The Economics of Faith: Using an Apocalyptic Prophecy to Elicit Religious Beliefs in the Field

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beliefs about the supernatural
people
who believe(d) in a specific date of Christ’s return
a belief that is tempting to dismiss as “crazy”
question:
can we learn anything about humans from beliefs more generally?
are they mentally unsound?
or maybe...
these people are normal
like you and I
but simply hold beliefs we don’t agree with?
if so then...
we can learn about how and why people in general:
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1) form extreme beliefs
we can learn about how and why people in general:

1) form extreme beliefs
2) adjust to evidence against them
we argue → they are normal
all humans are a bit strange
beliefs based on insufficient evidence are hard to rationalize
(within traditional economics)
→ prefs over outcomes
beliefs have instrumental role
less traditional theories
1) cognitive dissonance costs

Akerlof and Dickens (1982)
2) anticipatory utility

Brunnermeier and Parker (2005)
beliefs play a hedonic role
rational agents \(\rightarrow\) manipulate beliefs (based on costs)
demand for beliefs
general “behavioral” evidence
stated overconfidence in surveys

(Svenson 1983)
(attribute and signal space)

Santos-Pinto and Sobel (2005)
Benoit and Dubra (2011)
self-serving bias

Babcock and Lowenstein (1993)
attribution theory

Heider (1958)
confirmation bias

Lord, Ross and Lepper (1977)
valence-dependent processing/search

Eil and Rao (2011)
Mobius et al. (2011)
(could be just a bias towards positive, not demand for beliefs)
ideally we’d have:
1) beliefs formed recently
1) beliefs formed recently
2) data cannot be misinterpreted with slight biases or difference in priors
1) beliefs formed recently
2) data cannot be misinterpreted with slight biases or difference in priors
3) trigger financial decisions
the Family Radio group satisfy these properties
we study them in 4 ways
1) time-preference (belief) study
1) time-preference (belief) study
2) survey of group members
1) time-preference (belief) study
2) survey of group members
3) model of beliefs
1) time-preference (belief) study
2) survey of group members
3) model of beliefs
4) analysis of online message board
<Background>
Harold Camping
Camping May, 2011
89 years old
Successful Civil Engineer
UC Berkeley Graduate
Founder and head of “Family Radio”
theological basis
biblical literalism
through various other calculations/numerology
date pinned
The Bible Guarantees It

Judgment Day
May 21

...Cry mightily unto God  Jonah 3:8

Mon – Fri  5:30 – 7 PM

610 AM Radio  FamilyRadio.com
SAVE THE DATE!
RETURN OF CHRIST
MAY 21, 2011
WECanKNOW.com
“...blow the trumpet...warn the people”
Ezekiel 33:3

Judgment Day
May 21, 2011
THE BIBLE GUARANTEES IT!

2012
0 5
DAYS LEFT
“no longer a possibility”
“absolute certainty”
“guaranteed”
Prediction:
On May 21
then 5 months of
Armageddon
Oct 21, 2011

Physical End of World
(based on literal interpretation of Book of Revelation)
other denominations opt for "metaphorical interpretation"
Timeline of the Prediction
2004: Camping discusses prediction on FR air
2004: Camping discusses prediction on FR air
2004: Long-time financial manager of FR dies
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2005 March: Camping publishes “Time Has an End” formally “proving” May 21, 2011
Judgment Day
2004: Camping discusses prediction on FR air
2004: Long-time financial manager of FR dies
2005 March: Camping publishes “Time Has an End” formally “proving” May 21, 2011 Judgment Day
2004-2006: FR liquidates assets (FCC spectrum), donations pick up
2004: Camping discusses prediction on FR air
2004: Long-time financial manager of FR dies
2005 March: Camping publishes “Time Has an End” formally “proving” May 21, 2011 Judgment Day
2004-2006: FR liquidates assets (FCC spectrum), donations pick up
2006-2011: spending balloons, mainly through advertising, assets swell then drop
Family Radio balance sheet
(compiled from IRS 990 filings)
May 7-14, 2011: Our experiment
May 7-14, 2011: Our experiment
May 21, 2011: Nothing out of the ordinary
May 7-14, 2011: Our experiment
May 21, 2011: Nothing out of the ordinary
May 7-14, 2011: Our experiment
May 21, 2011: Nothing out of the ordinary
June 6, 2011: Camping suffers stroke, makes no further public appearances
May 7-14, 2011: Our experiment
May 21, 2011: Nothing out of the ordinary
June 6, 2011: Camping suffers stroke, makes no further public appearances
Oct 21, 2011: ?
evidentiary basis similar to religious groups in general

(more controversial)
2006 Gallup poll:

3 in 10 Americans: Bible is literal word of God
4 in 10: God created humans in present form about 10,000 years ago
4 in 10: “angles and demons are active in the world”
92% believe in God, 79% “absolute certainty”
why study these people?
1) Religious beliefs guide decisions
2) These beliefs have a similar (or at least not too different) basis as those held by many people
3) **verifiable** predictions based in the supernatural are rare
<Experiment and Survey>
experiment basic idea:

- more you believe in May 21, less valuable money delivered after May 21 is
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- to measure demand for beliefs, we vary stakes, through changing probability decision is executed
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- more you believe in May 21, less valuable money delivered after May 21 is
- to measure demand for beliefs, we vary stakes, through changing probability decision is executed
- use Seventh-day Adventists as controls
experiment design:

- used BDM mechanism
  - check for $5 cashable immediately
  - check for $X cashable in 4 weeks
  - $X ranged from $1-500
- make choice
- decision enacted with either 6% prob or 50% prob
experiment features:

- totally private
- decisions not seen by anyone except person handling payments
decision sheet:
Control group
Seventh-day Adventists - believe in imminent return of Christ
Seventh-day Adventists

- 9th largest denomination in U.S.
Seventh-day Adventists

- approached in same way, after services
Summary statistics and participant overview
<table>
<thead>
<tr>
<th></th>
<th>Family Radio Sample</th>
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<th></th>
<th>7th Day Adventist Sample</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>6% Treatment</td>
<td>50% Treatment</td>
<td>p-value</td>
<td>6% Treatment</td>
<td>50% Treatment</td>
<td>p-value</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>42.09</td>
<td>40.67</td>
<td>0.86</td>
<td>33.50</td>
<td>38.60</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5.85)</td>
<td>(5.22)</td>
<td></td>
<td>(4.74)</td>
<td>(4.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0.73</td>
<td>0.44</td>
<td>0.21</td>
<td>0.55</td>
<td>0.50</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.17)</td>
<td></td>
<td>(0.16)</td>
<td>(0.13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent belief that the rapture will occur on May 21st</td>
<td>95.00</td>
<td>90.56</td>
<td>0.65</td>
<td>8.33</td>
<td>6.07</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4.51)</td>
<td>(8.71)</td>
<td></td>
<td>(5.62)</td>
<td>(4.15)</td>
<td></td>
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</tr>
<tr>
<td>Had heard about the group that believes May 21st will be the Judgement Day</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.75</td>
<td>0.87</td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.13)</td>
<td>(0.09)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With what percent chance do you believe the Rapture will occur within your lifetime?</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>30.00</td>
<td>45.67</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(9.95)</td>
<td>(10.78)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours spent per week in &quot;spreading the news&quot; that May 21st is Judgement Day</td>
<td>3.71</td>
<td>2.91</td>
<td>0.41</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.54)</td>
<td>(0.78)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent belief in being saved (raptured) on Judgement Day</td>
<td>86.11</td>
<td>77.86</td>
<td>0.61</td>
<td>60.00</td>
<td>73.33</td>
<td>0.41</td>
<td></td>
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<tr>
<td></td>
<td>(7.10)</td>
<td>(14.45)</td>
<td></td>
<td>(11.56)</td>
<td>(11.06)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent belief that the End of the World will occur on October 21st, conditional on seeing no visible signs that the Judgement Day occurred on May 21st</td>
<td>84.36</td>
<td>79.44</td>
<td>0.77</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(9.68)</td>
<td>(13.16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Observations</td>
<td>12</td>
<td>11</td>
<td>13</td>
<td>13</td>
<td>16</td>
<td></td>
<td></td>
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</tbody>
</table>
Distribution of Cut-off Values

6% Probability

Distribution of Cut-off Values

50% Probability

Minimum amount of money (cutoff) willing to forego in 4 weeks for $5 today

[Graph showing frequency distribution for different cut-off values with categories: 5, 50, 100, 200, 300, 400, 500, >500]

Legend:
- Family Radio
- Seventh Day Adventists

Graphs by Treatment group
### Cutoff values for Family Radio and Seventh Day Adventist experimental groups, by treatment

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<tbody>
<tr>
<td></td>
<td>6% Treatment (1)</td>
<td>50% Treatment (2)</td>
<td>p-value (3)</td>
<td>6% Treatment (4)</td>
</tr>
<tr>
<td></td>
<td>Observations</td>
<td></td>
<td></td>
<td>Observations</td>
</tr>
<tr>
<td>Cutoff value</td>
<td>500.00</td>
<td>472.73</td>
<td>0.32</td>
<td>16.77</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(27.07)</td>
<td></td>
<td>(5.26)</td>
</tr>
</tbody>
</table>

Notes: Robust standard errors in parentheses.
If the subject did not circle any amounts, we code their cutoff as $500. Note that no subject, in either sample, chose a cutoff of exactly $500.
FR seem to believe, up to stakes $500
SDA show reasonable discount factor (0.71)
inelastic demand for beliefs
what did FR members think they would do if prediction failed?
“Imagine you wake up on May 21\textsuperscript{st} and there are no visible signs that Judgment Day occurred, what percent chance would you then place on the End of the World occurring on October 21\textsuperscript{st}?
Even answering →

admitting fallible?
all but 6 answered

- 1 blank
- 5 “May 21 will happen!”
% Continue to believe Oct 21 end-of-world, conditional on no visible signs May 21
mean: 80.1%
significantly different from May 21 belief: z=2.44
shows more doubt but...
modal subject says they will continue to believe 100% even if prediction fails in key ways
but a minority do say they will stop believing
What did happen?
May 21, 2011
May 21, 2011
quietly passes
May 23, 2011
“Spiritual judgment occurred. God has judged us all, silently. Through His mercy has spared us Armageddon. The end of the world and Rapture will come quietly on Oct 21, 2011”

- Camping

(in national press conference)
How did believers adjust?
IRB: could not follow members
Next best: textual analysis of online message board
Message board overview

- open to public to read, must join to post
- we recorded all messages 1 month before and 1 month following May 21
- RA coded over 5000 messages for content
- Analysis only includes users who posted before and after
Notes:
(1) Includes all posts from message board users who posted at least one message before May 21st, 2011
(2) Posts were collected for the 2 month period April 22, 2011 to June 22, 2011.
flurry of uncertainty following May 21
alternate dates
Notes:
(1) Sample includes posts between May 21st and May 26th from users who posted at least one message before May 21st, 2011.
(2) No alternate dates were posted before May 21, 2011. Four alternate dates were posted after May 26, 2011.
(none prior to May 21)
alternate date: typically predicts Rapture within 1 day of post
seem “hopeful”
user-level analysis
Before May 21, 2011

After May 21, 2011

Strength of belief

Strength of belief

Notes:
(1) Strength of belief is an index created by the research team using the contents of a user’s posts; it varies at the user, before/after level.
(2) Sample includes all message board users who posted at least one message before May 21st, 2011.
(3) 66 users posted at least one message before May 12th, 2011; 15 of these users attrited after May 21, 2011.
Before: 87% strong believers
After: 53%
Before: 4.5% non-believers
After: 11.2%
89% continue to believe at least somewhat
what about attrition?
if we assume all attriters became non-believers: 28.5% non-believers
ex-post rationalization?

or...
“commitment to believe”
mean “prospective” continued belief: 80%

(quite similar to observed)
word frequency analysis
“Official” theory:

Pre-May 21: Rapture, earthquakes, fire, etc.
“Official” theory:

Pre-May 21: Rapture, earthquakes, fire, etc.
Post-May 23: “spiritual judgment”, no Rapture
“spiritual judgment” not even mentioned before May 21
other alternate theories were discussed

Ex. Matthew 24:36
related work
Festinger (1957)

UFO cult and “cognitive dissonance”
Hader (1983)

Nuclear war cult
Often barriers to exit high
Family Radio had
no church
no compound
members lived normally in community
yet still significant attachment to a falsified theory
(consistent with what the told us ahead of time)
Model
religious beliefs in general seem “extreme”
some believe fully in God
others think this is crazy
and we all have similar evidence

(more controversial)
colloquially
“you believe or you don’t”
Model

- PB model with “religious” action
- 2 states $s \in \{0, 1\}$
- Action choice $a \in [0, 1]$
  \[
  \frac{\partial u(a,1)}{\partial a} > 0, \quad \frac{\partial u(a,0)}{\partial a} < 0, \quad \frac{\partial^2 u(a,\cdot)}{\partial a^2} < 0
  \]
- (Best to choose action 1 if state 1. Action 0 if state 0. Utility concave)
- Interpretation: action is higher cutoff, refusing to save money, prayer.
- This action is costly in state 0, but leads to higher payoff in state 1
- Given objective belief $\pi$, choose belief $\hat{\pi}$ and action $a^*(\hat{\pi})$
Consider example function $u(a, 1) = a^x$ and $u(a, 0) = (1 - a)^x$.
“What is the probability you think God of taken more broadly, a spiritual higher power exists?
<Conclusion>
even beliefs formed on insufficient evidence seem tough to move
the mind seems to “commit in advance” to many beliefs
could help explain other examples of a failure to update
a demand for beliefs
model can explain
“extreme” religious beliefs generally
the supply and demand for beliefs appears to be a strong determinant of human behavior
<The End>