BELIEF IN A JUST WORLD AND REDISTRIBUTIVE POLITICS*

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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 desserts. 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. More generally, the paper develops a theory of collective beliefs and motivated cognitions, including those concerning "money" (consumption) and happiness, as well as religion.

> "Individuals have a need to believe that they live in a world where people generally get what they deserve." *The Belief in a Just World: A Fundamental Delusion* [Lerner 1982].

INTRODUCTION

International surveys reveal striking differences between the views held in different countries concerning the causes of wealth and 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 held belief in the American Dream, is but the most striking example of this phenomenon. At the same time, ethnographic studies of the working and middle classes reveal that people do not come to these views as dispassionate statisticians. On the contrary, they con-

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stantly struggle with the cognitive dissonance required to maintain and pass on to their children the view that hard work and good deeds will ultimately bring a better life, that crime does not pay, etc., in spite of signals that life may not always be that fair. Psychologists have similarly 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 conflicts with this view they try 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 borne by the poor.

The basic model works as follows. Because of imperfect willpower, people continually strive to motivate themselves (or their children) toward effort, educational investment, perseverance in the face of adversity and away from the slippery slope of idleness, welfare dependency, drugs, etc. In such circumstances, maintaining somewhat rosy beliefs about the fact that everyone will ultimately get their "just desserts" 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 bloc, and set a low tax rate. Conversely, when people anticipate little redistribution, the value of a proper motivation is much higher than with a generous safety net and high taxes. Everyone thus has greater incentives to believe in self-sufficiency, and consequently more voters end up with such a world-view. Due to these complementarities between individuals' ideological choices, there can be two equilibria. A first, "American" equilibrium is characterized by a high prevalence of just-world beliefs and a relatively laissez-faire public policy. The other, "European" equilibrium is characterized by more pessimism and a more extensive welfare state. Agents are also less likely to blame poverty on a lack of effort or willpower, but aggregate effort and income are lower than in the first equilibrium.

More generally, this paper proposes a mechanism for the emergence and persistence of *collective* beliefs and *ideologies.* Three other main applications are thus developed. The first con-

cerns 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 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.

I. Self-Reliance and Redistribution

The extent of direct and indirect redistribution—through taxes and transfers, social insurance, education finance, and labor market regulation—differs remarkably across advanced democracies, as epitomized by the contrast between the United States and Europe. While there are potential explanations for this puzzle that do not involve differences in beliefs about the causes of wealth and poverty (e.g., Bénabou [2000] and Alesina and Glaeser [2004]), considerable evidence suggests that citizens' views on the role of self-reliance versus societal factors do play a major role.[1]

1. Importance of beliefs. Data from the World Values Survey [Alesina, Glaeser, and Sacerdote 2001; Keely 2002] show that only 29 percent of Americans believe that the poor are trapped in poverty and only 30 percent that luck, rather than effort or education, determines income. The figures for Europeans are nearly *double:* 60 percent and 54 percent, respectively. Similarly, Americans are about twice as likely as Europeans to think that the poor "are lazy or lack willpower" (60 percent versus 26 percent) and that "in the long run, hard work usually brings a better life" (59 percent versus 34–43 percent [Ladd and Bowman 1998]). Large disparities in attitudes also exist within Europe, especially between OECD and Eastern European countries [Suhrcke 2001].

1. Models stressing the role of beliefs about social mobility include Hirschman and Rothschild [1973], Piketty [1995, 1998], Bénabou and Ok [2001], Rotemberg [2002], and Alesina and Angeletos [2005]. An alternative class of theories emphasizes how welfare states and laissez-faire societies can arise as multiple steady states from the joint dynamics of the wealth distribution and redistributive policies [Bénabou 2000, 2006; Saint-Paul 2001; Hassler et al. [2003], Desdoigts and Moizeau 2005]. A third line of explanation points to differences in political institutions such as a centralized versus a federal state, or in more exogenous national factors, particularly ethnic heterogeneity; see Alesina, Glaeser, and Sacerdote [2001] and Alesina and Glaeser [2004] for comprehensive overviews.

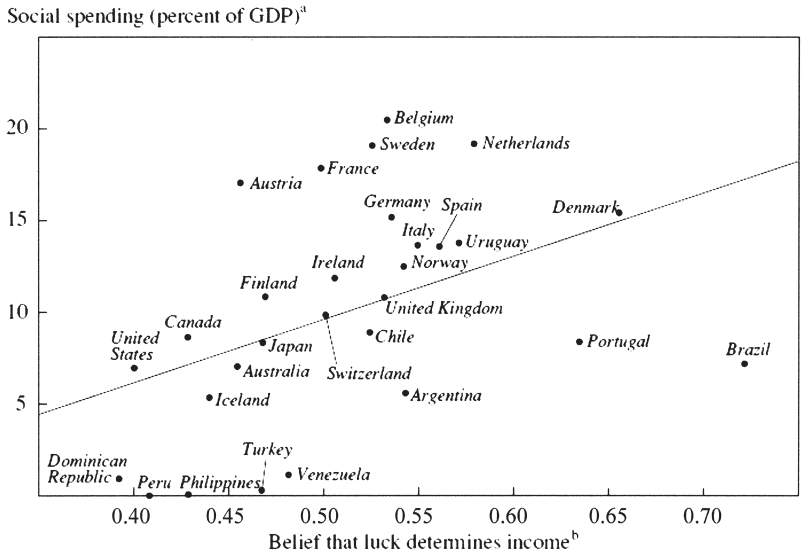

FIGURE I
Beliefs and Policies
(Source: Alesina, Glaeser, and Sacerdote [2001]). a) Average for 1960–1998. b) Mean value for country, measured as an index from 1 to 10, with 10 indicating strongest belief; data for 1981–1987).

Such massive differences cannot be ignored, especially since there is a strong correlation between these beliefs and actual levels of redistribution: see Figure I, reproduced from Alesina, Glaeser, and Sacerdote [2001]. The standard interpretation is one where popular beliefs determine policy outcomes, and indeed it is the case that individual voters' perceptions of the extent to which people control their own fate are major determinants of their attitudes toward inequality and redistribution—swamping in particular the effects of own income and education (e.g., Fong [2001]). But it may also be that the nature of the social contract shapes people's beliefs, and our model in fact emphasizes that causality runs in both directions.

2. Inaccuracy of beliefs. It should next noted that these popular perceptions are often distinctly at odds with reality. For instance, there is a significant discrepancy between the widespread view of the United States as an exceptionally mobile society (especially in the minds of Americans themselves) and the actual evidence on intergenerational income or educational mobility,

which, on average, shows no significant difference with European welfare states.[2] Similarly, it defies plausibility that the American poor should be intrinsically lazier than their European counterparts. And indeed, Alesina and Glaeser [2004] show that the hours worked by the bottom quintile are very comparable on both sides of the Atlantic, and more generally that there is no relationship across countries between the difference in hours worked by the top and bottom quintiles and national perceptions of the laziness of the poor.

Theories of how people come to hold divergent beliefs about the roles of luck and effort in life fall into three categories: "horizontal," "top-down" and "bottom-up." The first view is one of costly learning, as proposed by Piketty [1995]. When finding out about the mobility process requires experimenting with different levels of effort, individuals (or nations) will eventually stop doing so (the "bandit problem") and may thus settle on incorrect beliefs in a purely involuntary, accidental manner. The second view has its roots in the Marxist tradition, according to which workers, especially in America, hold a "false consciousness" about the fairness of market rewards and the prospects of improving their lot through effort, having been brainwashed by the propaganda of capitalists who control education, the media, etc. A modern and more symmetric version of this view is represented by Alesina and Glaeser [2004], who argue that just as American beliefs result from indoctrination predominantly controlled by the wealthier classes, European beliefs result from indoctrination predominantly controlled by Marxist-influenced unions, teachers, and politicians. The third view, which is the one we explore, is that individuals' beliefs are (consciously or not) shaped as much by their own functional goals and psychological needs as by actual data: to a certain extent, people believe what they want to believe.

We shall come back to the comparison between the last two approaches in Section IV. Indeed, our model can be reinterpreted as formalizing people's receptivity to competing sources of political indoctrination, making it a natural complement to models that emphasize the supply side of propaganda (e.g., Glaeser [2005]), but also implying that the "top-down" and "bottom-up" views are not easily distinguished on the basis of cross-country

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

correlations. We turn now to some of the ethnographic and experimental evidence which, together with the statistical facts on beliefs and redistribution, motivates our approach.

3. Motivated beliefs. Sociologists and political scientists such as Lane [1959], Hochschild [1981, 1995], and Lamont [2000] conducted hundreds of detailed interviews of working- and middle-class individuals (both White and Black), exploring in particular their views on economic success, poverty, and redistribution. The first key finding that consistently emerges from this research is a form of "false consciousness" that is *chosen and valued* by the workers themselves—much like a religion. They obstinately hold on 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 always so just, and constantly struggle with the resulting "cognitive dissonance." Typical of many is this statement by Maria, a poor cleaning lady interviewed by Hochschild [1981]: "Once, Maria wonders if executives deserve their $60,000 annual salary: «I don't think they do all that [much] work, do you? Sit at their desk—they got it easy». But she suppresses the thought immediately. «Well, maybe it is a lot of work. Maybe they have a lot of writing to do, or they have to make sure things go right. So maybe they are deserving of it."»

This type of cognitive conflict and belief manipulation also has an important intergenerational aspect, and both are found at all income and education 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 1, 2002].

The second key finding of the ethnographic research on the working class is the overarching importance of *willpower*—what Lamont [2000] terms "the disciplined self." The main challenge in the life of the working poor is the daily struggle to "keep it going," to persevere in the face of adversity, lest they share the fate of those around them who gave up: welfare dependency, homelessness, crime, substance abuse, etc. Their often harsh judgments on those in the underclass (especially Blacks) reflect their attributing deep 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.*"[3]

Both of these key findings—motivated beliefs and weakness of will—are closely echoed by psychologists. The latter relates to self-control problems, which in recent years have 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] term "the fundamental attribution error," namely an excessive tendency to explain the behavior and outcomes of others by underlying dispositions 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 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 people generally get what they deserve.

Many experiments thus show how individuals systematically construe what they observe so as to preserve this belief. A typical example is 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).[4] Such findings are not confined to the laboratory. For instance, Di Tella, Galiani, and Schargrodsky [2004], exploiting a

3. 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."

4. The more extreme 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 conditions 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.

rare "natural experiment" arising from the Argentinian government's granting of land titles to some very poor households, show how the beneficiaries of a pure windfall responded by adopting increased beliefs that one can succeed on one's own, that money is important for happiness, and that others can be trusted.

Bringing together these convergent strands of evidence from economics, political sociology, and psychology, our model incorporates a) a "demand side" for motivated beliefs, arising from imperfect willpower (equivalently, divergent parent-child preferences) or from anticipatory feelings, about this world or the next; b) a "supply side," taking the form of selective recall/awareness or that of parental indoctrination; c) general equilibrium interactions between individuals' cognitive choices, arising endogenously via the collective policy decision.

The intergenerational interpretation of the model involves only standard forms of communication (at home or through schools and churches) and thus 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. Our paper thus brings into political economy the recent work on cognitive dissonance, motivated beliefs, overconfidence, etc. (e.g., Akerlof and Dickens [1982], Carrillo and Mariotti [2000], Bénabou and Tirole [2002, 2004], and Köszegi 2005]). In stressing the links between beliefs about self-determination and redistributive policies, it is also closely related to Piketty [1995] and to recent work by Cervellati, Esteban, and Kranich [2004] and especially by Alesina and Angeletos [2005]. These last authors offer an alternative explanation for the coexistence of low- and high-redistribution societies, in which distributive-justice concerns on the part of voters give rise to multiple self-fulfilling beliefs about the share of income inequality that is attributable to variations in effort. In our model the equilibria correspond instead to divergent yet self-sustaining perceptions of the *same* reality—that is, to different ideologies.

II. A Model of Ideology

II.A. 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 II. Each produces period 2 output with the technology

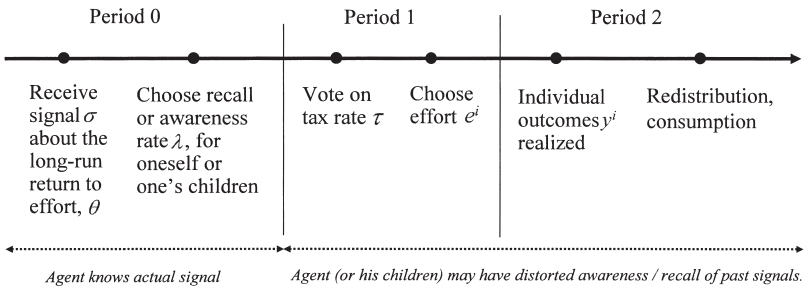

FIGURE II
Timing of Signals and Actions

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

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 the parents, discrimination, etc.[5] For a minority $\varphi < \frac{1}{2}$ of agents π^i takes a high value π_1, while for the 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, toward the pursuit of long-term goals.[6] In Sections V and VI similar

5. 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 $E[\varepsilon] = 0$), except for the one on stigma in subsection III.D, which is more specific.

6. Indeed, Lerner's [1982, p. 9] opening description of the "Belief in a Just World" is that "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

results will obtain when people just derive comfort from thinking that they live in a world that is fair and predictable, as well as when they are concerned about potential rewards and punishments in the afterlife.

We now focus on the first, motivation-based specification. The expected utility perceived by individual i at $t = 0,1$ is

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

where τ is the tax rate he will face in period 2, Ω_t^i his date t information set and $\beta_1 \equiv \beta < 1 \equiv \beta_0$ represents a "salience of the present" affecting preferences at the time effort must be exerted. Due to this form of imperfect willpower ($\beta < 1$), the effort choice e^i will tend to be too low, compared with 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.

II.B. 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, $\sigma^i = \varnothing$. This "no news is good news" assumption serves only to simplify the analysis and is inessential to the results (see subsection III.B). By an abuse of language, we will sometimes refer to $\sigma = L$ and $\sigma = \varnothing$ as the informative and uninformative states of the world. The expected return to effort in each state is denoted

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

and the difference $\Delta\theta \equiv \theta_H - \theta_L$. Just after receiving the date-zero signal $\sigma^i \in \{L,\varnothing\}$, agent i's information set is Ω_0^i. Later on,

there are manageable procedures which are effective in producing the desired states." The motivation approach also fits closely with the emphasis on willpower and perseverance that pervades the ethnographic evidence mentioned earlier.

7. Conditionally independent draws from a distribution that depends on θ would lead to similar results. By focusing on exogenous signals, we are abstracting from the possibility that the equilibrium tax rate τ may reveal information about θ. As explained in subsection III.B, however, one can choose parameters so that it does not.

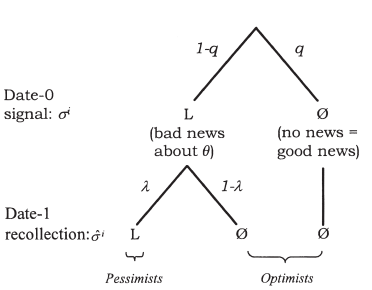

FIGURE IIIa
The Determination of Beliefs

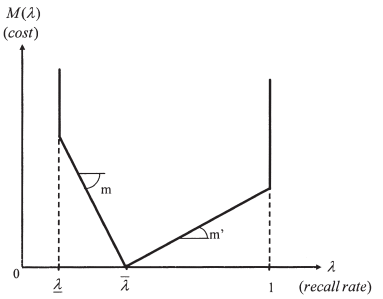

FIGURE IIIb
The Awareness Technology

however, he may no longer be aware of, or reliably recollect, the initial news; see Figures II and IIIa. 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 IIIb describes the cognitive technology through which individuals can (partially) manipulate their own beliefs, or those of their children, about whether or not the world is "just." Formally, the probability

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

that any signal will later on be recalled can be increased or decreased, at some cost $M(\lambda)$. This may involve expending real resources (eliminating evidence, avoiding certain cues and social interactions), time (searching for and rehearsing reassuring information, for instance, through political activism or religious participation), psychic costs (stress from repression), or reputation (misleading one's children, who may eventually find out). A typical awareness-cost function will have a U-shape, minimized at some costless "natural" rate of recall $\bar{\lambda} \leq 1$. For simplicity, we specify $M(\lambda)$ as piecewise linear, with a lower bound $\underline{\lambda}$ on feasible rates of awareness (or a maximum degree of repression $1 - \underline{\lambda}$) and constant marginal costs m and m' for information suppression and rehearsal, respectively; see Figure IIIb.[8]

8. For evidence from the psychology literature on the selective accessibility of past data, see Bénabou and Tirole [2002]. The idea that people can repress the recall of certain memories is also receiving new support from brain imaging

ASSUMPTION 1. 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 $0 \leq \underline{\lambda} < \bar{\lambda} \leq 1$.

In equilibrium, the optimal awareness 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 a) λ can be less than 1; b) individuals understand, 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* ($\chi = 0$).[9]

Agents' posterior beliefs when they vote and work,

$$\mu^i \equiv \Pr[\sigma^i = \varnothing|\Omega_1^i], \tag{6}$$

are thus equal to $\mu^i = 0$ for "pessimists" who recall $\hat{\sigma}^i = L$ and to $\mu^i = r$ for (qualified) "optimists" for whom $\hat{\sigma}^i = \varnothing$.

[O'Connor 2004]. There is also evidence of the *malleability* of beliefs specifically pertaining to markets and distributional justice and of some of the cognitive processes involved. Kay and Jost [2003] show that just reading a vignette about fictional (poor, rich) × (happy, unhappy) or (poor, rich) × (honest, dishonest) characters significantly affects subjects' views about the justice of the American economic and political system. In both the United States and post-transition Hungary, Jost et al. [2003] find subjects' scores on Paulhus' [1984] self-deception scale to be robust predictors of their tendency to endorse the market system as fair and efficient.

9. Our main results, namely the multiplicity of equilibria with different values of λ and the ranking of the associated tax rates in the state in which agents actually implement these cognitive strategies, hold for all $\chi \in [0,1]$. The ranking of tax rates in the uninformative state ($\sigma = \varnothing$) is generally ambiguous, and only when χ is small enough can we ensure that it remains the same. As discussed in subsection III.B, this reflects the fact that while Bayesian agents' beliefs in each state of the world may be distorted, the average across states must still equal the prior. Any model of belief manipulation (self-deception, child indoctrination, propaganda, religion, etc.) that explicitly deals with information flows and agents' inferences will inevitably share similar constraints on making comparative predictions that hold across all states of the world.

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.[10]

II.C. Effort Decisions

Knowing the redistributive environment he will face, each agent chooses effort optimally as a function of his beliefs about the expected return:

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

where

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

His policy preferences, on the other hand, depend also on his *beliefs about other agents' beliefs,* as these determine the tax base from which transfers will be financed:

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

where

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

Indeed, in state $\sigma = \varnothing$ everyone has the same posterior $\mu^j = r$, whereas in state $\sigma = L$ a fraction λ of agents have $\mu^j = 0$ and the remaining $1-\lambda$ have $\mu^j = r$, where λ is the equilibrium awareness rate and $r = r^*(\lambda|\chi)$. 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

10. The belief-manipulation "technology" described above, introduced in Bénabou and Tirole [2002] has been applied in an intrapersonal context by Kopczuk and Slemrod [2005] and in an intergenerational one by Dessi [2004]. An alternative approach focuses on the parental transmission of *preferences* [Bisin and Verdier 2000].

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

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

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 where they do not ($\gamma = \beta$), for instance, because τ and e^i are chosen simultaneously.[11]

II.D. Socioeconomic 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

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

This expression embodies three intuitive effects. First, in the numerator, a lower relative endowment $\pi^i - \bar{\pi}$ naturally 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 be 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.[12] This is most apparent when $\pi^i = \bar{\pi}$, in which case T decreases with the

11. For simplicity, we assume that voters vote sincerely and do not condition their choice of τ on being pivotal.

12. 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 [2005] for empirical evidence of its importance in determining voters' attitudes toward redistribution.

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 ($\mu^i = 0$). 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 ($\gamma = \beta$).

The following assumptions 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 2. 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

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

PROPOSITION 1. Under Assumption 2, 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 [2005], which show that beliefs in self-determination reduce individuals' demand for redistribution[13] 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,

13. 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.

$\sigma = \varnothing$, 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 $(1 - \varphi)\lambda > \frac{1}{2}$, they will be a majority and impose their choice. When $(1 - \varphi)\lambda < \frac{1}{2}$, 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 $\lambda < \frac{1}{2}$, 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 $\lambda > \frac{1}{2}$, 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 in Figure IV. Of course, each agent's awareness rate is endogenous, resulting from ideological or indoctrination choices made earlier on. We now turn to the determination of these motivated beliefs.

II.E. Ideology as a Cognitive Investment

Consider 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) followed by everyone else. Substituting into (2), his (ex ante) intertemporal utility will then be

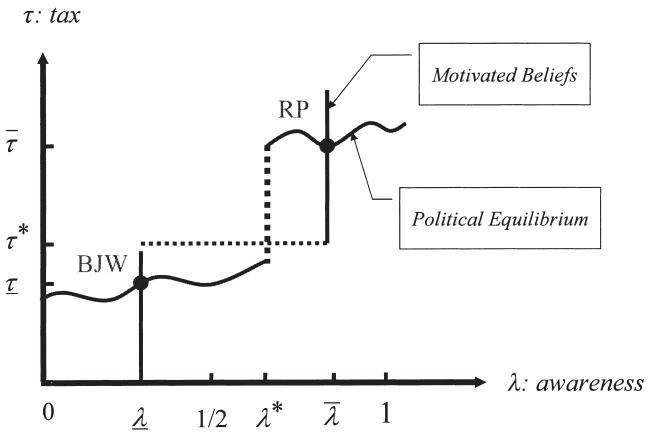

FIGURE IV
Equilibrium Policies and Ideologies (BJW: Belief in a Just World; RP: Realistic Pessimism)

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

where

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

The agent thus recognizes that while his effort at $t = 1$ will be based on a possibly higher expected return $\theta(\mu^i)$, its productivity will still be θ_L; see (14). Similarly, his forecast of aggregate output in (13) is independent of μ^i, as it reflects the return to effort θ_L and belief distribution $(\lambda, 1-\lambda)$ predicted by the true signal $\sigma = L$.

At $t = 1$, if the agent recalls $\hat{\sigma}^i = L$, he will be a pessimist $(\mu^i = 0)$, whereas if $\hat{\sigma}^i = \varnothing$, he will be an optimist $(\mu^i = r)$. From (14) the cognitive decision 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 information trans-

mission λ', as discussed in subsection II.B. Two key effects are apparent in this expression:

—*The role of time inconsistency.* When $\beta \approx 1$, the term in brackets is maximized at $\lambda' = 1$: information is always valuable. Conversely, when $\beta \approx 0$, it is maximized at $\lambda' = 0$, reflecting the fact that sustaining motivation is critical.[14]

—*The role of taxes.* Assume that β is low enough that dissonance reduction is valuable. 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 individuals' ideological choices.

With the piecewise linear specification of $M(\cdot)$ in Assumption 1, the solution to (15) is "bang-bang": the optimal awareness rate is either $\underline{\lambda}$ or $\bar{\lambda}$,[15] depending on whether τ is above or below some (easily computed) threshold τ^*. This is illustrated by the "Motivated Beliefs" locus in Figure IV.

III. American "Belief in a Just World" versus 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].

III.A. Equilibrium Outcomes

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

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

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

τ : is the majority tax rate, given the distribution of beliefs induced by (λ, r), (18)

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

15. In general, the optimal strategy could also involve rehearsing bad news; i.e., $\lambda' = 1 > \bar{\lambda}$. This case (which is not very different from $\lambda' = \bar{\lambda}$) will be ruled out as an equilibrium later on, however; see (22).

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

Under conditions that we shall identify, the political and psychological mechanisms embodied in these equations and illustrated on Figure IV give rise to 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: $1 - \underline{\lambda} > \frac{1}{2}$.[16] 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, forgetting (or minimizing to their children) any dissonant information at a high rate $1 - \underline{\lambda}$.

We now formally establish the existence of the BJW and RP equilibria.[17] Readers who wish to skip this step may go directly to the next subsection.

We start from the parameters $\underline{\lambda}$ and $\bar{\lambda}$ of the awareness technology in Assumption 1, 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 $\theta(\bar{r})$ from (8).

ASSUMPTION 3. Let: (i) $\underline{\lambda} < \frac{1}{2} < (1 - \varphi)\bar{\lambda}$ 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

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

17. 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 $\lambda \in (\underline{\lambda},\bar{\lambda})$.

$\bar{\lambda}$ to $\underline{\lambda}$. The role of the second one (which automatically holds when $\gamma = \beta$) will become apparent 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 question 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.

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

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

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 2–4 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.

III.B. Implications and Robustness

1. Ideology, redistribution, and national income. Our central results pertain to the state of the world in which agents actually receive news (hard information) about θ, namely here the not-so-just state $\sigma = L$. This is the most relevant one, as only then are individuals faced with an actual cognitive decision, allowing 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.[18] 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. As noted earlier, the widespread perception (especially in the United States itself) of modern American society as exceptionally mobile is at odds with the empirical evidence: comparative studies of intergenerational mobility show,

18. The ex ante welfare calculus is substantially more complex. 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 just mentioned. In state $\sigma = \varnothing$, however, the "Bayesian skepticism" discussed below may result in lower effort under the BJW equilibrium (see Proposition 3), which is particularly costly since $\sigma = \varnothing$ is the most productive state. The net welfare outcome thus depends on parameters, and in particular on agents' degree of Bayesian sophistication. For instance, if χ is small, welfare in state $\sigma = \varnothing$ is unaffected, leading to a net gain. If χ is close to 1, there can be a net loss, as shown in a partial-equilibrium context in Bénabou and Tirole [2002].

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 has the same eigenvalues, implying that standard measures of mobility are independent of (λ,r,τ,σ).[19] 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 generally overestimated (as fewer agents are aware that $\sigma = L$) in the American-type equilibrium.

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

3. Sophistication or naivete? In the uninformative state ($\sigma = \varnothing$), 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 is transmitted, the lower one's confidence $r^*(\lambda;\chi)$ that none were indeed received. Thus, voters' expectations of their productivity $\theta(r)$ and of the output 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 exactly coincide in the two equilibria, and the overall correlation structure is entirely determined by what happens when $\sigma = L$.[20] When $\chi > 0$, the effect on the equilibrium

19. Let $\Phi_L(\tau|\lambda,r) \equiv a\beta(1-\tau)\theta_L[\lambda\theta_L + (1-\lambda)\theta(r)]$ and $\Phi_H(\tau|\lambda,r) \equiv a\beta(1-\tau)\theta_H\theta(r)$. The mobility matrix is

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

with eigenvalues 1 and $\pi_1 - \pi_0$. Cross-sectional inequality, by contrast, does vary with the equilibrium and the realized state, but in a nonmonotonic way, as it is proportional to $[\bar{\pi} + \Phi_\sigma(\tau|\lambda,r)][1 - \bar{\pi} - \Phi_\sigma(\tau|\lambda,r)]$.

20. Note also from (5) that with naive agents ($\chi \to 0$), the probability q with which state $\sigma = \varnothing$ occurs can be arbitrarily close to zero.

outcome of agents' doubting their recall (or parents) can go either way, but one can identify sufficient conditions (such as those in Proposition 3) for the results to remain the same as in the informative state.[21]

4. Who is "right"? It is worth emphasizing that neither the model's main message nor the source of its results is that "Americans" have a less *accurate* vision of economic mobility than "Europeans." What really matters is only that their worldview (in the state of the world where there is information) be more *optimistic*—whether *rightly* or *wrongly*. To see this, instead of $\sigma \in \{L,\varnothing\}$ let us now assume that "no news is bad news": $\sigma \in \{H,\varnothing\}$, with $E(\theta|H) > E(\theta|\varnothing)$. Agents' cognitive decision in the informative state $\sigma = H$ is then how much to invest in reminding themselves, and conveying to their children, that the world is just—which it really is. There will be more investments and celebrations of that type (raising λ above $\bar{\lambda}$) in the American-like equilibrium than in the (now unduly pessimistic) European one, and again this will be mutually sustaining with lower redistribution.[22]

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 $\underline{\lambda} < \frac{1}{2}$, 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,

21. 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 $\theta(r)^2/\Gamma(r)$ 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^2 or Γ responds more.

22. The two polar specifications of the information structure could also be combined into a symmetric one, with $\sigma \in \{L,\varnothing,H\}$. The American equilibrium would then have a lower recall rate λ_L in state L and a higher one λ_H in state H than its European counterpart. These two cognitive manipulations are even strategic complements: choosing a low (high) λ_L makes one more (less) skeptical in the recall state $\hat{\sigma}^i = \varnothing$, which increases (decreases) the incentive to choose a high λ_H.

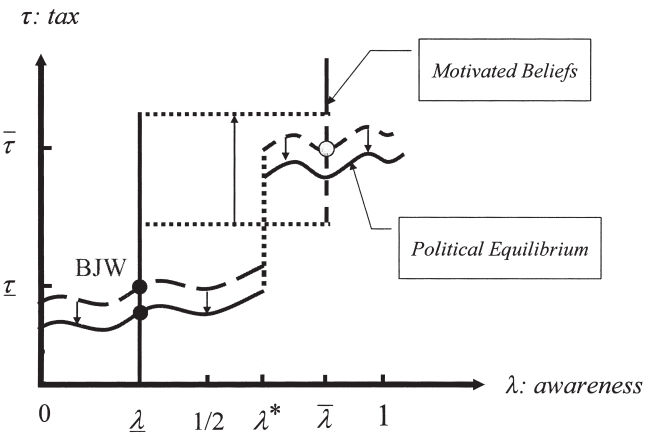

FIGURE V
Economic Shocks and Induced Ideological Shifts

perfectly correlated with it), so that they have *exactly the same incentives* to forget or deny it as they had for σ.[23]

III.C. Initial Conditions and Ideological Shifts

Suppose that the payoff to success increases to $X > 1$, capturing for instance the rise in the returns to education over the last 25 years. As shown in Figure V, such skill-biased technical change has two effects. First, the equilibrium policy locus shifts down (over the range where the poor are pivotal), as it is now more costly to distort effort; the critical value $\lambda^* \equiv 1/[2(1 - \varphi)]$, remains invariant, however. Second, the motivated-beliefs locus shifts up, as a proper motivation to study, work hard, etc., becomes more valuable, making "positive" beliefs in self-determination and the justness of market rewards even more adaptive than before.[24]

Putting both effects together yields the most interesting

23. This recurrent desire of agents to avoid or distort information distinguishes our model from that of Piketty [1995]. In his framework agents are always "hungry" for accurate information, so when they are able to observe the political choices of other people or countries, it is necessary to add heterogeneous priors to the costly learning process in order to prevent convergence to the truth.

24. Formally, as X rises, everyone increases their effort in proportion, so a) voter's desired tax rates are still given by (11) but with a now scaled up to aX; b) in (15), the economic payoffs are scaled up by X^2, reflecting both the direct productivity effect and the effort response; equivalently, the cognitive function $M(\lambda)$ is scaled down by X^2.

point. Whereas, by itself, the rise in X 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 self-reliance (even though θ has not changed) that can cause the Welfare-State equilibrium to unravel, leaving only the Laissez Faire outcome.[25] The same comparative statics can help understand the role of historical conditions in the selection of equilibria. If the initial generations who settled in America were self-selected to have a low disutility for effort (a high a), the effect is exactly the same as that of a temporarily high X. One can also point to their religious background as one that made effort-promoting beliefs particularly desirable (see Section VI for an explicit application of the model to the Protestant ethic); such parameters again move the two loci in ways that tend to make the BJW equilibrium unique. Conversely, one can think of the Great Depression as a large and "memorable" shock (a decrease in X or a negative signal $\sigma = L$ about θ, with perhaps a high associated m) which, although temporary, triggered a durable change in attitudes toward wealth and poverty that made possible a radically new set of redistributive institutions.

Beyond such discontinuities, the more general point is that the endogenous response of ideology to economic or political shocks has a *multiplier* effect that can significantly amplify and prolong their impact on redistributive institutions and real activity. We shall encounter related amplification mechanisms when analyzing the effectiveness of political propaganda or the spread of consumerism later on.

III.D. The Lazy Poor

Suppose that a fraction x of the population are "lazy," meaning that they have no willpower with respect to effort, $\beta = 0$. We assume for simplicity that laziness and initial endowments π^i 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).

Let us now ask what attributions people will make concerning the causes of poverty. When thinking of a person j with ex

25. Other models where skill-biased technical change can undermine—through very different channels that do not involve ideology—the sustainability of the Welfare State include Hassler et al. [2003] and Bénabou [2006].

post income $y^j = 0$, an agent with belief μ^i that effort pays will assess the probability that j's condition is due to laziness as

$$(24) \quad p^i \equiv \Pr[\beta^j = 0 \mid y^j = 0, \Omega_1^i] = \frac{(1-\bar{\pi})x}{(1-\bar{\pi})x + (1-x)[(1-\bar{\pi} - a\beta(1-\tau)\Gamma(\mu^i)]}.$$

Focusing again on the informative state ($\sigma = L$), p^i tends to be higher in the BJW than in the RP equilibrium, for two reasons. First, $1 - \tau$ is higher, implying a greater incentive to work (hence likelihood of success) for any nonlazy person. Second, the majority of agents are optimists, whose estimate of the average contribution of effort to success is higher than that of the pessimistic majority which prevails 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—a result in line with the international surveys cited in the introduction, the ethnographic interviews conducted by Lamont [2000] in the United States and France and Gilens' [1999] study of Americans' views of welfare recipients. These negative perceptions will likely generate resentment, or at best a lack of empathy, in the rest of the population; indeed, there is strong evidence that people want to help only "those who help themselves" (e.g., Fong [2001], Kangas [2003], and Bowles, Fong, and Gintis [2006]). Incorporating such selective altruism into the model would clearly cause the BJW-induced stigma to depress transfers even further.[26]

IV. Propaganda: Supply and Demand

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 [1995] and Alesina and Glaeser [2004]. The latter also point to the converse role played by unions and the education system in the dissemination of left-wing ideas in Europe, to which we would add the influence of prominent intellectuals.

At the same time, beliefs are not just passively molded by a top-down supply of propaganda. First, the ethnographic and ex-

26. In the U. S. context, a central role in the stigma associated with poverty and welfare recipiency is also played by racial stereotypes [Gilens 1999; Alesina, Glaeser, and Sacerdote 2001], a phenomenon from which we abstract here.

perimental-psychology evidence consistently indicates that people *want* to believe. Second, examples like the Soviet Union show that even a monopolistic, omnipresent stream of misinformation cannot, by itself, durably sway minds in the face of a contradictory reality. This is a fortiori true in democratic, well-informed societies. For propaganda to work most effectively, people must be *receptive* to it—it must serve and exploit some "need" that they consciously or unconsciously perceive.[27] The puzzle in the United States-Europe contrast has thus always been why their working classes proved differentially amenable to populist/socialist versus pro-market doctrines, given exposure to both.[28] A theory of political propaganda, like a theory of advertising or a theory of religion, should also include the "demand side." Our model provides such a building block.

Let us think of "unjust-world" signals ($\sigma = L$) being periodically received by certain segments of society, then relayed to the whole population by left-wing parties or unions. The model then explains why, in an American-type equilibrium, people would not want to hear such messages, would try to dismiss them, keep them out of schools, etc., whereas in a European-type equilibrium they would be much more receptive. Conversely, if there periodically occur signals favorable to markets and individualism ($\sigma = H$, as discussed earlier), right-wing parties seeking to disseminate them would find an audience much more willing to listen to, rehearse, and celebrate these stories in the American Dream equilibrium than in the other one. Given such *differential returns* to left- and right-wing indoctrination, 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.

27. Classical cases are *scapegoating* (finding others to blame for one's misfortunes—economic hardship or stagnation, military defeat) and *downward social comparisons* (finding some group to feel superior to). It would be quite interesting to combine such psychologically based demands with Glaeser's [2005] model of the strategic supply of hateful messages about ethnic minorities by politicians pursuing partisan distributive agendas.

28. The rich array of historical quotations provided by Alesina and Glaeser [2004] confirm that a) there was no lack of prominent populist and antirich discourse in the United States (even leaving aside Marxism) during the late nineteenth and early twentieth centuries; it just did not take hold; b) in Europe, governments and education systems were hardly less conservative than in the United States until at least the post-World War I period—and in many cases, we would argue, much later: it was only post-World War II or even in the 1960s that left-leaning teachers and unions overturned the long-standing conservative dominance of education in countries such as France.

Our model also indicates that the evidence presented by Alesina and Glaeser [2004] in support of the "top-down" view of ideology (in which the side that has a given advantage in the supply of propaganda gets to shape the beliefs of a public that passively absorbs what it is fed) is equally compatible with demand variations playing instead the predominant role.

These authors first explain how factors such as a majoritarian (rather than proportional) representation system, a larger land area or an ethnically homogeneous population can make it easier for the Right to be or remain in power and block redistribution, in particular by facilitating its indoctrination of the masses. They then present scatterplots showing that in advanced countries with such characteristics, smaller fractions of the population believe that luck determines incomes and greater ones that the poor are lazy. These correlations are interpreted as supporting the view that "ideology is a by-product of, or at best a natural accompaniment to, national policies on welfare, and not a separate cause."

While thought-provoking, these findings are not sufficient to resolve the issue. Concerning land area, the negative correlation appears entirely due to three outliers: the United States, Canada, and Australia. These also happen to be the "open frontier" giants where the availability of free land created a genuine equality of opportunity for the initial generations of settlers and immigrants. Thus, as suggested by many analysts of American history, the most likely role of land abundance was to shape initial views on opportunity and social mobility—akin to selecting the BJW equilibrium in our model—rather than to facilitate control of the masses by the wealthy.[29] Concerning the system of representation, in the long run it is a choice variable, which a number of countries have indeed altered.[30] Even ethnic heterogeneity can be viewed as partially endogenous, through immigration policy; more importantly, this third correlation admits multiple inter-

29. Long and Ferrie [2005] indeed confirm that between 1850 and 1880 the United States was indeed much more mobile than Great Britain (with occupational and geographical mobility going hand in hand) but that mobility declined significantly after 1920, bringing to an end the reality of "American exceptionalism" with respect to social mobility—though not its popular perceptions.

30. As Alesina, Glaeser, and Sacerdote [2001] write: "The electoral system may itself be endogenous to other variables, including attitudes toward the poor . . . One may argue that in the United States the present system was chosen and maintained precisely because it supported certain policy outcomes. Post-War France went back and forth from more to less proportionality in part to suit the needs of various leaders."

pretations, including (as discussed by Alesina and Glaeser) the majority ethnic group simply being prejudiced toward minorities.

Let us nonetheless accept that exogenous factors linked to geography, ethnic fragmentation or inertial political institutions create a bias in favor of the Right in the American "political technology": our model then predicts the *same* three correlations with beliefs as those just described. Going back to Figure IV, a pro-rich bias in the political system translates into a downward or leftward shift of the equilibrium tax locus (for instance, disenfranchising some of the poor reduces λ^*). This, in turn, tends to trigger a shift in equilibrium beliefs that makes the welfare-state equilibrium vanish, leaving only the laissez-faire outcome.[31] Moreover, this endogenous shift in ideology (coming about through any combination of individual cognitive investments or changed receptivity to propaganda) is a much larger contributor to the final difference in policies than the initial exogenous variation in political technology.

Our point is of course not that political beliefs and propaganda are all demand-driven, but rather that cross-country correlations cannot be taken as evidence that they are essentially supply-driven and ideologies just imposed top-down. More generally, beliefs may respond to exogenous variations in political institutions and yet also powerfully shape these institutions.

V. Culture as Collective Belief

V.A. 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 nonmarket activities, generates lasting increases in wellbeing.

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] and Frank [2000]). Psychologists also point to phenomena

31. For other parameter configurations it makes a laissez-faire equilibrium appear where initially only the welfare-state one existed. It could also leave the (stable) equilibrium set and therefore beliefs unaffected, but this is an artifact of the step functions. In the more general case of two continuous, upward-sloping curves with the same pattern of intersections, beliefs will always respond in a way that amplifies the policy impact of the initial perturbation.

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, academic tenure) and relational ones (marriage, divorce, etc.), the claim is often made that the failure of "affective forecasting" operates *differentially,* leading to a bias toward 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.[32]

Consider the same model as before, but replacing θ in the production function (1) by a fixed, known return and letting uncertainty affect instead individual's long-term utility from consumption. Preferences at dates $t = 0,1$ are thus (with $\beta_1 \equiv \beta < \beta_0 \equiv 1$ as before)

$$U_t^i \equiv E\left[\left(\frac{\theta}{P}\right)[(1-\tau)y^i + \tau\bar{y}] - \frac{(e^i)^2}{2a\beta_t}\middle|\Omega_t^i\right], \tag{25}$$

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 initial endowments: $\pi_0 = \pi_1 = 0$. This model is clearly isomorphic to the previous one (with $\pi^i \equiv 0$), 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 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 wellbeing.

32. 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.

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, 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. Earlier comparative statics results also carry over, so that Figure V now illustrates how a moderate increase in productivity or purchasing power $X = 1/P$, reflecting, for instance, opening to international trade, 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.

V.B. Beliefs and Affect

We have so far stressed the value of beliefs in self-determination for the pursuit of long-term goals. Another important motive discussed by psychologists (e.g., Lerner [1982]) is that people derive comfort from thinking that they live in a just world. Many find the idea that personal fate is largely random and beyond one's control anxiety-provoking and the notion that it is predetermined by social origins upsetting.[33] Such *affective* motives for just-world beliefs can easily substitute for, or combine with, the *functional* one; they are in fact formally equivalent. To see this, let agents' utility at date $t = 0,1$ be augmented as

$$(26) \quad U_t^i \equiv E\left[(1-\tau)y^i + \tau\bar{y} - \frac{(e^i)^2}{2a\beta_t} + u((1-\tau)\theta(\mu^i)) \,\middle|\, \Omega_t^i \right],$$

with $u' > 0$, meaning that people like to think that "effort pays," having a high *net* return $(1 - \tau)\theta$. Such hedonic beliefs create

33. These tastes are well reflected in popular novels and movies, particularly 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]. Equation (26) below can also be seen as a reduced form for anticipal feelings of the type studied by, e.g., Caplin and Leahy [2001], Landier [2000], Köszegi [2005], and Brunnermeier and Parker [2005].

again a complementarity between agents' cognitive choices, since a) on the political side, the new term reinforces the tendency for an agent's desired tax rate τ^i to decline with his belief μ^i, and hence for the equilibrium τ to decline with the fraction of optimists, $1 - \lambda$; b) on the cognitive side, it creates a new incentive to suppress bad news, $u((1 - \tau)\theta(r)) - u((1 - \tau)\theta_L)$, which rises with $1 - \tau$ as long as u is not too concave. For instance, if $u(b) \equiv \rho b^2/2$ then, for all $\lambda < \bar{\lambda}$,

(27)

$$-\frac{\partial(U_0^i|\sigma = L)}{\partial\lambda} = (1 - \tau)^2 r(\Delta\theta)\left(\frac{\beta a\theta_L}{2}\right)\left[1 + \left(\frac{\rho}{\beta a} - \beta\right)\left(1 + \frac{r\Delta\theta}{2\theta_L}\right)\right] - m.$$

The hedonic parameter ρ thus plays essentially the *same role,* in the demand for just-world beliefs, as the degree of intertemporal preference conflict $1 - \beta$ (which could thus be zero).

VI. Religion

The most common and powerful form of individually chosen but collectively sustained belief is religion. A simple variant 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 are tied to effort and industriousness (or lack thereof) during one's lifetime.[34] The alternative view is that there is no afterlife, or that if there is one, its rewards are determined according to criteria unrelated to industriousness, or even antithetical to material success: upholding vows of poverty and asceticism, good deeds toward others, scrupulous observance of rituals, contemplation, the "extinction of desires," etc. Uncer-

34. Such a link is consistent with both moral-hazard-based and adverse-selection-based doctrines. In the first case, effort and industriousness are "good" behaviors that please and are encouraged by the divine power(s). In the second, the ability to consistently engage in such virtuous conduct distinguishes the "chosen," who were elected for salvation, from the "reprobates," who are irredeemably abandoned to sin and damnation. The insight that Calvinistic beliefs in predestination generate a strong psychological desire to "self-diagnostic" which constitutes a powerful work incentive is famously due to Max Weber. See Ainslie [1992] for a good discussion and Bodner and Prelec [2003] and Bénabou and Tirole [2004] for formal models of self-signaling. For reviews of the literature on religion and economics, see Iannaconne [1998], Guiso, Sapienza, and Zingales [2003], and Noland [2003].

tainty over the existence or nature of the next world can be simply modeled 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.[35]

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 $\sigma \in \{\varnothing, L\}$.[36] An agent's preferences at $t = 0,1$ are thus

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

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 and therefore the lower he wants taxes to be, so as to avoid redistributing income toward less hard-working "unbelievers." (By 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 generate high anticipatory utility. If he expects to work little, on the other

35. We set $\beta = 1$ for simplicity and to make clear that the mechanism explored here (as in the previous subsection) does not require any intrapersonal or intergenerational conflict. Religion is also largely a self-discipline mechanism, however, and this can be captured in our model by allowing $\beta < 1$. We leave this extension to future work.

36. Among the negative signals ($\sigma = L$) that believers in a religion R may receive are scientific advances that contradict traditional teachings, immoral conduct by religious officials, personal tragedies, and injustices in the world (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. In the polar specification with $\sigma \in \{H,\varnothing\}$, positive signals could include prayers "answered," "miracles," etc.

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 religions that *do not* stress industriousness and worldly achievements, accompanied by the reverse pattern of labor supply and redistributive policy.

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 ½.

Given the preferences (28), an agent with belief μ^i chooses effort $e^i = a[(1 - \tau)\alpha + \theta(\mu^i)]$ and his expectation of aggregate output is $\bar{y} = \bar{\pi} + a[(1 - \tau)\alpha + \Theta(\mu^i)]$, where

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

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

$$V(\tau,\mu^i) \equiv (a/2)[(1 - \tau)\alpha + \theta(\mu^i)]^2 + a\tau[(1 - \tau)\alpha + \Theta(\mu^i)], \tag{29}$$

resulting in the preferred policy

$$\tau^i \equiv \min\left\{\frac{\Theta(\mu^i) - \theta(\mu^i)}{\alpha}, 1\right\}. \tag{30}$$

Intuitively, believers expect to work hard and thus want regressive taxation (or, if that is ruled out, $\tau^i = 0$), whereas nonbelievers favor progressive redistribution. In the no-information state ($\sigma = \varnothing$), everyone shares the same beliefs and the tax rate is $T_{opt}(r) = -\lambda r(1 - r)(\Delta\theta/\alpha)$ (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 nonbelievers with $\mu^i = 0$; so, once again, the tax rate jumps up when λ exceeds a critical threshold:

$$\tau = \begin{cases} T_{opt}(r) \equiv -\lambda r(1 - r)(\Delta\theta/\alpha) < 0 & \text{if } \lambda \leq 2 \\ T_{pess}(r) \equiv \min\{r(1 - \lambda)(\Delta\theta/\alpha), 1\} > 0 & \text{if } \lambda > ½. \end{cases} \tag{31}$$

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 will be

(32)

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

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 1 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 (31). 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 on 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, particularly Protestants, have less favorable attitudes toward redistribution than others and are more tolerant of inequality (e.g., Alesina [2001], Guiso, Sapienza, and Zingales [2003], and Scheve and Stasavage [2005]).

—At the *cross-country* level, Barro and McCleary [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).

This simple model of religion could be enriched in a number of interesting directions. First, one could explore channels of general-equilibrium feedback other than redistributive institutions, which we have highlighted.[37] Second, letting $\beta < 1$ would 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 (α and θ) and examine when the corresponding beliefs are substitutes or complements.[38] Indeed, many studies find a positive association between individuals' religiosity (particularly Protestantism) and their scores on BJW-type scales or their beliefs that success *in life* can be achieved through hard work, that poverty is attributable to laziness, and that some inequality is needed to provide incentives for effort [Peplau and Tyler 1975; Guiso, Sapienza, and Zingales 2003]. On the other hand, Scandinavians and Americans are both predominantly Protestant but, as shown by Figure I, hold very different views on what determines people's economic fate.

VII. Conclusion

Is the "American Dream," according to our theory, but a 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 (in the benchmark case) involve more overesti-

37. A natural one involves the informational spillovers that endogenously arise when agents' signals σ^i are imperfectly correlated and they observe each others's actions, as in the herding literature. Alternatively, in the traditional (preference- rather than belief-based) literature on the economics of religion, it is often assumed that religious participation involves network externalities. More recently, Scheve and Stasavage [2005] propose a model of religion as a substitute for insurance, in which a) religiosity confers psychic or material benefits that help people buffer economic shocks (such as unemployment), thus offering an alternative explanation for why more religious individuals desire less public redistribution; b) if these benefits increase with the number of religious participants, multiple equilibria may arise.

38. Our model already suggests channels for both mechanisms. On one hand, if an individual expects to work hard because he thinks that the economic return is high, he has a greater incentive to believe that effort will also 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 return to effort. These two effects could produce a correlation of either sign between ideological and religious beliefs, depending on whether the opportunity costs of religiosity or the need for motivation varied most. The general-equilibrium effect of redistribution on belief formation, finally, will always tend to induce a positive correlation.

mation of the extent to which people ultimately get what they deserve, can go from rags to riches, etc., *net* incomes are (as a result) truly more closely tied to merit than in a more redistributive "Realistic Pessimism" equilibrium. Moreover, what really matters is not which set of beliefs is more accurate but only that there be more optimism, or less pessimism, in the American than in the European equilibrium. This endogenously shared ideology can also have important growth and efficiency benefits, including improving people's 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 antiredistributive ideology, consumerist versus leisurist views on happiness, and even religion, all of which were examined here. Many other interesting ones, such as organized propaganda, seem within the reach of further research.

APPENDIX

Proof of Proposition 1. Let us first make explicit the values of the function $\Gamma(\mu^i)$ for the two posteriors that agents 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

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

1) Proof of concavity: we have

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

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

$$\begin{aligned}&(2 - \beta/\gamma)(\mu^i\theta_H + (1 - \mu^i)\theta_L)^2 \\ &\qquad < 2[\mu^i\theta_H\theta(r) + (1 - \mu^i)\theta_L(\lambda\theta_L + (1 - \lambda)\theta(r))].\end{aligned}$$

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 $(2 - \beta/\gamma)(\theta_L)^2 < 2\theta_L[\lambda\theta_L + (1 - \lambda)\theta(r)]$, which trivially holds. For $\mu^i = r$, we require that

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

Since $r(1 - r) \leq \frac{1}{4}$, this is ensured by Assumption 2(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

(A.2)

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

which is equivalent to

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

Now, note that

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

and that

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

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

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

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 said term in brackets is positive. Since $(\bar{\pi} - \pi_0)/a\beta < \theta_L^2$ by Assumption 2(ii) and $\theta(r) \geq \theta_L$, a sufficient condition for (A.6) to hold with $\pi = \pi_0$ is

$$\left(2-\frac{\beta}{\gamma}\right)\theta_L(1-\lambda r)-2\left(1-\lambda r-\frac{\beta}{\gamma}\right)\theta_L+\left(\frac{\beta}{\gamma}\right)r(\Delta\theta)>0 \Leftrightarrow$$
$$\left(-\frac{\beta}{\gamma}\right)\theta_L(1-\lambda r)-2\left(-\frac{\beta}{\gamma}\right)\theta_L+\left(\frac{\beta}{\gamma}\right)r(\Delta\theta)>0 \Leftrightarrow$$
$$\theta_L(1+\lambda r)+r(\Delta\theta)>0,$$

hence the result. ‖

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

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

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

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

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

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

$$\frac{\pi_0 - \bar{\pi}}{a\beta} + \Gamma(0) < 2\Gamma(0) - \left(2 - \frac{\beta}{\gamma}\right)\theta(0)^2 \Leftrightarrow$$

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

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

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 $\tau^i = \min\{T(\pi^i,\mu^i),1\}$. (If τ was constrained to be nonnegative, we would have instead $\tau^i = \max\{\min\{T(\pi^i,\mu^i),1\}, 0\}$; 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

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

where

(A.7)

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

(A.8)

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

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

$$\theta(\underline{r})^2\Gamma(0|\bar{\lambda},\bar{r}) > \theta(0)^2\Gamma(\underline{r}|\underline{\lambda},\underline{r}) \Leftrightarrow$$
$$\theta(\underline{r})^2\Gamma(0|\underline{\lambda},\underline{r}) - \theta(0)^2\Gamma(\underline{r}|\underline{\lambda},\underline{r}) > \theta(\underline{r})^2[\Gamma(0|\underline{\lambda},\underline{r}) - \Gamma(0|\bar{\lambda},\bar{r})].$$

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

$$\underline{r}\theta_L(\Delta\theta)[(1-\underline{\lambda})\theta(\underline{r})^2 + \underline{\lambda}(1-\underline{r})\theta_L^2]$$
$$> \theta(\underline{r})^2\theta_L[\underline{\lambda}\theta_L + (1-\underline{\lambda})\theta(\underline{r}) - \bar{\lambda}\theta_L - (1-\bar{\lambda})\theta(\bar{r})] \Leftrightarrow$$
$$\underline{r}[(1-\underline{\lambda})\theta(\underline{r})^2 + \underline{\lambda}(1-\underline{r})\theta_L^2] > \theta(\underline{r})^2[(1-\underline{\lambda})\underline{r} - (1-\bar{\lambda})\bar{r}],$$

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

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

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

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

or

$$2\theta_L(\Delta\theta)\{\underline{r}[\underline{\lambda}(1-\underline{r}) + 1 - \underline{\lambda}] - (1-\underline{\lambda})\underline{r} + (1-\bar{\lambda})\bar{r}\}$$
$$< (\beta/\gamma)[\theta(\underline{r})^2 - \theta(0)^2] \Leftrightarrow 2\theta_L(\Delta\theta)[\underline{\lambda}\underline{r}(1-\underline{r}) + (1-\bar{\lambda})\bar{r}]$$
$$< (\beta/\gamma)\underline{r}(\Delta\theta)[2\theta_L + \underline{r}(\Delta\theta)].$$

We can rewrite this as

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

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 2–3, 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

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

We now proceed to show the claimed results.

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

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

The required equilibrium conditions are therefore that

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

$$\begin{aligned}(\text{A.12}) \quad (1-\bar{\tau})^2\bar{r}&\left[(1-\beta)\theta_L - \beta\bar{r}\left(\frac{\Delta\theta}{2}\right)\right] \\ &< (1-\underline{\tau})^2\underline{r}\left[(1-\beta)\theta_L - \beta\underline{r}\left(\frac{\Delta\theta}{2}\right)\right].\end{aligned}$$

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

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

Thus, the two requirements jointly take the following form:

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

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 wants 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

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

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),

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

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, $\pi_1 - \pi_0 \ll \chi \ll 1$). 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)

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

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

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

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 in Proposition 3. Turning now to aggregate output, in an equilibrium (λ,r) it is given by

$$\frac{\bar{y}_\varnothing - \bar{\pi}}{\alpha\beta\theta_H} = (1-\tau)[\theta_L + r(\Delta\theta)] = [1 - T_{opt}(\pi_0)][\theta_L + r(\Delta\theta)]$$
$$\approx \left(\frac{\gamma}{\beta}\right)\left[1 + \left(\frac{2\gamma}{\beta} - 1\right)\chi\lambda(1-\lambda)\xi\right]\theta_H\left[1 - \chi(1-\lambda)\left(\frac{1-q}{q}\right)\left(\frac{\Delta\theta}{\theta_H}\right)\right]$$
$$\approx \left(\frac{\gamma\theta_H}{\beta}\right) + \chi\left(\frac{\gamma\theta_H}{\beta}\right)\left[\left(\frac{2\gamma}{\beta} - 1\right)\lambda(1-\lambda)\xi - (1-\lambda)\left(\frac{1-q}{q}\right)\left(\frac{\Delta\theta}{\theta_H}\right)\right]$$
$$= \left(\frac{\gamma\theta_H}{\beta}\right) + \chi\left(\frac{\gamma\theta_H}{\beta}\right)\left(\frac{1-q}{q}\right)\left(\frac{\Delta\theta}{\theta_H}\right)(1-\lambda)\left[\left(\frac{2\gamma}{\beta} - 1\right)\left(\frac{\theta_L}{\theta_H}\right)\lambda - 1\right].$$

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

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

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 that we are in the case $\gamma = 1$ and β is low enough. In particular, it must be below $\frac{2}{3}$. ■

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

ASSUMPTION 5. Let (i) $\underline{\lambda} < \frac{1}{2} < \bar{\lambda} \leq 1$ and (ii) assume that

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

Note that when $\underline{\lambda}$ and $\bar{\lambda}$ tend toward $1/2^-$ and $1/2^+$ respectively $\underline{r}$ and $\bar{r}$ tend to a common limit $r^*(\frac{1}{2};\chi)$, so the left-hand side tends toward $+\infty$ 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

$$m < V(\underline{\tau},\underline{r})-V(\underline{\tau},0)=\alpha\underline{r}(\Delta\theta)[(1-\underline{\tau})\alpha+\theta_L$$
$$+\underline{r}(\Delta\theta)/2+\underline{\tau}\underline{r}\underline{\lambda}],$$

where

$$\underline{\tau}=T_{opt}(\underline{r})=-\underline{\lambda}\underline{r}(1-\underline{r})(\Delta\theta)/\alpha.$$

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

$$m > V(\bar{\tau},\bar{r}) - V(\bar{\tau},0) = a\bar{r}(\Delta\theta)[(1 - \bar{\tau})\alpha + \theta_L + \bar{r}(\Delta\theta)/2 + \bar{\tau}\bar{r}\bar{\lambda}] > -m',$$

where

$$\bar{\tau} = T_{pess}(\bar{r}) = \min\{\bar{r}(1 - \bar{\lambda})(\Delta\theta)/\alpha,1\}.$$

The necessary and sufficient conditions for multiplicity are therefore that

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

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

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

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

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

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 $T_{opt}(r) = -\lambda r(1 - r)(\Delta\theta)/\alpha$, Expression (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

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

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

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