Time preference and intergenerational attitudes on climate change

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Outline

Motivation

Figure: Climate change (Source: Internet)

- Research questions: Do people with higher discount rates care less about climate change mitigation and show less willingness to take responsibility for future generations?

Literature review

- The predictive power of patience, measured by MEL, on real-world outcomes such as cognitive ability, health, or criminal behavior (Cohen et al., 2020);
- Individual discount rates affect environmental decision-making (Alpizar et al., 2023; Wang et al., 2016; Newell and Siikamäki, 2015);
- How future-oriented framing can increase concern for future generations (Hauser et al., 2014; Kamijo et al., 2017; Nishimura et al., 2020; Hara et al., 2019; Shahrier et al., 2017; Shaw et al., 2025; Qin et al., 2024; Shrum, 2021).

Overview of the experiment

- We designed a online experiment with 1157 participants;
- Time preferences were elicited using "Money Earlier or Later";
- Three treatment groups (Forward and Backward (FAB), Imaginary Trip to the Future (ITF), Letter to the Future Generation (LFG)) and a control group;
- Surveyed participants' inter-generational attitudes on climate change.

Our findings

- More impatient individuals are associated with significantly less willingness to assume responsibility for addressing climate change on behalf of future generations;
- More impatient individuals report lower willingness to engage in mitigation actions.

Experimental design

- Treatment groups: FAB, ITF, LFG;
- Pilot study and power analysis;
- Experimental procedure:
  1. Background information about climate change;
  2. Treatment;
  3. Donation to Institute for Public Environment (IPE);
  4. Discount rate elicitation;
  5. Survey: socioeconomic characteristics and climate attitudes.

ITF treatment

- Where are you?
- What's the weather look like? Is it affected by climate change?
- Take a deep breath and feel the air you take, how do you feel?
- Take a look around, what does your surrounding environment look like?
- What are the fuels of transportation tools?
- What are the hot topics discussed on the Internet today?
- What are the expressions of the pedestrians around you? Which one is the most frequent?

FAB treatment

- Imagine you are traveling to 2060 and write a short essay about their life;
- Make a request to the current generation for donation on behalf of the future generation.
- Return to the present and make a donation as the current generation.

LFG treatment

- Ask respondents if they have children, nephews/nieces, or grandchildren;
- If yes, write a letter to them who live in 2060 about the risk and impact of climate change, and what they have done to mitigate climate change;
- If no, write a letter to a child who is born today and lives in 2060.

Climate Change Attitude Survey

- Perceived Threat of Climate Change (PTCC):

Q1: Climate change is a major threat to the world;
Q2: Climate change is a major threat to China.

- Scientific knowledge of climate change (SKCC):

Q3: Climate change is caused by human activities such as burning fossil fuels;
Q5: Climate change will reduce the frequency of floods;
Q6: Climate change will increase the frequency of droughts;
Q7: Climate change will cause sea levels to rise;
Q8: Climate change will lead to shorter heatwaves;

Climate Change Attitude Survey

- Policy Support and Behavioral Intention (PSBI)

Q4: It is not important to take action to mitigate climate change;
Q9: I am willing to pay or reduce my consumption to mitigate climate change.

- Future Orientation and Intergenerational Responsibility (FOIR)

Q10: Climate change will harm the health and well-being of future generations;
Q11: The current generation should not worry about protecting the environment; future generations should;
Q12: Intergenerational equity is an important consideration in formulating climate change policies;
Q13: I am willing to pay money to support actions that mitigate climate change, even if the benefits are received by future generations;
Q14: I prefer enjoying the present rather than spending a lot of time worrying about the future.

Distribution of climate change attitude

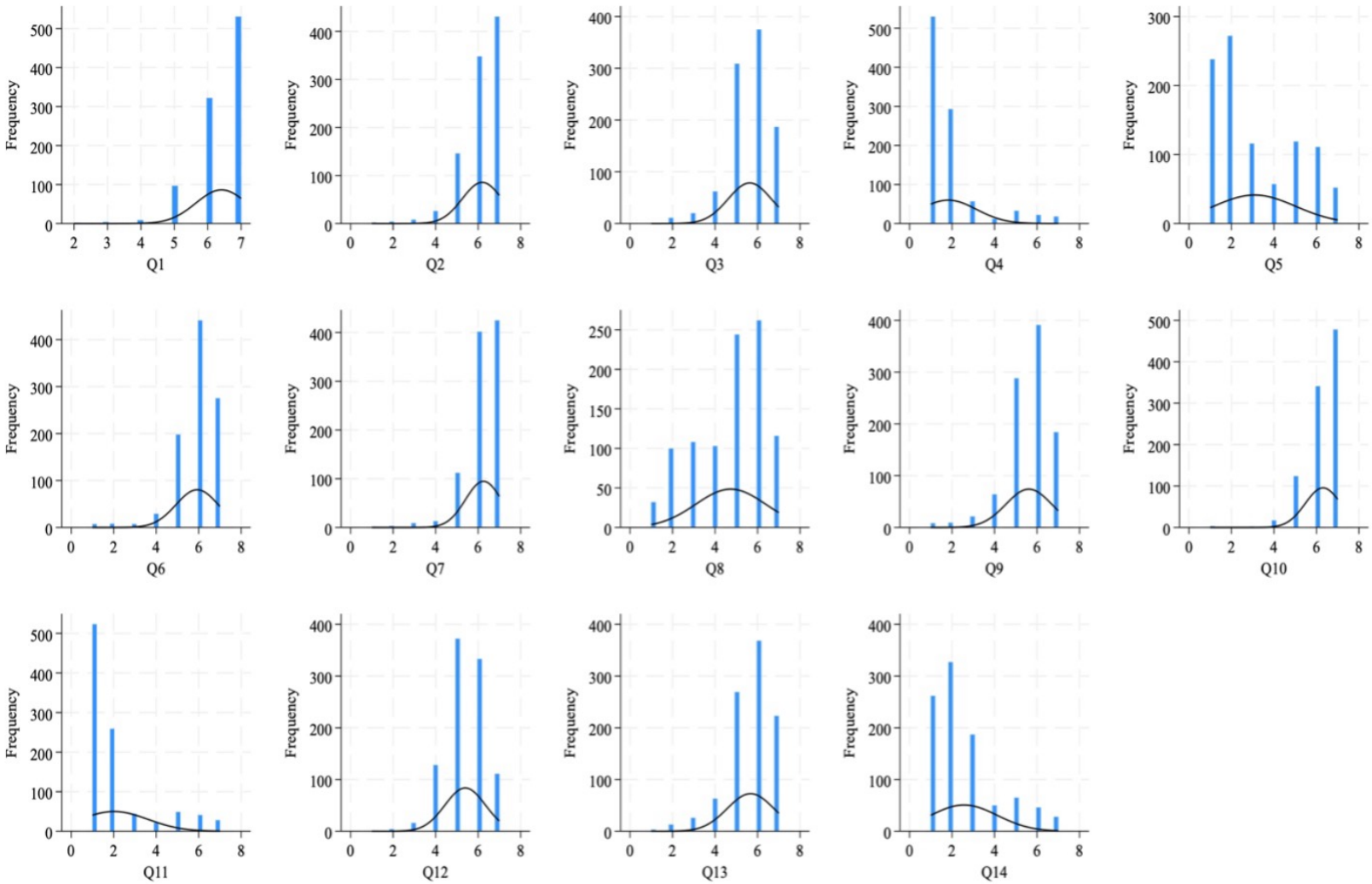

Figure: Distribution of climate change attitude

Discount rate elicitation

Numbering	Amount after 1 week (A)	Amount after 1 month (B)	Your choice (tick A or B)	
1	100	100	A	B
2	100	101	A	B
3	100	102	A	B
4	100	103	A	B
5	100	104	A	B
6	100	105	A	B
7	100	106	A	B
8	100	107	A	B
9	100	108	A	B
10	100	109	A	B
11	100	110	A	B
12	100	111	A	B
13	100	112	A	B
14	100	113	A	B
15	100	114	A	B
16	100	115	A	B
17	100	116	A	B
18	100	117	A	B
19	100	118	A	B
20	100	119	A	B

Figure: Discount rate elicitation decision table

Distribution of time preference

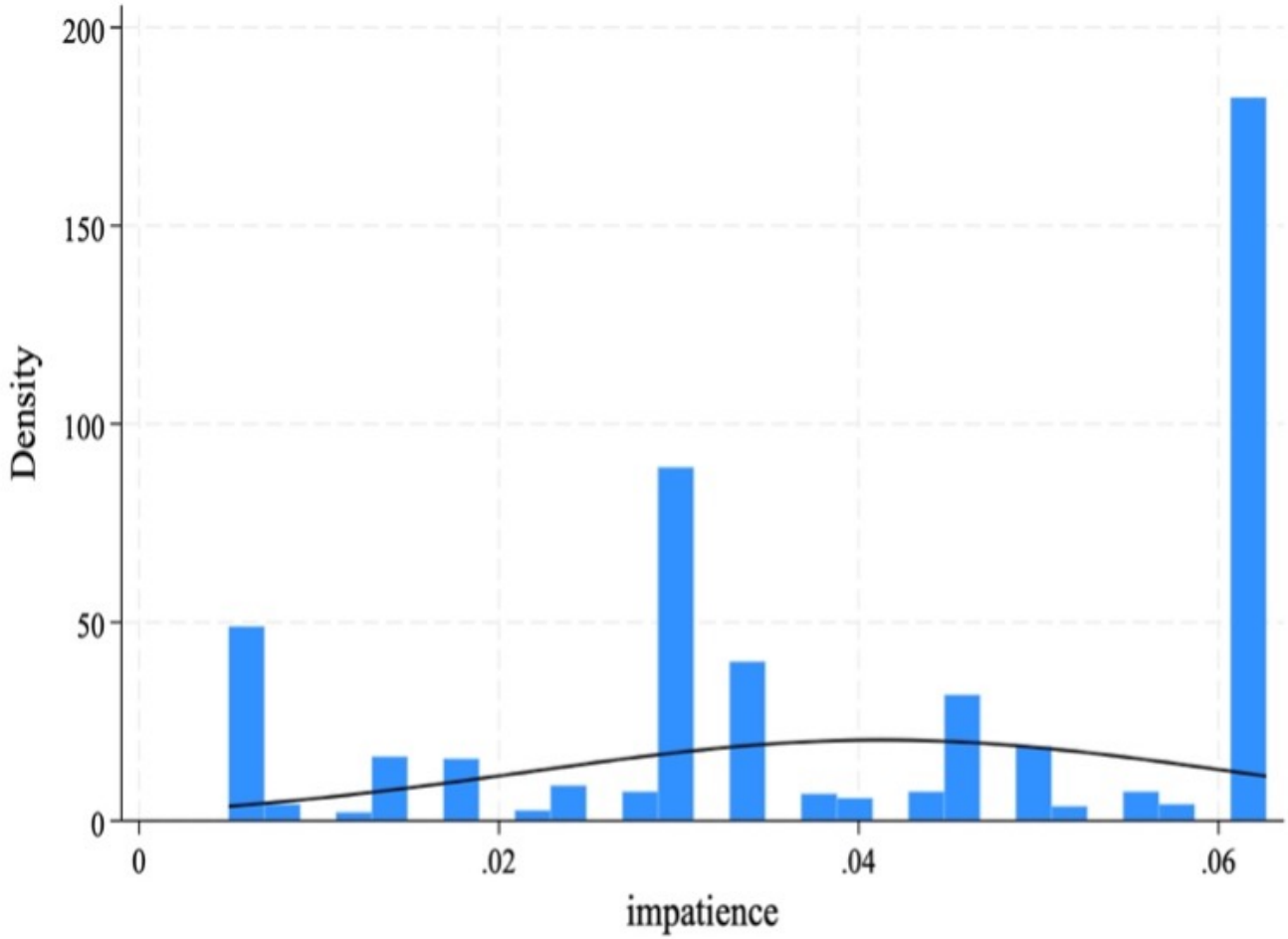

Figure: Distribution of time preference

Note: The black line represents a kernel estimate to illustrate the overall shape of the distribution.

Descriptive statistics of socioeconomic characteristics

Table: Descriptive statistics of socioeconomic characteristics

Variable	Sample size	Mean	Standard deviation	Min	Max
Gender	965	0.463	0.499	0	1
Age	965	32.927	7.742	17	77
Outdoor	965	0.399	0.490	0	1
Education	965	3.933	0.556	1	5
Income	965	3.468	1.204	1	6
Family	965	3.673	1.020	1	6
Kid	965	0.750	0.433	0	1
News	965	3.439	0.569	1	4

Empirical model

$$\Pr(Q_i = k) = \Phi(\alpha + \beta \cdot \text{impatience} + \boldsymbol{\gamma}'\mathbf{X}) + \varepsilon \qquad (1)$$

Where $k = 1, 2, \ldots, 7$ and $i = 1, 2, \ldots, 14$;
Φ denotes the cumulative distribution function (CDF) of the standard normal distribution;
α is the intercept term;
β is the coefficient for time preference (impatience);
$\boldsymbol{\gamma}$ is a vector of coefficients for control variables $\mathbf{X}$;
ε is the error term.

Baseline model regression results (PSBI)

Table: Baseline model regression results (PSBI)

	Q4	Q9
Impatience	6.850***	-2.242
	(2.042)	(1.765)
Treatment	0.042	-0.003
	(0.084)	(0.078)
Gender	0.254***	-0.079
	(0.076)	(0.071)
Age	0.002	0.001
	(0.006)	(0.005)
Kid	0.046	0.167
	(0.105)	(0.099)
News	-0.503***	0.616***
	(0.069)	(0.066)
N	965	965
R^2	0.017	0.048

Notes: Robust standard errors are in parentheses.
$*p < 0.05; **p < 0.01; ***p < 0.001$.

Baseline model regression results(FOIR)

Table: Baseline model regression results(FOIR)

	Q10	Q11	Q12	Q13	Q14
Impatience	-1.067	5.880**	0.508	-1.496	5.142**
	(1.923)	(1.892)	(1.847)	(1.762)	(1.799)
Treatment	0.018	0.145	-0.022	0.105	0.117
	(0.084)	(0.087)	(0.080)	(0.078)	(0.079)
Gender	0.001	0.065	0.131	-0.124	0.019
	(0.075)	(0.075)	(0.071)	(0.071)	(0.070)
Age	-0.019**	-0.003	-0.021***	0.000	0.013*
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Kid	0.327**	-0.048	0.185	0.262**	-0.322***
	(0.106)	(0.108)	(0.101)	(0.097)	(0.088)
News	0.335***	-0.376***	0.319***	0.632***	-0.587***
	(0.067)	(0.067)	(0.059)	(0.065)	(0.066)
N	965	965	965	965	965
R^2	-0.033	-0.030	-0.016	0.017	0.033

Notes: Robust standard errors are in parentheses.
$*p < 0.05; **p < 0.01; ***p < 0.001$.

Robustness Check

Table: Robustness Check Regression Results

	PSBI		FOIR	
	Model 1	Model 2	Model 1	Model 2
Impatience	-5.024**		-3.854*	
	(1.744)		(1.704)	
Switch_point		-0.016**		-0.012*
		(0.005)		(0.005)
Treatment	-0.005	-0.006	-0.043	-0.043
	(0.075)	(0.075)	(0.073)	(0.073)
Control variables	Yes		Yes	
N	965	965	965	965
R^2	0.038	0.038	0.029	0.029

Notes: Robust standard errors are in parentheses.
$*p < 0.05; **p < 0.01; ***p < 0.001$. Model 1 and Model 2 use *impatience* and *switch_point* as the main explanatory variables, respectively.

Conclusion

- More impatient individuals are associated with significantly less willingness to assume responsibility for addressing climate change on behalf of future generations;
- More impatient individuals report lower willingness to engage in mitigation actions.

Limitations and Future research

- There can be a gap between people's attitudes and actual behavior;
- Our study shows a correlation rather than a causal relation between people's impatience and climate change attitude;
- A critique of the MEL is that the elicited discount rate can be associated with people's risk and trust level (Cohen et al., 2020).

Thank you!

Any suggestions are welcome, please contact me at bqinecon@xjtu.edu.cn.

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