false consciousness". First, as seen earlier, this does not match the ethnographic evidence. Second, examples like the Soviet Union make clear that even a monopolistic, omnipresent stream of propaganda cannot durably sway minds in the face of a contradictory reality. This is a fortiori true in democratic, well-informed societies. For propaganda to work effectively, people must be *receptive* to it –it must serve some "need" that they consciously or unconsciously perceive. Indeed the puzzle in the historical US-Europe contrast has always been why Americans proved less amenable to socialist or populist doctrine than Europeans, and the latter less amenable to pro-market doctrine. A theory of political propaganda, like a theory of advertising or a theory of religion, should include the "demand side". Our model can be thought of in those terms, with the supply exogenously fixed.

Let us think, for instance, of "unjust-world" signals ($\sigma = L$) being periodically received by certain segments of society, and then systematically relayed to the whole population by left-wing parties or unions. The model then explains why, in a US-type BJW equilibrium, people would not want to listen to such messages, would try to dismiss them, keep them out of schools, etc., whereas in a European-type RP equilibrium they would be much more receptive. Conversely, if there periodically occur signals favorable to markets and individualism ($\sigma = H$, as discussed in the previous section), right-wing parties seeking to disseminate them would find an audience much more willing to listen to, rehearse and celebrate these stories in the US-type equilibrium than in the other. Given such *differential returns to left- and right-wing propaganda*, even a symmetric supply mechanism (and a fortiori one where the incumbent side had greater resources) would lead to a trans-Atlantic polarization of the dominant discourses.

Our model is also consistent with the evidence presented by Alesina and Glaeser (2004) in support of the view that it is political institutions (or their exogenous determinants) that drive ideology, while at the same time showing that this is perfectly compatible –and even complementary– with a reverse causal mechanism, from ideology to political outcomes. These authors first argue, based on political-economy arguments, that factors such as a majoritarian (rather than proportional) representation system, an ethnically heterogeneous population or a

larger land area make it easier for the right to be in power and block redistribution. They then show that in countries with such characteristics, larger fractions of the population indeed believe that individual effort determines economic outcomes, or that the poor are lazy. Taking as given that the above factors create a bias in the "political technology" in favor of the right, this is also what our model predicts. On Figure 5, an exogenous downward shift in the equilibrium tax locus (or, equivalently, a leftward shift in the critical λ^*, such as results from a political disenfranchisement of some of the poor, or an overrepresentation of the rich) typically leads to a shift in equilibrium beliefs that –depending on the initial configuration– makes a BJW equilibrium appear where previously there was only the RP one, or makes the RP one disappear when both existed. Note also that, as with skill-biased technological progress, this endogenous response of ideology (coming about through any combination of individual cognitive investments or changed receptivity to propaganda) is a much more important contributor to the final difference in policy than the initial exogenous variation.

5 Culture and religion as collective beliefs

5.1 Consumerist versus leisure-oriented societies

The model can also shed light on attitudinal differences, both within and across countries, concerning 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 view that, in modern societies, people excessively value material consumptions relative to "relational" ones such as family, friends, community service, etc. (e.g., Putnam (2000), Frank (2000)). Psychologists, in particular, point to phenomena such as the "hedonic treadmill" and people's general tendency to underestimate the speed at which their level of wellbeing will revert to a baseline level following both favorable and unfavorable life events. (Gilbert et al. (1998), Kahneman (2000)). While such "adaptation" has been found to operate on both changes in material consumption (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 or status goods at the expense of relational ones or self-development (e.g., Frey and Stutzer (2003)). Why it should be so, however, is typically not explained; we provide here a simple *motivated-beliefs* theory of this phenomenon.[28]

Consider the same model as before, but replacing θ in the production function (1) by a fixed, known return. Now, however, income y^i is an argument of a standard (indirect) utility function,

[28] Loewenstein, Rabin and O'Donoghue (2003) explore the implications of "projection bias" (consumers' failure to fully anticipate changes in their preferences) for several important issues such as the endowment effect, durable goods purchases and addiction. On the other hand, the myopic forecasting rule followed by individuals in their model is assumed a priori, and taken to apply equally to all sources of utility.

which for simplicity we again take to be linear. Thus, at date $t = 0, 1$ (and with $\beta_0 \equiv 1 > \beta \equiv \beta_1$ as before),

$$U_t^i \equiv E\left[\left(\frac{\theta}{P}\right)\left[(1-\tau)y^i + \tau\bar{y}\right] - \frac{\left(e^i\right)^2}{2a\beta_t}\middle|\,\Omega_t^i\right], \tag{27}$$

where θ is an imperfectly known preference parameter negatively related to the speed of hedonic adaptation and P a known price deflator: terms of trade, index of product variety or quality, etc. For simplicity, we abstract here from differences in initial endowments: $\pi_0 = \pi_1$. Redistributive concerns will nonetheless remain operative, due to agents' different perceived mobility prospects.

This model is clearly isomorphic to the previous one (with common π^i's), so under conditions very similar to those of Proposition 3 there are again two equilibria:

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

2. A leisure-oriented and redistributive equilibrium: the mechanism works in reverse here, with a majority or pivotal group holding more skeptical views about the value of "materialistic" pursuits and opting instead for leisure, family and social life, etc. Individuals in such societies work less both because of their different attitudes toward what makes one happy and because of the (endogenously) higher taxes that they face.

Thus, along these more "cultural" dimensions as well, our model fits the major dichotomy observed between the United States and Western European societies. The previous section's comparative statics results also carry over. In particular, an increase in productivity or in the *terms of trade* $X = 1/P$ can 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 Beliefs and affect

We have so far stressed the potential usefulness of beliefs in self-determination for the pursuit of long-term goals, using a model with conflicting ex-ante and ex-post preferences, whether intra- or intergenerational. This is an important motive, widely stressed by psychologists (for instance in the "self-efficacy" and "illusion of control" literatures), and familiar to all parents. But both psychologists (e.g., Lerner (1982)) and common observation suggest that many people also simply

derive comfort from thinking that they live in a just world.[29] Their sense of fairness may be offended if they believe personal 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 *affective* motives for just-world beliefs can easily be substituted for, or combined with, the *functional* one.

To see this, let us return to (2) and augment agents' utility at date $t = 0, 1$ as follows :

$$U_t^i \equiv E\left[(1-\tau)y^i + \tau\bar{y} - \frac{\left(e^i\right)^2}{2a\beta_t} + u((1-\tau)\theta(\mu^i))\middle|\,\Omega_t^i\right], \tag{28}$$

where $u' > 0$ and $\theta(\mu^i)$ is defined as before. In the effort term, $\beta_1 = \beta$ could now equal 1, as hyperbolic discounting is no longer needed. To demonstrate the *equivalence* between the two motives for cognitive manipulations, however, we allow any $\beta \leq 1$. In the anticipal-utility term, the key assumption is that agents at $t = 1$ derive satisfaction from holding positive views about the *net* return to effort $(1-\tau)\theta$, rather than just θ. This is more natural, as a world where θ is high but all the fruits of effort are taxed away would not be a very fair one. Together with the political mechanism, it again leads to a complementarity between agents' cognitive choices.

First, the more people believe that θ is high, the lower the equilibrium τ. Indeed, the anticipal term has no impact on effort decisions (conditional on τ and μ^i), so voters' utility at $t = 1$ remains the same as in (10), except for the addition of $u\left((1-\tau)\theta(\mu^i)\right)$ .This clearly reinforces the preexisting tendency for an agent's ideal tax rate τ^i to decline with his level of optimism μ^i. Second, on the cognitive side, an agent with $\sigma^i = L$ at $t = 0$ now solves

$$\max_{\lambda' \in [0,1]} \left\{\lambda'\left[\tilde{U}_L(\tau,0) + u((1-\tau)\theta_L)\right] + (1-\lambda')\left[\tilde{U}_L(\tau,r) + u((1-\tau)\theta(r))\right] - M(\lambda')\right\}, \tag{29}$$

where $\tilde{U}_L$ is still given by (14). The difference $\tilde{U}_L(\tau,r) - \tilde{U}_L(\tau,0)$ is the previously studied motivational incentive to manipulate awareness. Affective concerns create a further incentive $u((1-\tau)\theta(r)) - u((1-\tau)\theta_L)$, which also rises with $1-\tau$ provided u is not too concave:[30] the lower the tax rate, the more satisfying it will be, at $t = 1$, to believe that θ is high. In particular, with $u(c) \equiv \rho c^2/2$ the overall incentive to suppress bad news (gross of the required costs) becomes

$$(1-\tau)^2 r(\Delta\theta)\left(\frac{\beta a \theta_L}{2}\right)\left[1 + \left(\frac{\rho}{\beta a} - \beta\right)\left(1 + \frac{r\Delta\theta}{2\theta_L}\right)\right]. \tag{30}$$

The anticipal-utility coefficient ρ thus plays essentially the *same role,* in determining the demand for just-world beliefs, as the degree of time inconsistency $1-\beta$. In particular, even when $\beta = 1$

[29] On may point for instance to fiction and movie endings –especially the prototypical "Hollywood ending". For an insightful discussion of "the mind as a consuming organ", including applications to literature and the arts, see Schelling (1988). Recent models of anticipal feelings include Caplin and Leahy (2001), Landier (2000), Köszegi (2004) and Brunnermeier and Parker (2004).

[30] It suffices that the coefficient of relative risk aversion, $-cu''(c)/u'(c)$, be less than 1. This includes the case where u is linear, so our results do not depend on any nonlinear transformation of the probabilities $(\mu_i, 1-\mu_i)$.

there is a positive incentive to engage in belief manipulation (to be traded off against the marginal cost m), as long as ρ is above some minimum value.

5.3 A simple theory of religion

The most common and powerful of form of individually chosen but collectively sustained belief is religion. A simple extension of the model allows us to analyze individual and cross-country differences in a specific but economically important class of religious beliefs, namely those linked (or similar) to the "Protestant ethic". By this we refer to a belief that there is a hereafter in which rewards and punishments will be determined according to effort and industriousness (or lack thereof) during one's lifetime.[31] The alternative view is that there is most likely no afterlife, or that if there is one, its rewards are determined according to criteria unrelated to industriousness, or even antithetical to material success: vows of poverty and asceticism, good deeds towards others, scrupulous observance of rituals, contemplation, the "extinction of desires", etc. Uncertainty over the likelihood or nature of divine rewards (and punishments) can be simply modelled as follows:

a) In the production function, let θ be replaced by a fixed return, $\alpha \geq 1$. Thus, everyone agrees on the nature of *economic* processes (rewards in the material world).

b) Preferences involve no time-inconsistency ($\beta = 1$) but include an anticipal term for the *"value of the afterlife"*, $u(e, \theta)$, about which agents are uncertain.[32]

Without loss of generality let $u(e, \theta) = \theta e$, where $\theta_H > \theta_L$ are now the two possible (expected) values of θ, conditional on $\sigma = \varnothing, L$.[33] An agent's preferences at $t = 0, 1$ are thus

$$U_t^i \equiv E\left[(1-\tau)y^i + \tau\bar{y} - \frac{\left(e^i\right)^2}{2a} + \theta(\mu^i)e^i \middle| \Omega_t^i\right], \tag{31}$$

where $\theta(\mu^i) = \mu^i\theta_H + (1-\mu^i)\theta_L$ reflects the strength of his religious faith at $t = 1$. Note that the policy variable $1-\tau$ no longer enters the anticipal term; yet an endogenous complementarity in belief formation will still arise, though now through a more subtle channel:

– The more religious an individual is, the harder he works. Therefore the lower he wants taxes to be, so as to avoid redistributing income towards less hard-working "unbelievers". (By

[31] Our purpose is of course not to delve into the details of different doctrines. We will just observe that effort and industriousness could yield rewards in the hereafter either because they are "good" per se, or because they signal a characteristic specific to the "chosen" (see Ainslie (1992) for a discussion of this idea originating with Weber, and Bodner and Prelec (2002) and Bénabou and Tirole (2004) for models of self-signaling). For discussions of the literature on religion and economics see Iannaconne (1998), Guiso et al. (2002) and Noland (2003).

[32] We set $\beta = 1$ here only for simplicity and to make clear that the mechanism explored in this section does not require any intrapersonal or intergenerational conflict. In fact, religion is also largely a self-discipline mechanism, and this can easily be captured in our model, by allowing $\beta < 1$. We leave this extension to future work.

[33] Among the types of negative signals $\sigma = L$ that believers in a religion R may now receive are scientific advances that contradict traditional teachings, immoral conduct by religious officials, personal tragedies and injustices in the world (e.g., wars, genocides, natural disasters) that challenge one's faith, or the fact that believers in some other religion R' are more numerous or growing in numbers.

contrast, μ^i no longer affects the tax-distortion concern, as α is common knowledge.) Thus, a greater proportion of religious individuals leads (over the relevant range where the pivotal vote switches) to a lower degree of redistribution.

– Conversely, the anticipation of a low tax rate increases the value of investing in (or transmitting) religious beliefs**.** If a person expects to work hard because of low redistribution, then believing that effort carries important rewards in the afterlife will result in high anticipatory utility. If he expects to work little, on the other hand (because of high taxes or personal tastes) then fervent religious beliefs are not very welfare-enhancing.

Therefore, under appropriate conditions, we can again expect two equilibria:

1. A high-religiosity / "Protestant work ethic" equilibrium, accompanied by high effort and low redistribution.

2. An equilibrium characterized by a greater predominance of *agnosticism,* or of religions that *do not* stress industriousness and worldly achievements, accompanied by the reverse pattern of labor supply and redistributive policy.

To highlight the role of differences in religiosity, we shall establish these results in the simple case where there are no ex-ante disparities in endowments or social status among agents: $\pi_0 = \pi_1$ (more generally, $\pi_1 - \pi_0$ is relatively small). We also require a certain joint condition on the exogenous parameters of the model, given in the Appendix (Assumption 5); it holds in particular when $\underline{\lambda}$ and $\bar{\lambda}$ are close enough to 1/2.

Given the preferences (31), an agent with belief μ^i chooses effort $e^i = a\left[(1-\tau)\alpha + \theta(\mu^i)\right]$ and his expectation of aggregate output is $\bar{y} = \bar{\pi} + a\left[(1-\tau)\alpha + \Theta(\mu^i)\right]$, where

$$\Theta(\mu^i) \equiv \mu^i\theta(r) + (1-\mu^i)\left[\lambda\theta_L + (1-\lambda)\theta(r)\right]$$

is his estimate of others' average belief in the afterlife. The resulting expected utility from a tax rate τ is then

$$V(\tau, \mu^i) \equiv (a/2)\left[(1-\tau)\alpha + \theta(\mu^i)\right]^2 + a\tau\left[(1-\tau)\alpha + \Theta(\mu^i)\right], \tag{32}$$

resulting in the preferred policy

$$\tau^i \equiv \min\left\{\frac{\Theta(\mu^i) - \theta(\mu^i)}{\alpha}, 1\right\}. \tag{33}$$

Intuitively, believers expect to work hard and thus want regressive taxation (or, if that is ruled out, laissez faire, $\tau^i = 0$), whereas nonbelievers are in favor of progressive redistribution. With only two classes of agents, the political equilibrium is very simple. In the no-information state ($\sigma = \varnothing$), agents all share the same beliefs and the tax rate is $T_{opt}(\underline{r}) = -\lambda r(1-r)\left(\Delta\theta/\alpha\right)$ (again, nonnegative values could be ensured by introducing a public good). In the more interesting informative state, $\sigma = L$, there are $1-\lambda$ believers with $\mu^i = r$ and λ non-believers with $\mu^i = 0$;

so, once again, the tax rate jumps up when λ exceeds a critical threshold:

$$\tau = \begin{cases} T_{opt}(r) & \equiv & -\lambda r(1-r)\left(\Delta\theta/\alpha\right) < 0 & \text{if } \lambda \leq 2 \\ T_{pess}(r) & \equiv & \min\left\{r(1-\lambda)\left(\Delta\theta/\alpha\right), 1\right\} > 0 & \lambda > 1/2 \end{cases} . \tag{34}$$

Consider now individuals' incentives to maintain and instill in their children strong religious beliefs (of the type that we focus on). Given a signal $\sigma = L$, the difference in expected utility between a believer and a nonbeliever is

$$V(\tau, r) - V(\tau, 0) = ar\left(\Delta\theta\right)\left[(1-\tau)\alpha + \theta_L + r\left(\Delta\theta/2\right) + \tau r\lambda\right]. \tag{35}$$

The important property to notice is that (since $\alpha \geq 1$) it is again increasing in $1-\tau$, even though taxes bear only on α, which is known, whereas religious beliefs are about θ.

Proposition 4 *Let $\beta = 1$, $\pi_0 = \pi_1$ and let the productivity of effort be a fixed, known, $\alpha \geq 1$. Assume also that Assumptions 2 and 5 hold. Then, for a range of values of m (and all m' large enough) there exist two politico-religious equilibria, such that:*
1) In the informative state ($\sigma = L$), the fractions of believers are $1-\underline{\lambda}$ and $1-\bar{\lambda}$ and the tax rates $\underline{\tau}$ and $\bar{\tau}$, given by (34). Redistribution is lower, average effort and output higher, in the more religious equilibrium.
2) In the no-information state ($\sigma = \varnothing$), the rankings of tax rates, effort and output across the two equilibria depend on parameters. If χ is low enough, in particular, there exist values of $\underline{\lambda}$ and $\bar{\lambda}$ such that these rankings remain the same as in the informed state.

Our model thus provides a simple theory of endogenous differences in religious beliefs, resolving in the process earlier discussions of whether religion can be brought within the scope of the economics of information and of its relationship to cognitive dissonance or other forms of belief adaptation (Montgomery (1996), Hardin (1997)). Furthermore, its predictions about the main economic correlates of religiosity accord well with a considerable body of evidence:

– At the *individual* level, studies universally find that more religious individuals, and particularly Protestants, have less favorable attitudes towards redistribution than others and are more tolerant of inequality (e.g., Alesina et al. (2001), Guiso et al. (2001)).

– At the *cross-country* level, Barro and Mc.Cleary (2003) find that a country's degree of religiosity –more specifically, the prevalence of beliefs in an afterlife characterized by heaven or hell– is associated with faster growth, controlling for the usual determinants (see also Noland (2003) for related results).

Naturally, this equilibrium model of religion is excessively simple. This same simplicity, however, makes it possible to extend it in several relevant directions. First, one could explore channels of general-equilibrium feedback other than that of redistributive institutions, which we have highlighted. Second, letting $\beta < 1$ would allow us to capture religion's important

role as a self-discipline device. Third, one could allow for uncertainty over rewards *both* in this world and in the next (or the latter's existence), namely over α and θ, and examine when these two sets of beliefs are *substitutes or complements.*[34] Indeed, many studies find a positive correlation between individuals' religiosity, particularly the Protestant ethic, and their scores on a BJW-scale (Peplau and Tyler (1975)), which in turn are important mediators of their opposition to redistributive policies. Similarly, using the World Values Survey and controlling for individuals' socioeconomic characteristics, Guiso et al. (2002) find that being religious has a positive association with believing that success *in life* depends more on hard work than on luck and circumstances, that poverty is attributable to laziness, that some inequality is needed to provide incentives for effort, and the like. On the other hand, one notes that Scandinavian countries share with the US a prevalence of Protestantism, but almost opposite views about the determinants of individuals' economic fate (Alesina and Glaeser (2004)).

6 Conclusion

Is the "American dream," according to our theory, but myth, 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 generally involve more reality distortion –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.[35] Furthermore, this shared ideology can have important growth and ex-ante welfare benefits, including improving individuals' 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.

More generally, our model provides a *theory of collective beliefs,* based on endogenous complementarities between individuals' cognitive choices that arise very naturally from the interplay of well-established psychological motives and economic rationality. This simple blueprint is applicable to a wide domain of beliefs and biases, such as pro- or anti-redistributive ideology, consumerist versus leisurist views on happiness, and even religion, all of which were examined here. Many others interesting ones, such as organized propaganda, seem within the reach of further research.

[34] Our model already suggests channels for both complementarity and substitutability. On one hand, if an individual expects to work hard because he believes that the worldly return to effort is high, he has a greater incentive to also believe that effort will be rewarded in the next world. On the other hand, if he anticipates working hard for religious reasons he may have (when $\beta < 1$) less self-motivational need to engage in positive thinking about the economic rewards to effort. These two effects could in principle produce a correlation of either sign between ideological and religious beliefs, depending on which parameter (e.g., the need for motivation vs. the opportunity costs of religiosity) is varied. The general-equilibrium effect of redistribution on belief formation, on the other hand, will tend to move both in the same direction.

[35] 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.

Appendix

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

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

1) Proof of concavity: we have

$$\frac{\partial^2 V^i}{\partial \tau^2} = a\beta\left[(2-\beta/\gamma)\,\theta(\mu^i)^2 - 2\Gamma(\mu^i)\right],$$

so the function V^i is concave in τ if $(2-\beta/\gamma)\,\theta(\mu^i)^2 < 2\Gamma(\mu^i)$, meaning that:

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

Since the difference between the left- and right-hand sides is quadratic and convex in μ^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 $(2-\beta/\gamma)\,(\theta_L)^2 < 2\theta_L\left[\lambda\theta_L + (1-\lambda)\theta(r)\right]$, which trivially holds. For $\mu^i = r$, we require that:

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

Since $r(1-r) \leq 1/4$, this is ensured by Assumption 1(i). ‖

We now rank agents' preferred tax rates, as functions of their endowments and beliefs.

2) Proof that $T_{opt}(\pi_0) < T_{pess}(\pi_0)$: By (11), for any π we have $T_{opt}(\pi) < T_{pess}(\pi)$ if and only if:

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

which is equivalent to:

$$\left(\frac{\bar{\pi} - \pi}{a\beta}\right)\left[\left(2 - \frac{\beta}{\gamma}\right)(\theta(r)^2 - \theta_L^2) - 2\left(\Gamma(r) - \Gamma(0)\right)\right] < \left(2 - \frac{\beta}{\gamma}\right)\left[\theta(r)^2\Gamma(0) - \theta(0)^2\Gamma(r)\right]. \tag{A.3}$$

Now, note that:

$$\begin{aligned}\Gamma(r)-\Gamma(0) &= \theta(r)^2-\theta_L^2-\lambda(1-r)\theta_L(\theta(r)-\theta_L)-(1-\lambda)\theta_L(\theta(r)-\theta_L)\\ &= r\left(\Delta\theta\right)\left[\theta(r)+\theta_L-(1-\lambda r)\theta_L\right]=r\left(\Delta\theta\right)\left[(1+\lambda r)\theta_L+r\left(\Delta\theta\right)\right] \quad \text{(A.4)}\end{aligned}$$

and that:

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

which implies in particular that $\theta(r)^2/\Gamma(r)>\theta(0)^2/\Gamma(0)$. Thus, condition (A.3) takes the form:

$$\begin{aligned}\left(2-\frac{\beta}{\gamma}\right)\theta_L\left[(1-\lambda)\theta(r)^2+\lambda(1-r)\theta_L^2\right] &> \left[\left(2-\frac{\beta}{\gamma}\right)(\theta(r)+\theta_L)-2(1+\lambda r)\theta_L-2r\left(\Delta\theta\right)\right]\left(\frac{\bar\pi-\pi}{a\beta}\right)\\ &= \left[\left(2-\frac{\beta}{\gamma}\right)(2\theta_L+r\left(\Delta\theta\right))-2(1+\lambda r)\theta_L-2r\left(\Delta\theta\right)\right]\left(\frac{\bar\pi-\pi}{a\beta}\right)\\ &= \left[2\left(1-\lambda r-\frac{\beta}{\gamma}\right)\theta_L-\left(\frac{\beta}{\gamma}\right)r\left(\Delta\theta\right)\right]\left(\frac{\bar\pi-\pi}{a\beta}\right). \quad \text{(A.6)}\end{aligned}$$

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 $\bar\pi-\pi_0>0$. Assume therefore that the said term in brackets is positive. Since $\left(\bar\pi-\pi_0\right)/a\beta<\theta_L^2$ by Assumption 1(ii) and $\theta(r)\geq\theta_L$, a sufficient condition for (A.6) to hold with $\pi=\pi_0$ is

$$\begin{aligned}\left(2-\frac{\beta}{\gamma}\right)\theta_L(1-\lambda r)-2\left(1-\lambda r-\frac{\beta}{\gamma}\right)\theta_L+\left(\frac{\beta}{\gamma}\right)r\Delta\theta &> 0 \iff\\ \left(-\frac{\beta}{\gamma}\right)\theta_L(1-\lambda r)-2\left(-\frac{\beta}{\gamma}\right)\theta_L+\left(\frac{\beta}{\gamma}\right)r\Delta\theta &> 0 \iff \theta_L\left(1+\lambda r\right)+r\Delta\theta>0,\end{aligned}$$

hence the result. ‖

3) Proof that $T_{pess}(\pi_0)<1$: by (11), this is equivalent to

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

for which it is sufficient that $\bar\pi-\pi_0<\beta a\theta_L^2$, which is ensured by Assumption 1(ii). ‖

4) Proof that $T_{opt}(\pi_1)<0$: by (11), this is equivalent to:

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

which holds automatically since $\theta(r)^2>\Gamma(r)$ by (A.1). ‖

5) Proof that $T_{pess}(\pi_0) > 0$, when $(\bar{\pi} - \pi_0)/a\beta > (1 - \beta/\gamma)\theta_L^2$. 1. By (11), $T_{pess}(\pi_0) > 0$ if

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

hence the result. ‖

6) Proof that agents i's preferred tax rate is $T_{pess}(\pi^i)$ or $T_{opt}(\pi^i)$, depending on $\hat{\sigma}^i = L, \varnothing$: by concavity of V^i, we have $\tau^i = \min\left\{T(\pi^i, \mu^i), 1\right\}$.(If τ was constrained to be nonnegative, we would have instead $\tau^i = \max\left\{\min\left\{T(\pi, \mu^i), 1\right\}, 0\right\}$; this would make little difference to the results). Furthermore, we have established that: $T_{opt}(\pi_1) \leq T_{opt}(\pi_0) < T_{pess}(\pi_0) < 1$ and $T_{pess}(\pi_1) \leq T_{pess}(\pi_0)$,where the inequalities are strict whenever $\pi_0 < \pi_1$. Thus $T_{pess}(\pi_0)$ is the largest desired tax rate and the constraint $\tau^i \leq 1$ is never binding in equilibrium. ■

Proof of Proposition 2 . We can write

$$\begin{aligned}
\bar{\tau} - \underline{\tau} &\equiv T_{pess}(\pi_0\,|\bar{\lambda}, \bar{r}) - T_{opt}(\pi_0\,|\underline{\lambda}, \underline{r}) \\
&= \frac{\pi_0 - \bar{\pi} + a\beta\Gamma(\underline{r}\,|\underline{\lambda}, \underline{r})}{a\beta\left[2\Gamma(\underline{r}\,|\underline{\lambda}, \underline{r}) - (2 - \beta/\gamma)\,\theta(\underline{r})^2\right]} - \frac{\pi_0 - \bar{\pi} + a\beta\Gamma(0\,|\bar{\lambda}, \bar{r})}{a\beta\left[2\Gamma(0\,|\bar{\lambda}, \bar{r}) - (2 - \beta/\gamma)\,\theta(0)^2\right]} \\
&= \Pi_1 + \left(\frac{\bar{\pi} - \pi_0}{a\beta}\right)\Pi_2,
\end{aligned}$$

where

$$\Pi_1 \equiv \frac{1}{2 - (2 - \beta/\gamma)\,\theta(\underline{r})^2/\Gamma(\underline{r}\,|\underline{\lambda}, \underline{r})} - \frac{1}{2 - (2 - \beta/\gamma)\,\theta(0)^2/\Gamma(0\,|\bar{\lambda}, \bar{r})}, \tag{A.7}$$

$$\Pi_2 \equiv \frac{1}{2\Gamma(0\,|\bar{\lambda}, \bar{r}) - (2 - \beta/\gamma)\,\theta(0)^2} - \frac{1}{2\Gamma(\underline{r}\,|\underline{\lambda}, \underline{r}) - (2 - \beta/\gamma)\,\theta(\underline{r})^2}. \tag{A.8}$$

We now show that $\Pi_1 > 0$ and, under Assumption 3(ii), $\Pi_2 > 0$. First, $\Pi_1 > 0$ if and only if

$$\begin{aligned}
\theta(\underline{r})^2\Gamma(0\,|\bar{\lambda}, \bar{r}) &> \theta(0)^2\Gamma(\underline{r}\,|\underline{\lambda}, \underline{r}) \iff \\
\theta(\underline{r})^2\Gamma(0\,|\underline{\lambda}, \underline{r}) - \theta(0)^2\Gamma(\underline{r}\,|\underline{\lambda}, \underline{r}) &> \theta(\underline{r})^2\left[\Gamma(0\,|\underline{\lambda}, \underline{r}) - \Gamma(0\,|\bar{\lambda}, \bar{r})\right].
\end{aligned}$$

By (A.5) and (9), this is equivalent to:

$$\begin{aligned}
\underline{r}\theta_L\,(\Delta\theta)\left[(1 - \underline{\lambda})\theta(\underline{r})^2 + \underline{\lambda}(1 - \underline{r})\theta_L^2\right] &> \theta(\underline{r})^2\theta_L\left[\underline{\lambda}\theta_L + (1 - \underline{\lambda})\theta(\underline{r}) - \bar{\lambda}\theta_L - (1 - \bar{\lambda})\theta(\bar{r})\right] \iff \\
\underline{r}\left[(1 - \underline{\lambda})\theta(\underline{r})^2 + \underline{\lambda}(1 - \underline{r})\theta_L^2\right] &> \theta(\underline{r})^2\left[(1 - \underline{\lambda})\underline{r} - (1 - \bar{\lambda})\bar{r}\right],
\end{aligned}$$

or, equivalently, $\underline{r}\,\underline{\lambda}(1 - \underline{r})\theta_L^2 + (1 - \bar{\lambda})\bar{r}\theta(\underline{r})^2 > 0$, proving that Proposition 2 always holds when $\pi_0 = \bar{\pi} = \pi_1$. Next, $\Pi_2 > 0$ if and only if

$$2\left[\Gamma(\underline{r}\,|\underline{\lambda},\underline{r})-\Gamma(0\,|\bar{\lambda},\bar{r})\right]>(2-\beta/\gamma)\left[\theta(\underline{r})^2-\theta(0)^2\right]\iff$$

$$2\left[\Gamma(0\,|\underline{\lambda},\underline{r})-\Gamma(0\,|\bar{\lambda},\bar{r})\right]+2\left[\Gamma(\underline{r}\,|\underline{\lambda},\underline{r})-\Gamma(0\,|\underline{\lambda},\underline{r})-\left(\theta(\underline{r})^2-\theta(0)^2\right)\right]+(\beta/\gamma)\left[\theta(\underline{r})^2-\theta(0)^2\right]>0.$$

Using (9) to compute the first term and the the first line of (A.4) for the second one, this becomes

$$2\theta_L\left(\Delta\theta\right)\left[(1-\underline{\lambda})\underline{r}-(1-\bar{\lambda})\bar{r}\right]-2\left[\underline{\lambda}(1-\underline{r})+1-\lambda\right]\theta_L(\theta(\underline{r})-\theta_L)+(\beta/\gamma)\left[\theta(\underline{r})^2-\theta(0)^2\right]>0,$$

or:

$$\begin{aligned}2\theta_L\left(\Delta\theta\right)\left\{\underline{r}\left[\underline{\lambda}(1-\underline{r})+1-\lambda\right]-(1-\underline{\lambda})\underline{r}+(1-\bar{\lambda})\bar{r}\right\} &< (\beta/\gamma)\left[\theta(\underline{r})^2-\theta(0)^2\right]\iff\\ 2\theta_L\left(\Delta\theta\right)\left[\underline{\lambda}\,\underline{r}(1-\underline{r})+(1-\bar{\lambda})\bar{r}\right] &< (\beta/\gamma)\,\underline{r}\left(\Delta\theta\right)\left[2\theta_L+\underline{r}\left(\Delta\theta\right)\right].\end{aligned}$$

We can rewrite this as

$$\frac{\beta}{\gamma}>\frac{\underline{\lambda}\,\underline{r}(1-\underline{r})+(1-\bar{\lambda})\bar{r}}{\underline{r}[1+\underline{r}\left(\Delta\theta\right)/\left(2\theta_L\right)]}=\frac{\underline{r}(1-\underline{\lambda r})}{\underline{r}[1+\underline{r}\left(\Delta\theta\right)/\left(2\theta_L\right)]}+\frac{\bar{r}(1-\bar{\lambda})-\underline{r}\left(1-\underline{\lambda}\right)}{\underline{r}[1+\underline{r}\left(\Delta\theta\right)/\left(2\theta_L\right)]}.\tag{A.9}$$

From (17) we see that $r(1-\lambda)$ is increasing in $1-\lambda$, hence the last term in (A.9) is negative and the inequality therefore holds under Assumption 3(ii). ■

Proof of Proposition 3. In addition to Assumptions 1–3, the proposition requires

Assumption 4 *Denoting* $\tilde{r}\equiv\underline{r}$ *if* $\bar{\lambda}=1$ *and* $\tilde{r}\equiv\bar{r}$ *if* $\bar{\lambda}<1$, *let*

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

We now proceed to show the claimed results.

1. Informative state ($\sigma=L$). Let us examine the incentive to repress (gross of memory costs):

$$\begin{aligned}\tilde{U}_L(\tau,r)-\tilde{U}_L(\tau,0) &= a\beta(1-\tau)^2\theta_L\left(\theta(r)-\theta_L\right)-a\beta^2(1-\tau)^2\left(\frac{\theta(r)^2-\theta_L^2}{2}\right)\\ &= a\beta(1-\tau)^2\left(\theta_H-\theta_L\right)r\left[(1-\beta)\theta_L-\beta r\left(\frac{\Delta\theta}{2}\right)\right].\end{aligned}\tag{A.10}$$

The required equilibrium conditions are therefore that:

$$\beta\underline{r}\left(\frac{\Delta\theta}{2}\right)<(1-\beta)\theta_L\tag{A.11}$$

$$(1-\bar{\tau})^2\bar{r}\left[(1-\beta)\theta_L-\beta\bar{r}\left(\frac{\Delta\theta}{2}\right)\right]<(1-\underline{\tau})^2\underline{r}\left[(1-\beta)\theta_L-\beta\underline{r}\left(\frac{\Delta\theta}{2}\right)\right].\tag{A.12}$$

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

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

Thus, the two requirements jointly take the following form:

$$\left(\frac{\Delta\theta}{2\theta_L}\right)\underline{r} < \frac{1-\beta}{\beta} < \left(\frac{\Delta\theta}{2\theta_L}\right)\left(\bar{r}+\underline{r}\right), \tag{A.13}$$

which is ensured by Assumption 4 since $\underline{r} \leq \tilde{r}$. Finally, when $\bar{\lambda} < 1$ we also need to check that no agent want to rehearse bad news: $\tilde{U}_L(\bar{\tau},\bar{r}) - \tilde{U}_L(\bar{\tau},0) > -m'$. This condition is satisfied when m' is large enough, and even for all $m' > 0$ provided that

$$\bar{r}\left(\frac{\Delta\theta}{2}\right) < \left(\frac{1-\beta}{\beta}\right)\theta_L, \tag{A.14}$$

which is ensured by Assumption 4, since $\tilde{r} \equiv \bar{r}$ when $\bar{\lambda} < 1$. This establishes the existence of the two equilibria. Consider now aggregate output. In an equilibrium (λ, r),

$$\bar{y}_L = \bar{\pi} + a\beta\theta_L(1-\tau)\left[\theta_L + r(1-\lambda)\left(\Delta\theta\right)\right]. \tag{A.15}$$

Since $\underline{\tau} < \bar{\tau}$ and $(1-\underline{\lambda})\underline{r} > (1-\bar{\lambda})\bar{r}$ by (17), $\bar{y}_L$ is always higher in the BJW equilibrium.

2. Uninformative state ($\sigma = \varnothing$). Recall that we focus here on the case where $\pi_1 = \pi_0$ and χ is small (more generally, $\pi_1 - \pi_0 << \chi << 1$). As $\chi \approx 0$,

$$r = \frac{q}{q+\chi(1-q)(1-\lambda)} \approx 1 - \chi(1-\lambda)\left(\frac{1-q}{q}\right), \tag{A.16}$$

so by (A.1)

$$\begin{aligned}\Gamma(r)/\theta(r)^2 &= 1-\lambda(1-r)\left[\theta(r)-\theta_L\right]\left(\frac{\theta_L}{\theta(r)^2}\right) = 1-\lambda r(1-r)\left(\frac{\theta_L\Delta\theta}{\theta(r)^2}\right)\\ &\approx 1+\chi\lambda(1-\lambda)\left(\frac{1-q}{q}\right)\left(\frac{\theta_L\Delta\theta}{\theta_H^2}\right) \equiv 1+\chi\lambda(1-\lambda)\xi,\end{aligned}$$

where the last equality defines the parameter ξ. Therefore, given $\pi_1 = \pi_0$,

$$1 - T_{opt}(\pi_0) = \frac{1}{2-(2-\beta/\gamma)\,\theta(r)^2/\Gamma(r)} \approx \left(\frac{\gamma}{\beta}\right)\left[1+(2\gamma/\beta-1)\chi\lambda(1-\lambda)\xi\right].$$

Therefore, we have $T_{opt}(\pi_0\,|\underline{\lambda},\underline{r}) < T_{opt}(\pi_0\,|\bar{\lambda},\bar{r})$ if and only if $\bar{\lambda}(1-\bar{\lambda}) < \underline{\lambda}(1-\underline{\lambda})$,which is compatible with the other assumptions listed Proposition 3. Turning now to aggregate output, in an equilibrium (λ, r) it is given by

$$\frac{\bar{y}_\varnothing - \bar{\pi}}{a\beta\theta_H} = (1-\tau)\left[\theta_L + r\left(\Delta\theta\right)\right] = \left[1 - T_{opt}(\pi_0)\right]\left[\theta_L + r\left(\Delta\theta\right)\right]$$

$$
\begin{aligned}
&\approx \left(\frac{\gamma}{\beta}\right)\left[1+\left(\frac{2\gamma}{\beta}-1\right)\chi\lambda(1-\lambda)\xi\right]\theta_H\left[1-\chi(1-\lambda)\left(\frac{1-q}{q}\right)\left(\frac{\Delta\theta}{\theta_H}\right)\right]\\
&\approx \left(\frac{\gamma\theta_H}{\beta}\right)+\chi\left(\frac{\gamma\theta_H}{\beta}\right)\left[\left(\frac{2\gamma}{\beta}-1\right)\lambda(1-\lambda)\xi-(1-\lambda)\left(\frac{1-q}{q}\right)\left(\frac{\Delta\theta}{\theta_H}\right)\right]\\
&= \left(\frac{\gamma\theta_H}{\beta}\right)+\chi\left(\frac{\gamma\theta_H}{\beta}\right)\left(\frac{1-q}{q}\right)\left(\frac{\Delta\theta}{\theta_H}\right)(1-\lambda)\left[\left(\frac{2\gamma}{\beta}-1\right)\left(\frac{\theta_L}{\theta_H}\right)\lambda-1\right]
\end{aligned}
$$

Therefore, we have $\bar{y}_{\varnothing}(\underline{\lambda},\underline{r})>\bar{y}_{\varnothing}(\bar{\lambda},\bar{r})$ if and only if

$$
\begin{aligned}
&(1-\underline{\lambda})\left[\left(\frac{2\gamma}{\beta}-1\right)\left(\frac{\theta_L}{\theta_H}\right)\underline{\lambda}-1\right]-(1-\bar{\lambda})\left[\left(\frac{2\gamma}{\beta}-1\right)\left(\frac{\theta_L}{\theta_H}\right)\bar{\lambda}-1\right]\\
=\ &(\bar{\lambda}-\underline{\lambda})\left[\left(\frac{2\gamma}{\beta}-1\right)\left(\frac{\theta_L}{\theta_H}\right)(\bar{\lambda}+\underline{\lambda}-1)-1\right]>0,
\end{aligned}
$$

or, finally

$$
\left(\frac{2\gamma}{\beta}-1\right)\left(\frac{\theta_L}{\theta_H}\right)(\bar{\lambda}+\underline{\lambda}-1)>1, \tag{A.17}
$$

which again is compatible with the other assumptions, provided we are in the case $\gamma=1$ and β is low enough. In particular, it must be below $2/3$. ■

Proof of Proposition 4 . As usual, let $\underline{r}$ and $\bar{r}$ denote the optimistic posterior beliefs associated to awareness rates $\underline{\lambda}$ and $\bar{\lambda}$ respectively. We shall require that

Assumption 5 *Let (i)* $\underline{\lambda}<1/2<\bar{\lambda}\leq 1$ *and (ii) assume that*

$$
\frac{\bar{r}^2\left(1-\bar{\lambda}\bar{r}/\alpha\right)\min\left\{1-\bar{\lambda},\alpha/(\bar{r}\Delta\theta)\right\}+\underline{r}^2\left(1-\lambda\underline{r}/\alpha\right)(1-\underline{r})\underline{\lambda}}{\bar{r}-\underline{r}}>\frac{\alpha+\theta_L}{\Delta\theta}+\frac{\bar{r}+\underline{r}}{2}. \tag{A.18}
$$

Note that when $\underline{\lambda}$ and $\bar{\lambda}$ tend towards $1/2^-$ and $1/2^+$ respectively $\underline{r}$ and $\bar{r}$ tend to a common limit $r^*(1/2;\chi)$, so the left-hand side tends towards $+\infty$ while the right-hand side remains finite, implying that condition is automatically satisfied.

We now prove the proposition. The low-recall equilibrium ($\lambda=\underline{\lambda},\tau=\underline{\tau}$) exists if and only if

$$
\begin{aligned}
m &< V(\tau,\underline{r})-V(\tau,0)=a\underline{r}\left(\Delta\theta\right)\left[(1-\underline{\tau})\alpha+\theta_L+\underline{r}\left(\Delta\theta\right)/2+\underline{\tau}\,\underline{r}\,\underline{\lambda}\right],\ \text{where}\\
\underline{\tau} &= T_{opt}(\underline{r})=-\underline{\lambda}\underline{r}(1-\underline{r})\left(\Delta\theta\right)/\alpha
\end{aligned}
$$

Similarly, the high-recall equilibrium ($\lambda=\bar{\lambda},\tau=\bar{\tau}$) exists if and only if

$$
\begin{aligned}
m &> V(\tau,\bar{r})-V(\tau,0)=a\bar{r}\left(\Delta\theta\right)\left[(1-\bar{\tau})\alpha+\theta_L+\bar{r}\left(\Delta\theta\right)/2+\bar{\tau}\,\bar{r}\,\bar{\lambda}\right]>-m',\ \text{where}\\
\bar{\tau} &= T_{pess}(\bar{r})=\min\left\{\bar{r}(1-\bar{\lambda})\left(\Delta\theta\right)/\alpha,1\right\}.
\end{aligned}
$$

The necessary and sufficient conditions for multiplicity are therefore that

$$
\bar{r}\left[(1-\bar{\tau})\alpha+\theta_L+\bar{r}\left(\Delta\theta\right)/2+\bar{\tau}\bar{r}\bar{\lambda}\right]<\underline{r}\left[(1-\underline{\tau})\alpha+\theta_L+\underline{r}\left(\Delta\theta\right)/2+\underline{\tau}\,\underline{r}\,\underline{\lambda}\right], \tag{A.19}
$$

and that m' be large enough. The above condition can be rewritten as

$$(\bar{r}-\underline{r})\left[\alpha+\theta_L+(\Delta\theta)\left(\bar{r}+\underline{r}\right)/2\right]<\bar{r}\,\bar{\tau}\left(\alpha-\bar{\lambda}\bar{r}\right)-\underline{r}\,\underline{\tau}\left(\alpha-\lambda\underline{r}\right).$$

Substituting in $\bar{\tau}$ and $\underline{\tau}$ yields the result, by Assumption 5(ii). Next, note that output in state $\sigma = L$ equals

$$\bar{y}_L=\bar{\pi}+a\left[(1-\tau)\alpha+\theta_L+(1-\lambda)r(\Delta\theta)\right].$$

Since $\underline{\tau}<\bar{\tau}$ and $(1-\underline{\lambda})\underline{r}>(1-\bar{\lambda})\bar{r}$ by (17), $\bar{y}_L$ is higher in the more religious equilibrium.

Consider now the no-information state, in which agents' uniformly shared beliefs are $\theta(\underline{r})$ and $\theta(\bar{r})$ respectively, with $\theta(\underline{r})<\theta(\bar{r})$, while taxes are $T_{opt}(\underline{r})$ and $T_{opt}(\bar{r})$. Since $T_{opt}(r)=-\lambda r(1-r)\left(\Delta\theta\right)/\alpha$, (A.16) implies that when χ is small taxes in state $\sigma=\varnothing$ are also lower under the more religious equilibrium if $\bar{\lambda}(1-\bar{\lambda})<\underline{\lambda}(1-\underline{\lambda})$. Note that this is compatible with the other assumptions in Proposition 4; in particular, Assumption 5 is automatically satisfied when χ is small enough, as both $\bar{r}$ and $\underline{r}$ tend to 1. Turning finally to output, it equals

$$\bar{y}_{\varnothing}=\bar{\pi}+a\left[(1-\tau)\alpha+\theta_L+r(\Delta\theta)\right], \tag{A.20}$$

so it is higher in the $(\underline{\lambda},\bar{\lambda})$ equilibrium if and only if $(\bar{r}-\underline{r})(\Delta\theta/\alpha)<T_{opt}(\bar{r})-T_{opt}(\underline{r})=\left[\bar{r}\left(1-\bar{r}\right)-\underline{r}\left(1-\underline{r}\right)\right](\Delta\theta/\alpha)$, or $\bar{r}+\underline{r}>2$, which is also satisfied when χ is close enough to 0. ■

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