

# Beliefs and Misbeliefs

Roland Bénabou

Princeton University

1<sup>st</sup> Tony Atkinson Lecture

LSE - STICERD – October 2014

Based in part on joint work with Jean Tirole (TSE),  
and with Davide Ticchi (Lucca) & Andrea Vindigni (Lucca)

# How do people form their beliefs?

- 1 Backward-looking expectations, adaptive learning
- 2 Rational expectations, Bayesian equilibrium (with refinements)
- 3 Fixed (wired-in) “biases and heuristics”: base rate neglect, confirmation bias, law of small numbers, hot hand fallacy, probability weighting...
- 4 Motivated beliefs, cognition, reasoning:
  - ▶ Held (or more likely to be) due to emotional or functional value
  - ▶ Resistant to evidence, but respond to costs, benefits and stakes
  - ▶ Several other distinctive “signatures”

# Motivated beliefs / cognition

- About the self:
    - ▶ Talent, intelligence, willpower, beauty, morality
    - ▶ Future prospects: rich vs. poor, healthy vs. sick, happy vs. unhappy
    - ▶ Identity (where do I belong? what are my values, goals?)
  - About how the world works:
    - ▶ Causes of **inequality (effort vs. luck)**, **social mobility**, “Belief in Just World”
    - ▶ Ideology, e.g. merits of state vs. market, proper scope of government
    - ▶ What is moral or immoral, “taboo”
    - ▶ Other people: trust, in-group / out-group stereotypes
    - ▶ Religion, culture
  - Such beliefs are central to individual and collective performance, social relationships, well-being
  - Much evidence that often **not formed and revised in a neutral, objective manner, but in part to serve important “needs”**
    - ▶ Purely psychological, consumption value
    - ▶ Functional, instrumental
- ⇒ **Beliefs as assets** that people invest in, value, defend, expend, repair, etc.

## Beliefs and misbeliefs: some examples

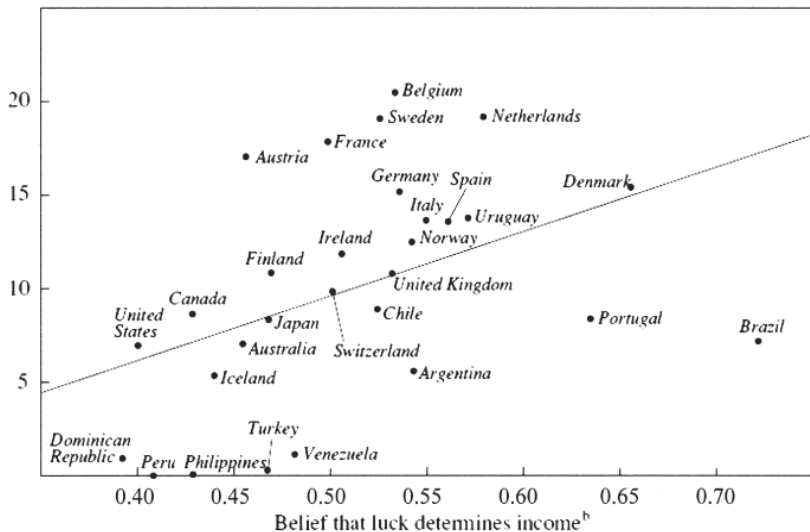
- 90% of US drivers think they are better than average (Svensson 1981).  
94% of professors at large US university thought were better than average professor, etc.
- People think less likely than similar others to suffer adverse life events, more likely to experience good ones (Weinstein 1981)
- 47% of Americans think humans were created instantaneously, 52% believe that humans and dinosaurs coexisted (2001 NSF survey).
- Implausible beliefs about rising asset prices during bubbles (Shiller 2005)
- Wide divergences in economic and political beliefs across otherwise similar countries (and also within): ideologies

# Case-Shiller (2003): expectations of housing price increases

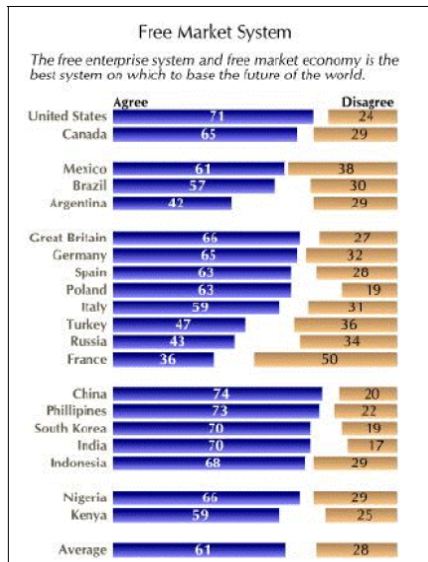
<i>Question</i>	<i>Los Angeles</i>		<i>San Francisco</i>		<i>Boston</i>		<i>Milwaukee</i>	
	<i>1988</i>	<i>2003</i>	<i>1988</i>	<i>2003</i>	<i>1988</i>	<i>2003</i>	<i>1988</i>	<i>2003</i>
Do you think that housing prices in the [city] area will increase or decrease over the next several years?								
Increase	98.3	89.7	99.0	90.5	90.2	83.1	87.1	95.2
Decrease	1.7	10.3	1.0	9.5	9.8	16.9	12.9	4.8
No. of responses	240	145	199	158	194	201	233	187
How much of a change do you expect there to be in the value of your home over the next 12 months?								
Mean response (percent)	15.3	10.5	13.5	9.8	7.4	7.2	6.1	8.9
Standard error	0.8	0.6	0.6	0.6	0.6	0.4	0.5	1.0
No. of responses	217	139	185	147	176	179	217	160
On average over the next 10 years, how much do you expect the value of your property to change each year?								
Mean response (percent)	14.3	13.1	14.8	15.7	8.7	14.6	7.3	11.7
Standard error	1.2	1.2	1.4	1.8	0.6	1.8	0.5	1.3
No. of responses	208	137	181	152	177	186	211	169

# Beliefs about social mobility

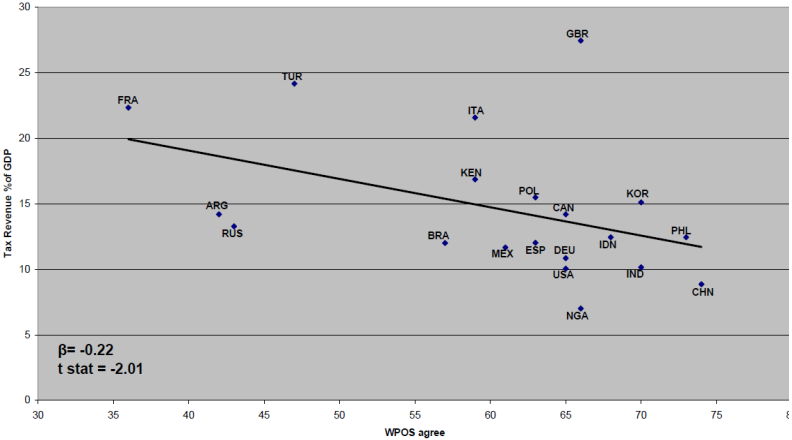
Social spending (percent of GDP)<sup>a</sup>



## Belief in markets (WPO 2005)



# Belief in markets and size of the state



● Source: Bénabou (2008)

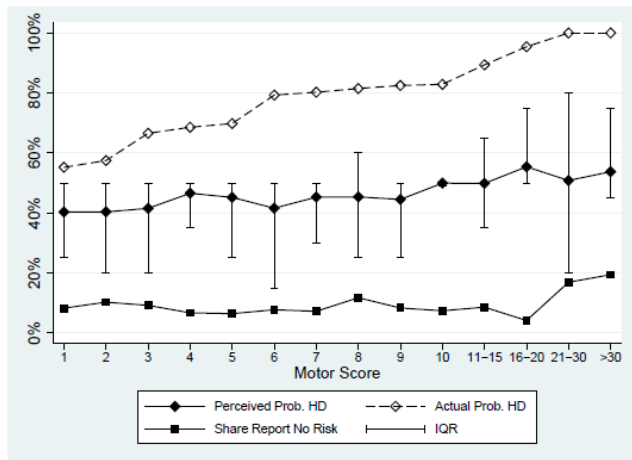
## Do they really believe (act on) it?

- Do so in incentivized experiments, e.g. displaying overconfidence
- Empirical data  $\Rightarrow$  evidence that do for health, housing, stocks
- Often incur high costs to defend or “express” beliefs: identity, religion
  - ▶ Augenblick et al. (2012) on end-of-world beliefs
- Vote on it:
  - ▶ Beliefs about determinants of economic success (luck or effort) are strong explanatory factors of individual attitudes toward redistribution as well as actual national social spending (Alesina et al. 2001)
  - ▶ Trust in markets strong (negative) predictor of size of the state/GDP (Bénabou 2008)

## Wishful perceptions of health risks

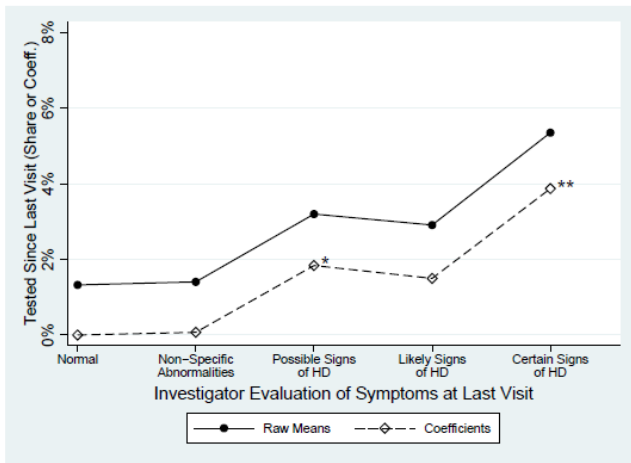
- Oster et al. (2013): follow untested people at risk for risk for Huntington's disease (1 parent has gene variation  $\Rightarrow$  50% ex-ante chance; updated based on symptoms)

Figure 4. : Perceived and Actual Risk of HD, by Motor Score



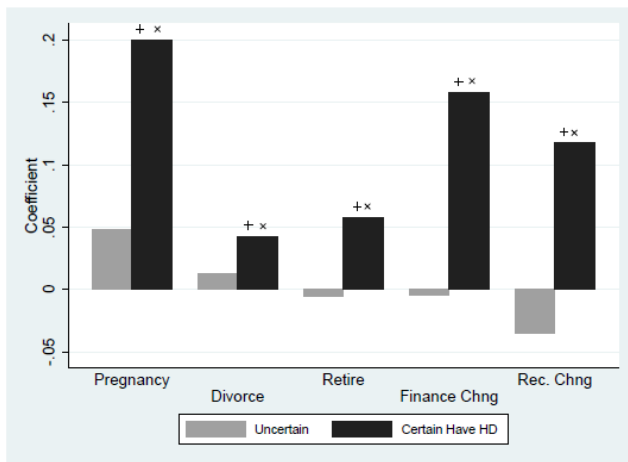
# (Non) Demand for testing

Figure 1. : Testing Behavior and Investigator Evaluation of Risk



# Behavior consistent with stated beliefs

Figure 5. : Behavior Choice Relative to Individuals without HD Expansion



# Lecture Plan

- 1 Motivated beliefs, cognition: why and how?
- 2 A simple unifying framework
- 3 Implications and evidence: individual beliefs and behavior
- 4 Implications and evidence: group beliefs and behavior  
(organizations, markets, ideology)
- 5 Religion
- 6 Concluding remarks

# I - Understanding Motivated Cognition

## 1. Why? (Demand side)

- Standard decision theory: better info  $\Rightarrow$  single DM (weakly) better off
- Hedonic value of beliefs: Schelling's (1984) "mind as a consuming organ"
  - ▶ Self-esteem, ego (B & T 2002, Koszegi 2006)
  - ▶ Anticipatory utility, reassurance about future (Akerlof & Dickens 1982, Loewenstein 1989, Caplin & Leahy 2010) Brunnermeier & Parker 2005, B & T 2011)
- Functional value of beliefs
  - ▶ Self-motivation, self-control: worry about future selves' actions
  - ▶ Signaling: convincing oneself makes it easier to convince others

## 2. How? (Supply side)

- Ex-ante information acquisition or avoidance
- Ex-post signal distortion: "management" of attention, interpretation, recall  
Either direct or via self inference (use own actions as diagnostics)

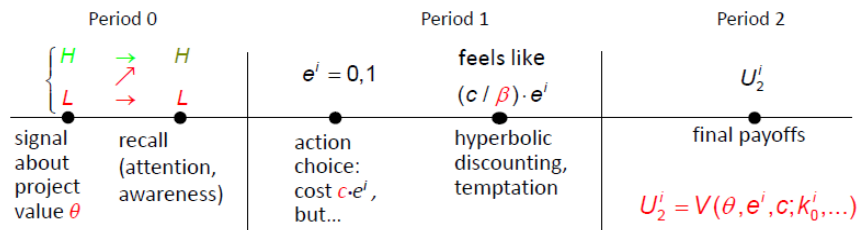
## 3. Welfare? Ultimately good/bad, functional or dysfunctional.

## Fixed heuristics & biases vs. motivated cognition

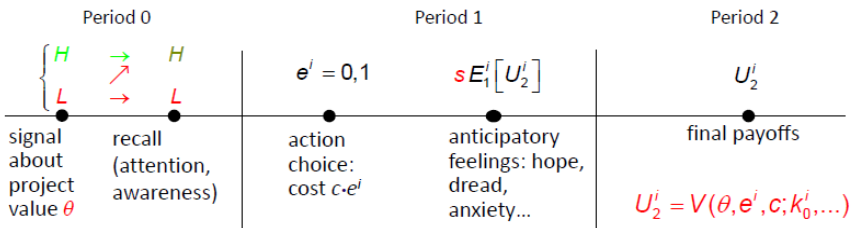
- Very different from mechanical biases and heuristics (“System I”)
  - ▶ E.g., Rabin & Schrag (1999), Eyster & Rabin (2005), Madarasz (2012)
  - ▶ Critical role of **emotions/desires**, both current and anticipated, interacting with **cognition**
  - ▶ Responds to incentives and **stakes**, whether economic or psychological / hedonic. Example: self-serving beliefs vs. confirmation bias
  - ▶ More cognitively sophisticated or educated people may be **better** at maintaining, defending desired beliefs (Kahan 2012)
- Consistent with recent trend in psych. that re-emphasizes role of emotions, especially those evoked by future good and bad prospects
  - ▶ Damasio (1994): emotions, esp. in anticipating future situations, are critical to making even good decisions; sometimes, bad ones.
  - ▶ Neuroscience; growing literature on processes underlying motivated beliefs, selective memory / asymmetric updating (Benoit & Anderson 2012, Sharot et al 2012)

## II - Motivated Beliefs: a Simple Unifying Framework

### 1. Self-Motivation and Belief Distortion



### 2. Anticipatory Utility and Belief Distortion



## Preferences and payoffs

- Period 1: makes decisions (if any) to maximize

$$U_1^i = -c/\beta e^i + sE_1[U_2^i] + \delta E_1[U_2^i]$$

- Period 0: makes cognitive “choices”, aiming to maximize

$$U_0^i = -\text{info costs}/\beta + \delta E_0 \left[ -ce^i + sE_1[U_2^i] \right] + \delta^2 E_0 \left[ U_2^i \right]$$

- ▶ Nests **anticipatory utility** ( $\beta = 1, s > 0$ ) & **self-motivation** ( $\beta < 1, s = 0$ )
- Positive results similar. Normative implications potentially different.
- Final payoffs: with  $\sigma = H, L$ ,

$$U_2^i = \alpha \cdot \theta_\sigma e^i + (1 - \alpha) \cdot \kappa_\sigma^i$$

- $\kappa_\sigma^i$ : fixed **stakes**, resulting from
  - ▶ Agent  $i$ 's previous investments, sunk decisions: exogenous stakes
  - ▶ Other agents'  $j \neq i$  equilibrium actions in state  $\sigma = H, L$ , affecting organization, market: endogenous stakes

## Information processing

- Signal  $\sigma = H$  or  $L \Rightarrow$  how much attention to pay, how to interpret, whether to “keep it in mind” or “not think about it”. Also: willingness to pay for  $\sigma$
- **Wishful thinking:** intrapersonal game of communication, via **attention, memory, awareness, interpretation, rationalization** (Bénabou & Tirole 2002)
  - ▶ **Realism:** acknowledge - encode - recall  $H \rightarrow H$  and  $L \rightarrow L$
  - ▶ **Denial:** ignore - miscode - misremember  $L \rightsquigarrow H$  (or  $H \rightsquigarrow L$ )  
Self-deception, selective inattention, rationalization: cost  $m \geq 0$
  - ▶ **Partial awareness:** recall rate  $0 < \lambda < 1$ , when indifferent
- **Not wanting to know:** : ex-ante information avoidance
  - ▶ At  $t = 0$ , agent chooses whether or not to learn the signal  $\sigma$
  - ▶ No anticipatory utility nor malleable awareness, but preferences for late resolution of uncertainty (Kreps-Porteus 1978, Bénabou 2013)
  - ▶ Tradeoff with decision value of information.

## Dealing with unpleasant realities

- In state  $\sigma = L$ , net Incentive to deny, rationalize away red flag is

$$\Delta U_0^i \equiv U_{0,Denial}^i - U_{0,Realism}^i = -m/\beta - \underbrace{\delta [c - (\delta + s) \alpha \theta_L]}_{\text{decision impact}}$$

$$+ \delta s r(\lambda^i) \underbrace{\delta [\alpha(\theta_H - \theta_L) + (1 - \alpha)(\kappa_H - \kappa_L)]}_{\text{gain in anticipatory utility}},$$

$$r(\lambda^i) = \frac{q}{q + \chi(1 - q)(1 - \lambda^i)}$$

- $\lambda^i$  : agent  $i$ 's equilibrium realism (recall rate for  $L$  signals)
- $\chi \in [0, 1]$  : degree of Bayesian sophistication. Benchmark:  $\chi = 1$

### III – Main Results: Individual Behavior

- Ex-post, **asymmetric updating** for good vs. bad news: denial, rationalization, wishful thinking. Matches evidence on asymmetric **recall**, awareness, updating
- Ex-ante, **information avoidance**: willful blindness
- **Comparative statics**: selective awareness more likely for beliefs relevant to:
  - ▶ Tasks for which **perseverance in spite of temptation** is more of an issue, i.e.  $c < (\delta + s) \alpha \theta_L < c / \beta c$
  - ▶ **Fixed or long-lasting forms of "capital"**: intelligence, health, attractiveness, honesty, social or cultural capital, ethnic identity, specialized human capital, illiquid assets: higher  $s$
  - ▶ Issues on which final resolution further into the future
  - ▶ **Higher initial endowments** of durable, illiquid assets –or more salient:

$$\kappa_0^i \equiv \theta k_0^i \Rightarrow \frac{\partial[\Delta U_0^i]}{\partial k_0^i} = s(1 - \alpha)(\theta_H - \theta_L)$$

- $\Rightarrow$  **Stakes-dependent beliefs**

## Main results: individual behavior

- Decisions for which cost of mistakes is smaller, e.g. because individual less likely to be pivotal: e.g. **voting** (Caplan 2007, B & T 2006, B. 2008)
- **Endowment effect**: have  $k_0^i \Rightarrow$  persuade myself will yield high return or future utility
- **Escalating commitment**: once think  $k^i$  asset is good for me, accumulate more of it, hence higher stakes in being optimistic about its long-term value to me, etc.
- **Hedonic treadmill**: such escalation may actually reduce utility, yet be unavoidable (self-trap. Pursuit of wealth, fame, “purity”).
- **Normative** consequences of belief distortion depend importantly on whether they arise from “**mental consumption**” (also: concave / convex) or from **functional motives**. Positive predictions less so.

# Asymmetric updating about oneself

- “The Good News-Bad News Effect” (Eil & Rao 2011); Möbius et al. (2010)
- Link to tradition in psychology: evidence of self-serving / selective / biased use or recall of information
  - ▶ See, e.g., Kunda (1987). Also Babcock et al. (1995) on bargaining
- Stage 1: collect info to rank the subjects on **intelligence** (IQ tests) or beauty (speed dating). Control condition: **card** with random number from 0 to 9
- Stage 2:
  - ▶ Subjects state their **prior belief**, in %, for being in each of 10 ranks on task
  - ▶ Two rounds of: (a) learn if rank above of below other randomly selected, anonymous participant; (b) state updated belief (incentivized)
  - ▶ At the end: elicit willingness to pay to learn / not learn true rank

## Actual vs. Bayesian updating

TABLE 2—MEAN BELIEF CHANGES BY SIGNAL DIRECTION AND CONDITION, DEPENDENT VARIABLE:  $\Delta\mu$

Condition	Beauty	IQ	Control
$\Delta\mu_{Bayes}$	0.212 (0.160)	0.0256 (0.072)	0.141 (0.136)
$\Delta\mu_{Bayes} \times 1\{s = 1\}$	0.475* (0.263)	0.540*** (0.131)	0.141 (0.172)
$1\{s = 1\}$	-0.642*** (0.150)	-0.772*** (0.101)	-1.119*** (0.172)
Constant	0.437*** (0.134)	0.599*** (0.061)	0.625*** (0.168)
Observations	206	183	385
$R^2$	0.49	0.55	0.48

Bootstrapped standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

TABLE 1—SUBJECT'S MEAN BELIEF AS A FUNCTION OF BAYESIAN MEAN

	Beauty	IQ	Control
Bayesian $\mu$	0.641*** (0.081)	0.846*** (0.102)	0.589*** (0.099)
Bayesian $\mu * 1$ {All $s = 1$ }	0.406*** (0.096)	0.0714 (0.129)	-0.00118 (0.192)
$1$ {All $s = 1$ }	-2.311*** (0.545)	-0.580 (0.811)	-0.531 (0.946)
Constant	2.054*** (0.525)	1.051 (0.757)	2.291*** (0.760)
Observations	163	139	292
$R^2$	0.867	0.869	0.717

Standard errors clustered at subject level in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## Actual vs. Bayesian updating

- Now includes all observations

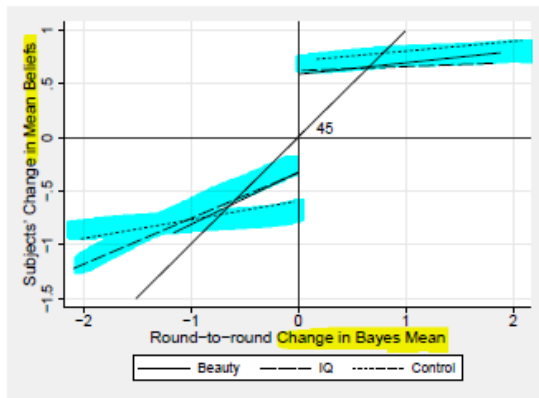


FIGURE 3. LINEAR FITTED VALUES OF ROUND-TO-ROUND CHANGES IN MEAN BELIEF BY CONDITION.

TABLE 2—MEAN BELIEF CHANGES BY SIGNAL DIRECTION AND CONDITION, DEPENDENT VARIABLE:  $\Delta\mu$ 

Condition	Beauty	IQ	Control
$\Delta\mu_{Bayes}$	0.212 (0.160)	0.0256 (0.072)	0.141 (0.136)
$\Delta\mu_{Bayes} \times 1\{s = 1\}$	0.475* (0.263)	0.540*** (0.131)	0.141 (0.172)
$1\{s = 1\}$	-0.642*** (0.150)	-0.772*** (0.101)	-1.119*** (0.172)
Constant	0.437*** (0.134)	0.599*** (0.061)	0.625*** (0.168)
Observations	206	183	385
$R^2$	0.49	0.55	0.48

Bootstrapped standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## Response to (self-relevant) bad news is also more noisy

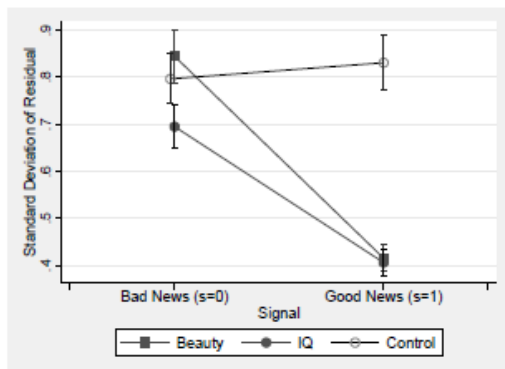


FIGURE 4. NOISE IN ROUND-TO-ROUND UPDATING BY TREATMENT AND SIGNAL TYPE. BARS GIVE +/- 1.96 STANDARD ERRORS.

# Signal valence versus confirmatory bias

TABLE 4— $\Delta\mu - \Delta\mu_{Bayes}$  AS A FUNCTION OF PRIOR GROUP AND SIGNAL VALENCE

	Good news		Bad news	
	Above avg	Below avg	Above avg	Below avg
CB prediction	—	+	—	+
CB in words	Over respond	Under respond	Under respond	Over respond
<i>Beauty</i>	-0.14 (-3.74)	-0.13 (-1.20)	0.00 (-0.03)	-0.13 (-1.32)
<i>IQ</i>	0.07 (1.46)	-0.08 (-0.70)	-0.14 (-0.91)	0.02 (0.23)
<i>Control</i>	0.13 (1.69)	0.21 (2.11)	-0.36 (-5.16)	-0.37 (-3.89)

*t* statistics ( $H_0 = 0$ ) in parentheses

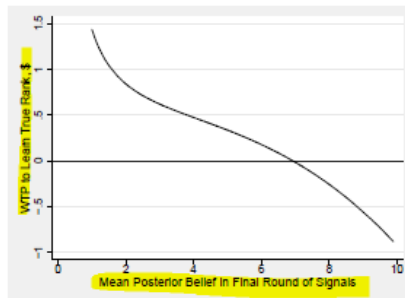
# Informational preferences

TABLE 3—WILLINGNESS-TO-PAY AS A FUNCTION OF FINAL ROUND BELIEFS

Condition	IQ	Beauty	Control
Final Round $\mu$	-0.325***	-0.206**	0.0112
	(0.107)	(0.0855)	(0.0423)
Final Round $\sigma$	0.911**	0.917	0.237
	(0.382)	(0.575)	(0.174)
Constant	0.729	0.298	-0.339
	(0.523)	(0.750)	(0.336)
Observations	77	65	142
$R^2$	0.099	0.180	0.015

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Robust standard errors in parentheses



# Summary of main findings

- 1 Update close to Bayes' rule for positive signals, **underupdate for negative signals**. But only when signals are about something have a stake in.
- 2 Will buy information when have relatively optimistic beliefs about, will pay to avoid it when have pessimistic beliefs
- 3 No evidence of confirmatory bias, **valence of signal matters!**
- 4 Möbius et al. (2010) "Self-Confidence Management: Theory and Experimental Evidence":
  - ▶ Similar experiment (on IQ only) with even "cleaner" methodology: beliefs elicitation mechanism more robust + subjects state beliefs only about binary outcome (being in top 50%) rather than full posterior distribution, making it much easier to compute what Bayesian updating should be.
  - ▶ Find underadjustment even to good signals, but significantly more in response to negative signals.

## Asymmetric updating about educational returns

- “How do Students Respond to Information about Earnings?”

(Wiswall & Zafar, 2013)

- Three steps:** (a) Elicit beliefs about own future earnings & average earnings by major; (b) Provide actual population earnings, by major; (c) Elicit updated beliefs about own earnings

Table 6: Self Earnings Updating and Population Errors

Dependent Variable: Revisions in Self Earnings Beliefs (Intermediate – Initial)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A</i>							
Error <sup>a</sup>		0.184***					
		(0.02)					
Error x General T							
Error x Specific T							
Error x 1(Error>0)			0.347*				
			(0.19)				
Error x 1(Error<0)			0.159***				
			(0.02)				
Err x Gender Match <sup>b</sup>				0.439***			
				(0.06)			
Err x Gend No Match				0.284***			
				(0.04)			
Num. Obs	2475	2475	1200	2475	2475	2445	2321

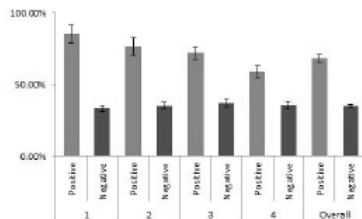
## Asymmetric recall of past performance

- “Selective Memory & Motivated Delusion” (Chew, Huang & Zhao 2012)
- Stage 1: 621 subjects, each answers 4 questions from Ravens IQ test; incentive = lottery for \$100, worth  $\approx$  \$1 in expectation
- Stage 2: Two months later, called back, showed same 4 questions + 2 had not seen, with the answers
  - ▶ Asked to recall whether answered correctly, incorrectly, had not seen, or can't remember. +\$1 for correct response, -\$1 for incorrect, 0 for “can't remember”
- 8 possible types of recall errors: +/- “Amnesia” ( $\sigma \rightarrow \emptyset$ ), “Confabulation,” ( $\sigma \rightarrow \sigma'$ ), “Delusion” ( $\emptyset \rightarrow \sigma$ )

	$a$	$b$	$c$	$d$
$s = G$	$a_G$ : CR	$b_G$ : Negative C	$c_G$ : Negative A	$d_G$ : Weak Negative A
$s = B$	$a_B$ : Positive C	$b_B$ : CR	$c_B$ : Positive A	$d_B$ : Weak Positive A
$s = \emptyset$	$a_\emptyset$ : Positive D	$b_\emptyset$ : Negative D	$c_\emptyset$ : CR	$d_\emptyset$ : Weak CR

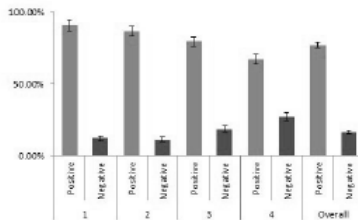
# Memory biases conditional on performance

Positive Amnesia vs. Negative Amnesia



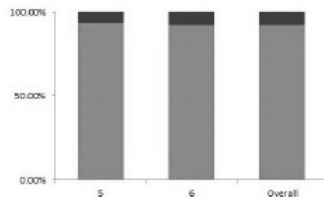
a

Positive Confabulation vs. Negative Confabulation



c

Positive Delusion vs. Negative Delusion



b

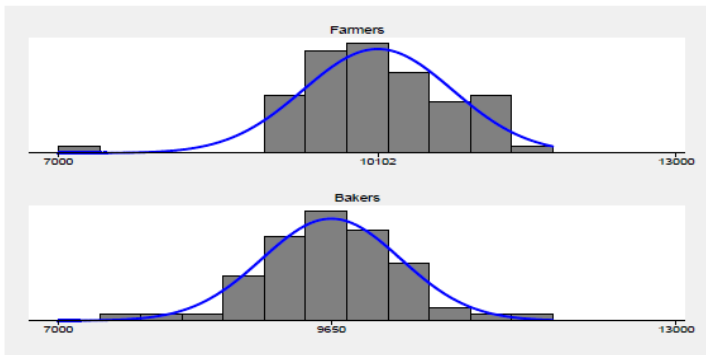
## Asymmetric recall of (un)fairness

- "Asymmetric Memory Recall in Social Interactions" (Li 2012)
- Trust Game:  $A$  trusts or not, if trusts  $B$  reciprocates or not.
- Strategy method. Then, after 0, 7 and 43 days: incentivized recall
- Results:
  - ① A player whose trust was betrayed is more likely to forget the act than one for whom was reciprocated
  - ② A player whose trust was betrayed is more likely to forget her trusting decision than one who did not trust
  - ③ A player who committed an unkind act perceives it as less unkind as time elapses
- Thompson & Loewenstein (1992) "Egocentric Interpretations of Fairness in Negotiations"
- Babcock et al. (1995) "Biased Judgements of Fairness in Bargaining"

## Stakes-dependent beliefs

- Mayraz (2011) “Wishful Thinking”
- 145 subjects, observe chart of “historical wheat prices”, then predict what price would be at date 100. Also state a level of confidence (1-10) in their prediction
  - ▶ Paid accuracy bonus. Do this 12 times
  - ▶ All prices normalized to lie in [ $\$4000$ ,  $\$12000$ ]
- Randomly assigned to being Farmers, whose payoff is  $P - 4000$ , or Bakers, whose payoff is  $16000 - P$
- Stakes =  $\$0.5$  or  $\$1$  for each  $\$1,000$  of notional profit

## Stakes-dependent beliefs

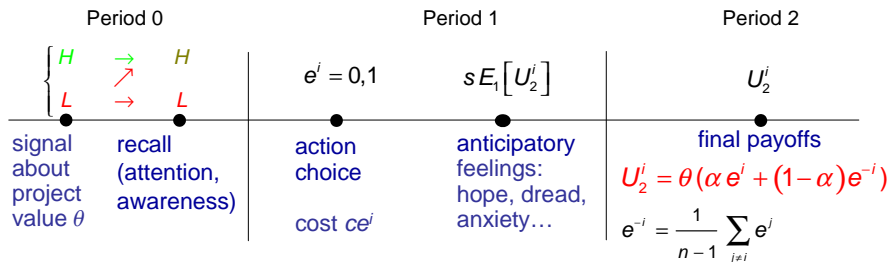


**Figure 4:** Histogram of the mean predictions made by *Farmers* and *Bakers*. A normal distribution curve was fitted to both histograms. The mean prediction was 10102 and 9650 respectively. 16 of the 20 subjects making the highest (lowest) mean predictions were *Farmers* (*Bakers*).

- Not consistent with rational expectations, fixed cognitive bias, or ego utility
- Consistent with anticipatory utility, broadly defined

## IV - Social Beliefs / Cognition

- “Groupthink: Collective Delusions in Organizations & Markets (RB 2013)
- What **interaction structures** lead (mis)beliefs to **spread**, or on the contrary to dampen across agents?
  - ▶ Will do here with anticipatory utility but more general (e.g., KP).



- Take here simplest interaction / organization structure; can enrich substantially (e.g., asymmetries)
- Stakes now **endogenous**:  $\kappa_\sigma^i = \theta(1-\alpha)e_\sigma^{-i}$ ,  $\sigma = H, L \Rightarrow$  **cognitive linkages**

## Dealing with unpleasant realities (state L)

- Incentive to deny  $\sigma = L$  :

$$\Delta U_0^i \equiv U_{0,Denial}^i - U_{0,Realism}^i = -m/\beta - \delta \underbrace{[c - (\delta + s) \alpha \theta_L]}_{\text{decision impact}}$$

$$+ \delta s r(\lambda^i) \delta \underbrace{[\alpha(\theta_H - \theta_L) + (1 - \alpha)[\theta_H - (1 - \lambda^{-i})\theta_L]]}_{\text{gain in anticipatory utility}},$$

$$r(\lambda^i) = \frac{q}{q + \chi(1 - q)(1 - \lambda^i)}$$

- $\lambda^i$  : agent  $i$ 's equilibrium realism (recall of  $L$  signals)
- $\lambda^{-i}$  : other agents' equilibrium degree of realism

# Mutually Assured Delusion (MAD) principle

- Note that:

$$\frac{\partial \Delta U_0^i}{\partial (1 - \lambda^{-i})} = sr(\lambda^i) \cdot (1 - \alpha)(0 - \theta_L)$$

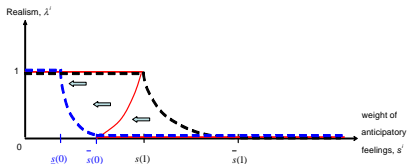
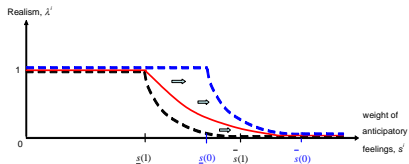
- When reality avoidance by others is **beneficial** (positive externalities), individual cognitive strategies are strategic **substitutes**
  - ▶ Others' disregard of bad news makes such news **less bad**, easier to accept
- When reality avoidance by others is **detrimental** (positive welfare externalities), individual cognitive strategies are strategic **complements**
  - ▶ Others' reality denial makes future prospects even **worse**, so bad news more scary, harder to face
- “Psychological multiplier”  $\Rightarrow$  interdependent beliefs and actions

## Proposition (groupthink)

- Both realism ( $\lambda = 1$ ) and collective denial ( $\lambda = 0$ ) are equilibria, for  $s$  within some range, iff

$$\text{Prob}(\text{state } L) \times (\theta_H - \theta_L) < (1 - \alpha) (0 - \theta_L).$$

- Groupthink more likely when more “common fate”, few exit options ( $\alpha \downarrow$ ); more tail risk, worse bad news ( $1 - q \downarrow \theta_L \downarrow$ ): “black swans”.



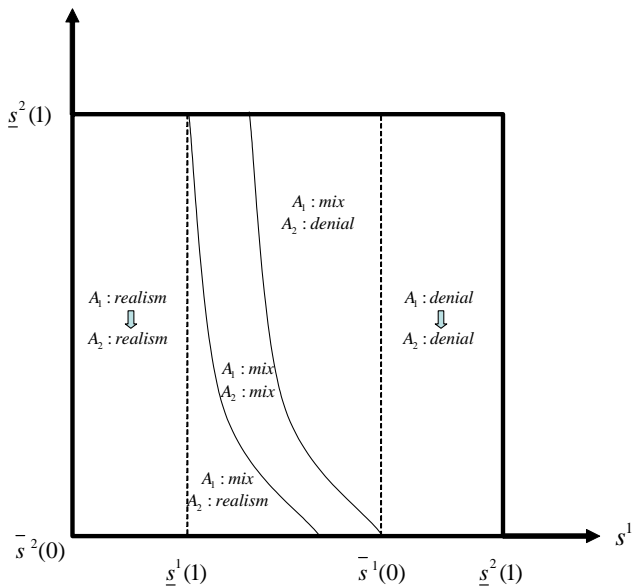
- Culture of denial: all persist in wrong course of action, ignoring the red flags –because others do (thereby making reality worse for everyone)
- Testable implications: e.g., vary payoff structure in experiments

## Hierarchies: top-down groupthink

- **Cognitive dependency:** agents  $i$ 's realism,  $\lambda^i$ , influenced most by how key contributors to his welfare deal with  $L$
- Simple hierarchy: agent 1 = manager, 2 = worker(s)
- Manager delusions (e.g., overinvestment, overborrowing) hurt workers >> the reverse (stay on the job, should look for another):

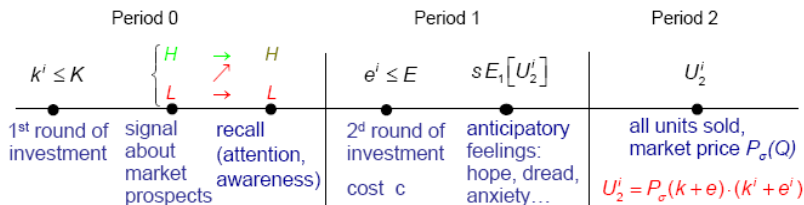
$b_L^{12} - a_L^{12}$ , large,  $b_L^{21} - a_L^{21}$  small  $\Rightarrow$  **unique equilibrium**, with...

# Follow the leader...



“Trickle down” of beliefs in a hierarchy

# V - “Irrational Exuberance” in Asset Markets



- Continuum of firms, investors. Can produce or invest  $k^i \leq K$  at  $t = 0$  with cost 0, and additional  $e^i \leq E$  at  $t = 1$  cost  $c$
- All units are sold at  $t = 2$ . Time to build, limited liquidity, no short sales  $\sim$  limits to arbitrage,
- Market price  $P_\sigma(\bar{k} + \bar{e})$ , reflects
  - ▶ total supply:  $\bar{k} + \bar{e} \in [0, K + E]$
  - ▶ variable market conditions:  $\sigma = H, L$
- Unchanged information structure, preferences

## Is investor exuberance contagious ?

- Does other market participants' exuberance (denial of bad news) make each individual more or less likely to also be bullish ?
- General obliviousness to weak fundamentals will further depress the (expected) final price:  $P_L(K + E) \ll P_L(K)$

Glut, market crash  $\Rightarrow$  two effects:

- ▶ **Substitutability:** if  $i$  remains bullish, will lose even more money on the extra  $E$  units which will produce / invest at  $t = 1$ ,

$$[c - P_L(K + E)] E \quad \text{v.s.} \quad [c - P_L(K)] E$$

- ▶ **Stakes:** if bearish, even greater capital losses must be immediately acknowledged on outstanding position  $k^i$

$$\Delta \kappa^i = [P_H(K + E) - P_L(K + E)] k^i \quad \text{vs.} \quad \Delta \kappa^i = [P_H(K + E) - P_L(K)] k^i$$

With appropriate conditions:

- **Escalating commitment / sunk cost effects:** the more agent  $i$  has invested to date ( $k^i$ ), the more likely he is to continue “blindly” / the less likely to be a realist
- **Market momentum:** the greater was *aggregate* prior investment ( $K$ ), the more likely each agent is to continue investing “blindly”
- **Contagious beliefs:**

### Proposition (market manias and crashes)

If prior  $q$  is high enough and  $P_H(K + E)(1 + E/K) < c/\delta$ ,

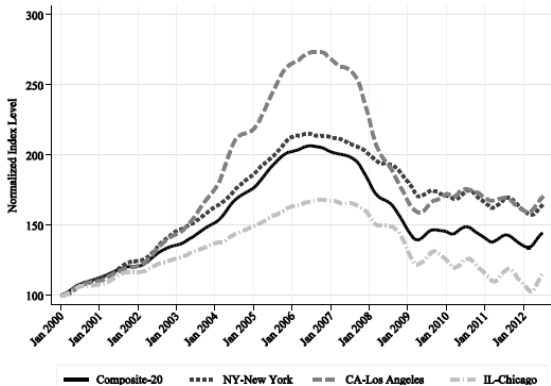
- 1 *There is a range of  $s$  in which both realism and blind “exuberance” in the face of adverse news are equilibria.*
- 2 *Market mania leads to overinvestment and eventual crash.*

# “Wall Street and the Housing Bubble”

- Cheng, Raina & Xiong (2014)

**Figure 1: Home Price Indices**

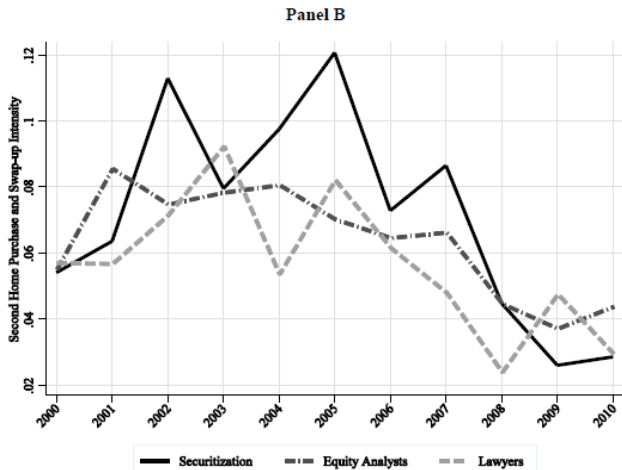
This figure plots the Case-Shiller non-seasonally-adjusted home price indices from January 2000 through July 2012. Values for January 2000 are normalized to 100.



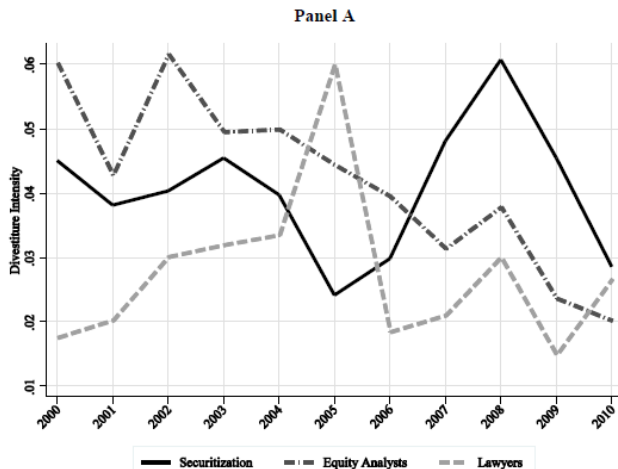
## Bad incentives or bad beliefs?

- **Standard account:** poorly designed incentives led Wall Street to take excessive risks in the housing market, leading to disastrous consequences: securitizing mortgages with very lax screening of subprime borrowers, liar loans, etc.
  - ▶ Unscrupulous insiders, knowingly deceiving households, banks, investors
- But: what did insiders really believe? Can we tell?
- Identify + track down **own housing transactions** of 400 securitization managers, issuers, investors: “**securitization agents**” comprising vice presidents, senior vice presidents, managing directors, and other non-executives at major investment houses and boutique firms
- **Control groups:**
  - ▶ S&P 500 equity analysts who do not cover homebuilding companies
  - ▶ Random sample of lawyers who did not specialize in real estate law.

# Second-home purchases



# Home divestitures (sales)



## Key findings

- Securitization agents **increased** rather than decreased, their housing exposure during the boom period, particularly through second home purchases and swaps of existing homes into more expensive homes
- Were also much **slower to sell** once prices had started falling
- Difference is not explained by interest rates or financing, and is more pronounced in relatively bubblier Southern California compared to the New York metro region
- Accords well with **stakes-dependent beliefs**
- As a result, securitization agents' overall home portfolio performance was **significantly worse than that of control groups**
- Agents working on the sell-side and for firms which had poor stock price performance through the crisis did particularly poorly themselves.

## Further research themes

- Bad incentives **and** bad beliefs : complements, not substitutes
  - ▶ Contract theory, mech. design with wishfully thinking / rationalizing agents
- Long-term dynamics of motivated learning
  - ▶ Gottlieb (2011) “Will you Never Learn”? (Answer:.. nope)
- Alternative theories / mechanisms for contagious beliefs in organizations, markets, politics, religion.
- Feedback with actors whose actions affect the **supply** of (hard or soft) information
  - ▶ Levy (2012) “Soothing Politics”: complementarities between politician’s actions and voters’ cognitive strategies
  - ▶ Propaganda, commercial advertising, etc.
- More experimental work, incl. neuro and field / empirical, on individuals but especially collective / contagious beliefs distortions.
- Next, look at yet another important set of beliefs that
  - ▶ Vary considerably across places, and are extremely persistent
  - ▶ Turn out to be strikingly associated with important economic outcome

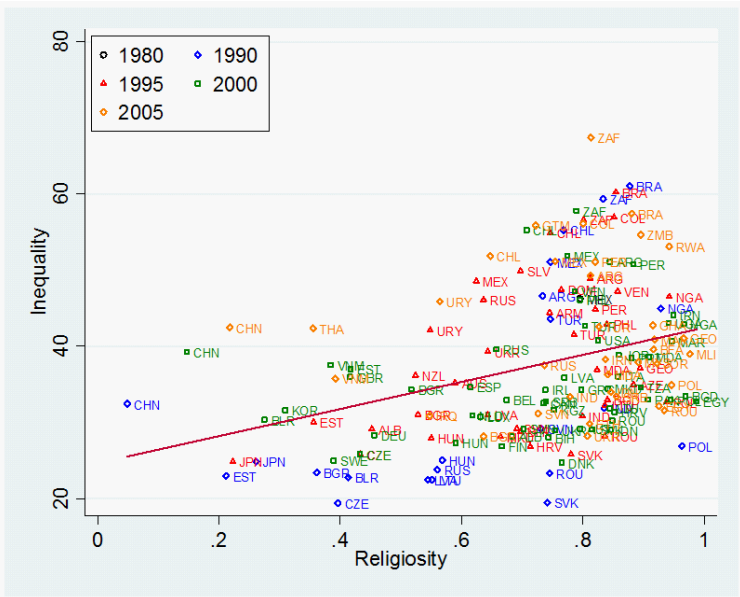
## VI - Religion

- **The Big One.** What is (always has been) the number one instance of motivated beliefs, which people choose, value, maintain, defend?
- Large traditional literature on the economics of religion, has mostly emphasized the “club goods” aspect: group formed to provide spiritual services (Iannaccone 1992, 1998) insurance (Steve & Statavage 2006), commitment by reducing outside options (Berman 2000)
- Link with human capita. Barro & McCleary (2003a), Botticini & Eckstein (2012)
- Important, but nothing specific here about beliefs per se
- Empirical literature on trust. Guiso, Sapienza, & Zingales (2003)
- More recently, starting to focus on religious beliefs per se - their functions, how maintained, etc.
  - ▶ Benabou & Tirole (2006): Belief in a Just [after-] World [or not] as self-sustaining social beliefs (equilibria)
  - ▶ Levy & Razin (2012): religious beliefs help screen agents likely to be more trustworthy / cooperative with each other

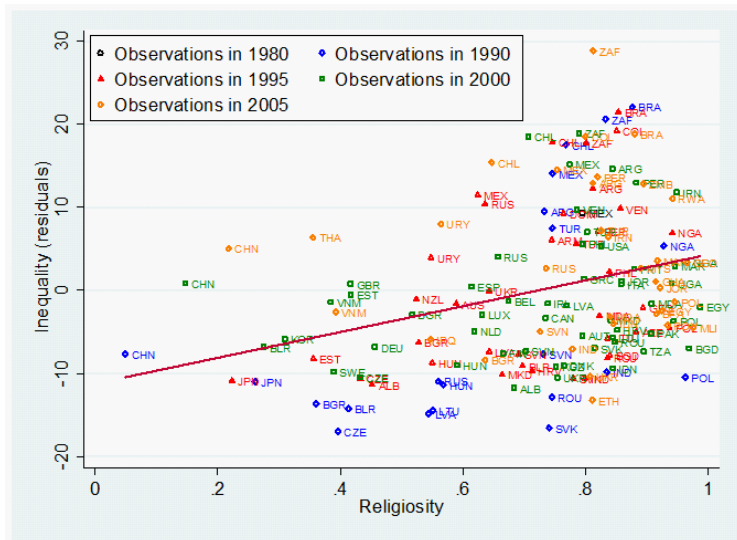
## In lieu of conclusion

- “Forbidden Fruits: The Political Economy of Science, Religion and Growth”  
(Bénabou, Ticchi & Vindigni 2013)
  - ▶ New, rather striking empirical findings: across countries as well as US states, strong **negative relationship between religiosity and innovation** (patents/capita)
  - ▶ Very robust, eg., controlling for income/capita, population, higher education, religious freedom
- More directly fitting for 1st Atkinson lecture + brand new findings...
  - ▶ Rough & very preliminary
  - ▶ Not worked out model yet

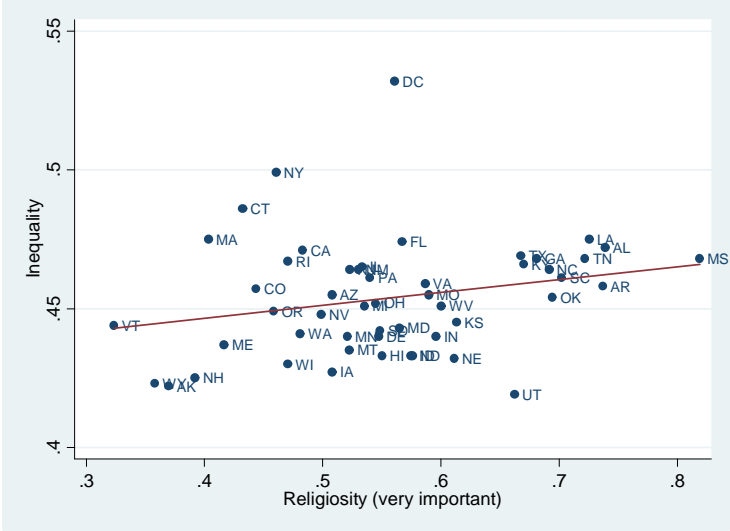
# Religiosity and inequality across countries



- Controls: GSP/capita, religious freedom



# Religiosity and inequality in the US



- **Controls:** GSP per capita, Population, Fraction with at least Bachelor's Degree

