

# Why Do People Differ in Their Aversion to Health Inequality?

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# Motivation



# Introduction

- Run an interactive online experiment with a representative sample of the UK adult population ( $n=903$ ).
- Participants make distributive decisions across 10 rounds which reveal their aversion to health inequality.
- We estimate relationships between participant's health inequality aversion and their: social and personal characteristics, economic preferences, political views and health beliefs.

# Outline

- Introduction
- Experiment
- Theory
- Results
- Conclusion

# Experiment

- Representative sample of UK adult population (n=903): Prolific.
- Interactive online experiment with 10 rounds: R-Shiny.
- Questionnaire: Socio-Demographics, Health, Preferences, Beliefs.

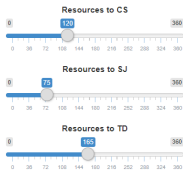
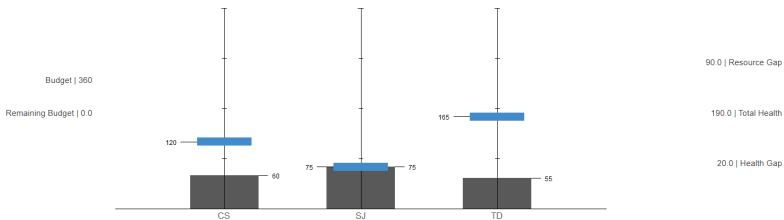
# Experiment

- Stated-preference experiment based on a constrained resource allocation problem.
- Social planners distribute a budget,  $m$ , amongst three individuals.
- Resources,  $y_i$ , multiplied by individual-specific multipliers,  $\pi_i$ , determine health,  $h_i = \pi_i y_i$  (years an individual will live in full health).
- Participants are forced to make equity-efficiency trade-offs across 10 rounds of decision problems.

## Figure: Experiment Interface

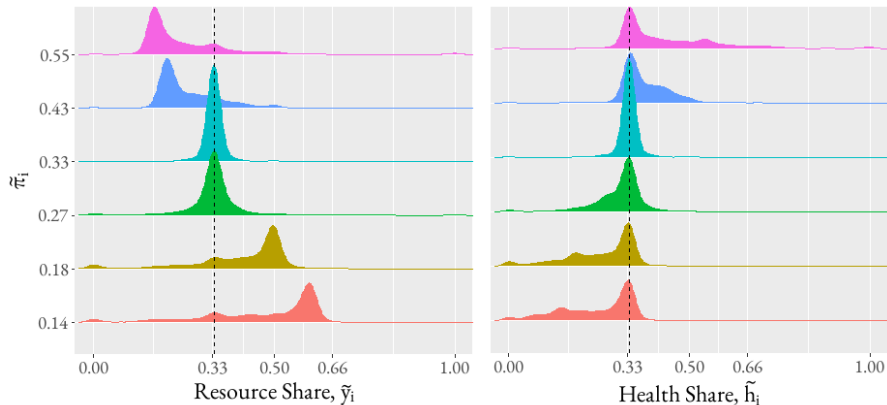
Scenario 5

Individual	CS	SJ	TD
Resources	120	75	165
Multiplier	0.500	1.000	0.333
Health	60	75	55



Next

Figure: Equity-Efficiency Trade-Offs



# Social Welfare Function

$$h_{EDE} = \left( \sum_{i=1}^N \frac{1}{N} h_i^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}} \quad (1)$$

where:

*Health* :  $h_i = y_i \pi_i$

*Health Inequality Aversion* :  $\varepsilon$

Estimation

# Health Inequality Aversion, $\varepsilon$

$$h_{EDE} = \left( \sum_{i=1}^N \frac{1}{N} h_i^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}} \quad (2)$$

*Health Maximiser* :  $\varepsilon = 0$

*Efficiency Prioritarian* :  $0 < \varepsilon < 1$

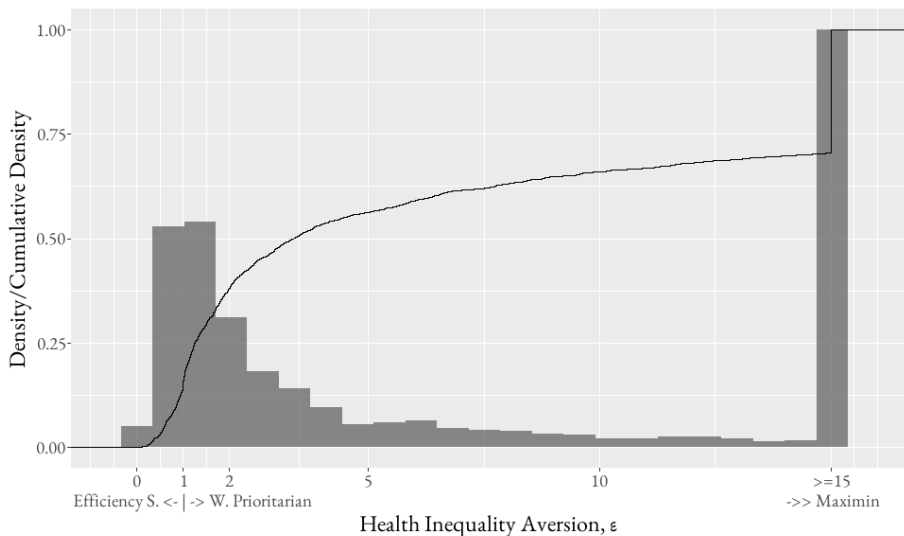
*Cobb-Douglas* :  $\varepsilon \rightarrow 1$

*Weighted Prioritarian* :  $1 < \varepsilon < \infty$

*Maximin* :  $\varepsilon = \infty$

Estimation

Figure: Distribution of Health Inequality Aversion



Introduction ○○○	Experiment ○○○○			Theory ○○	Results ○○●○○○○	Conclusion ○			
	Mean	Min	Max	Obs		Mean	Min	Max	Obs
<b>Demographics</b>					<b>Social/Cultural Capital</b>				
Age	42.43	18	83	901	Social Capital: Mean	53.57	0	81	884
Female	0.49	0	1	902	Social Capital: Count	5.93	0	18	883
Married	0.53	0	1	898	Cultural Capital: Highbrow	2.14	0	8	903
Born in UK	0.82	0	1	896	Cultural Capital: Emerging	3.79	0	8	903
White	0.80	0	1	903	<b>Country</b>				
Household Size	2.72	0	10	900	- England	0.84	0	1	891
Children in HH	0.49	0	6	899	- N. Ireland	0.02	0	1	891
<b>Education</b>					- Scotland	0.09	0	1	891
- Postgraduate	0.21	0	1	897	- Wales	0.05	0	1	891
- Undergraduate	0.38	0	1	897	<b>Health</b>				
- A-Level	0.27	0	1	897	Health: Likert 0-100	69.54	0	100	896
- Secondary/Primary	0.14	0	1	897	Self-Assessed Health	2.19	1	5	901
Private School	0.12	0	1	892	Subjective Life Expectancy	80.23	0	165	886
<b>Employment Status</b>					Health Condition	0.19	0	1	884
- Employed	0.63	0	1	899	Health Condition: Family	0.29	0	1	879
- Unemployed	0.11	0	1	899	Treated for COVID-19	0.15	0	1	893
- Retired	0.11	0	1	899	<b>Health Behaviour</b>				
- Student	0.10	0	1	899	Cigarettes Smoked Per Day	1.07	0	30	893
- Other	0.05	0	1	899	Alcohol Units Per Week	5.06	0	40	903
<b>Occupation</b>					Exercise Hours Per Week	5.33	0	25	903
- Manager/Professional	0.42	0	1	874	<b>Health Preferences</b>				
- Intermediate	0.31	0	1	874	- Risk Aversion	5.04	0	10	903
- Never Worked	0.11	0	1	874	- Inequity Aversion: Envy.	-0.49	-1	0	903
- Other	0.17	0	1	874	- Inequity Aversion: Pity.	0.42	-0	1	903
Income (£k)	28.68	3	175	817	<b>Political Views</b>				
Own Home	0.51	0	1	868	- Left-Right	-1.04	-5	5	798
Wealth: House (£k)	214.78	0	1250	758	- Libertarian-Authoritarian	-1.31	-5	5	788
Wealth: Savings (£k)	30.38	0	125	748	<b>Beliefs</b>				
Subjective SES	5.48	1	10	896	- Average QALE in UK	76.25	43	93	824

Table: Inequality Aversion Rank Correlations: Separate Univariate Regressions

	Coef.	N	R2		Coef.	N	R2
<b>Demographics</b>				<b>Social/Cultural Capital</b>			
Age	-0.000	901	0.000	Social Capital: Mean	0.001*	884	0.004
Female	-0.010	902	0.000	Social Capital: Count	0.005**	883	0.004
Married	-0.025	898	0.002	Cultural Capital: Highbrow	0.006	903	0.001
Born in UK	-0.007	896	0.000	Cultural Capital: Emerging	0.006	903	0.001
White	0.003	903	0.000	<b>Country</b>			
Household Size	-0.011	900	0.003	- England	-0.019	891	0.001
Children in HH	-0.008	899	0.001	- N. Ireland	-0.006	891	0.000
<b>Education</b>				- Scotland	0.035	891	0.001
- Postgraduate	-0.024	897	0.001	- Wales	-0.005	891	0.000
- Undergraduate	0.020	897	0.001	<b>Health</b>			
- A-Level	-0.010	897	0.000	Health: Likert 0-100	0.000	896	0.000
- Secondary/Primary	0.008	897	0.000	Self-Assessed Health	-0.002	901	0.000
Private School	0.018	892	0.000	Subjective Life Expectancy	-0.001	886	0.001
<b>Employment Status</b>				Health Condition	0.053**	884	0.005
- Employed	-0.007	899	0.000	Health Condition: Family	0.029	879	0.002
- Unemployed	-0.029	899	0.001	Treated for COVID-19	0.038	893	0.002
- Retired	-0.016	899	0.000	<b>Health Behaviour</b>			
- Student	0.039	899	0.002	Cigarettes Smoked Per Day	-0.002	893	0.001
- Other	0.052	899	0.002	Alcohol Units Per Week	0.001	903	0.001
<b>Occupation</b>				Exercise Hours Per Week	-0.002	903	0.001
- Manager/Professional	0.023	874	0.002	<b>Health Preferences</b>			
- Intermediate	-0.008	874	0.000	- Risk Aversion	-0.005	903	0.002
- Never Worked	0.028	874	0.001	- Inequity Aversion: Envy.	0.084***	903	0.008
- Other	-0.046*	874	0.004	- Inequity Aversion: Pity.	0.160***	903	0.024
Income (£k)	-0.000	817	0.001	<b>Political Views</b>			
Own Home	-0.024	868	0.002	- Left-Right	-0.013***	798	0.010
Wealth: House (£k)	0.000	758	0.000	- Libertarian-Authoritarian	-0.007	788	0.002
Wealth: Savings (£k)	0.000	748	0.001	<b>Beliefs</b>			
Subjective SES	0.001	896	0.000	- Average QALE in UK	-0.005***	824	0.016

Figure: Distribution of Median Health Inequality Aversion By Socio-demographics

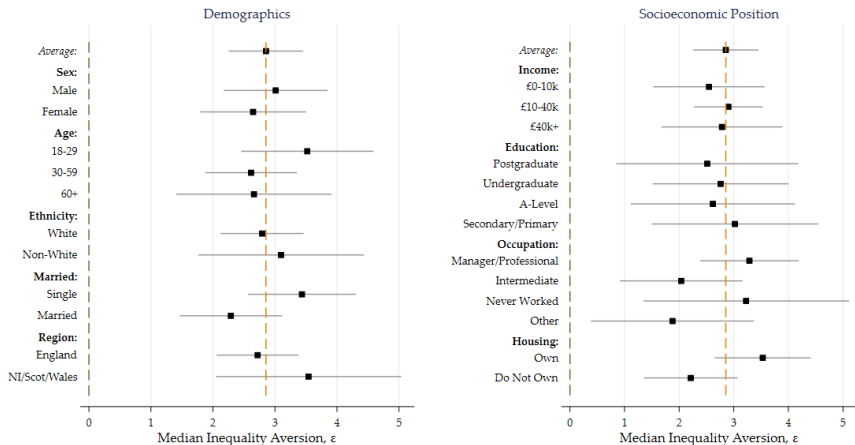
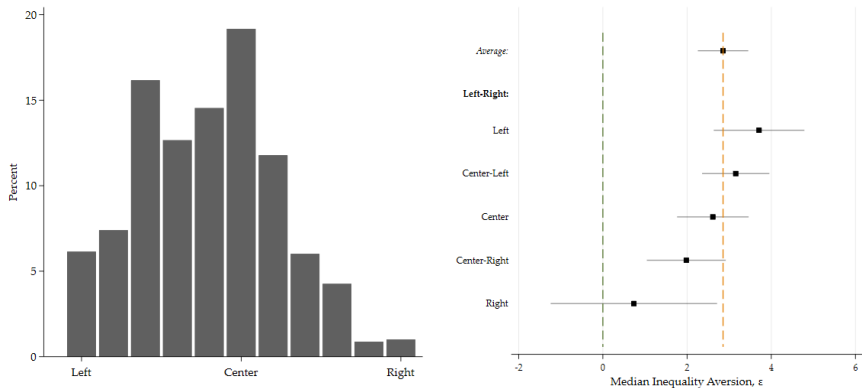


Figure: Median Health Inequality Aversion Across the Political Spectrum

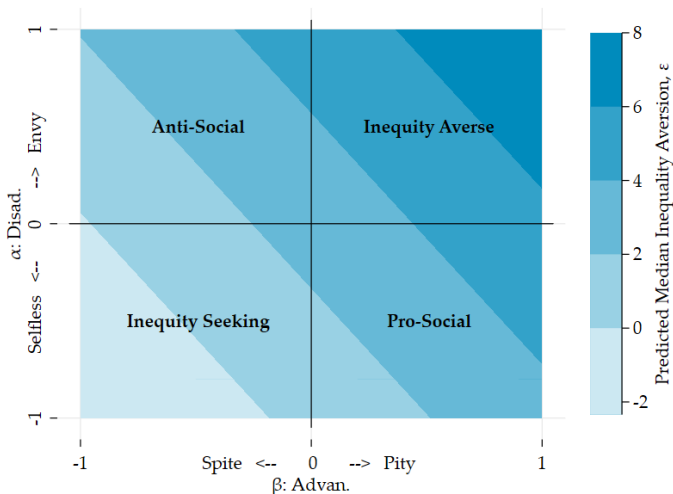


# Health Inequity Aversion: Envy and Pity

$$u_i = h_i - \alpha_i \max\{(h_j - h_i), 0\} - \beta_i \max\{(h_i - h_j), 0\}, \quad i \neq j. \quad (3)$$

	(1) $\alpha$ Coef./ (S.E.)	(2) $\beta$ Coef./ (S.E.)	(3) $\alpha, \beta$ Coef./ (S.E.)
$\alpha$ : Envy.	3.2312*** (0.999)		2.2167** (1.082)
$\beta$ : Pity.		3.7616*** (1.068)	2.8642** (1.159)
<b>Constant</b>	4.4336*** (0.577)	1.2812** (0.541)	2.7398*** (0.901)
Observations	903	903	903
$R^2$	0.0113	0.0134	0.0179

Figure: Predicted Median Health Inequality Aversion by  $\alpha$  and  $\beta$



# Conclusion

- There is substantial variation in the UK public's health inequality aversion, but the majority exhibit aversion to health inequality.
- This variation is not explained by a host of socio-demographics.
- But we do find political views, envy and pity are important.

# Optimal Allocations

$$h_{EDE} = \left( \sum_{i=1}^N \omega_i h_i^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}} \quad (4)$$

$$y_i^* = \frac{m}{1 + \sum_{j \neq i} \frac{\pi_j}{\pi_i} \left( \frac{\omega_j \pi_j}{\omega_i \pi_i} \right)^{\frac{1}{\varepsilon}}} \forall i \quad (5)$$

# Random Behavioural Model

Assume:

$$\tilde{Y}_i \sim \text{Dirichlet}(a_i), \quad E[\tilde{Y}_i] = \tilde{y}_i^* \quad (6)$$

where:

$$\tilde{y}_i^* = 1 \left[ 1 + \sum_{j \neq i}^N \frac{\pi_i}{\pi_j} \left( \frac{\omega_j \pi_j}{\omega_i \pi_i} \right)^{\frac{1}{\varepsilon}} \right]^{-1} \quad \forall i. \quad (7)$$

Estimate parameters  $\varepsilon$ ,  $\beta$  and  $\sigma$  by:

$$\max(LL_j) = \sum_{t=1}^T \log \left( \frac{\Gamma \left( \sum_{i=1}^3 a_{ijt} \right)}{\prod_{i=1}^3 \Gamma(a_{ijt})} \prod_{i=1}^3 \tilde{y}_{ijt}^{a_{ijt}-1} \right) \quad (8)$$

Where:

$$\tilde{y}_i^*(\sigma - 1) = a_i \quad \forall i \quad (9)$$

	Shapely %R2		
	Coef.	Ind.	Group
<b>Demographics</b>			
Age	0.00	0.9	6.1
Female	-0.01	0.4	
Married	-0.02	1.3	
Born in UK	-0.03	0.6	
White	0.00	0.1	
Household Size	-0.01	2.4	
Children in HH	0.01	0.3	
<b>Education</b>			
- Postgraduate	-0.06*	2.8	4.8
- Undergraduate	-0.00	0.6	
- Secondary/Primary	0.03	1.2	
Private School	0.00	0.3	
<b>Employment</b>			
- Unemployed	-0.04	1.1	5.0
- Retired	-0.05	1.1	
- Student	0.02	1.3	
- Other	0.04	1.5	
<b>Occupation</b>			
- Manager/Professional	0.04	2.2	7.1
- Never Worked	0.05	1.7	
- Other	-0.03	3.2	
<b>Income/Wealth</b>			
Income (£k)	-0.00	1.0	6.4
Own Home	-0.05*	2.2	
Wealth: House (£k)	0.00*	2.1	
Wealth: Savings (£k)	0.00	1.1	
<b>Socioeconomic Position</b>			
Subjective SES	-0.00	0.1	0.1

	Shapely %R2		
	Coef.	Ind.	Group
<b>Social/Cultural Capital</b>			
Social Capital: Mean	0.00	2.6	5.5
Social Capital: Count	0.00	2.0	
Cultural Capital: Highbrow	-0.00	0.4	
Cultural Capital: Emerging	0.00	0.6	
<b>Country</b>			
- N. Ireland	0.01	0.0	1.0
- Scotland	0.02	1.0	
- Wales	0.02	0.0	
<b>Health</b>			
Health: Likert 0-100	0.00	1.8	11.4
Self-Assessed Health	-0.01	0.8	
Subjective Life Expectancy	-0.00	1.7	
Health Condition	0.07**	4.7	
Health Condition: Family	0.01	0.9	
Treated for COVID-19	0.03	1.4	
<b>Health Behaviour</b>			
Cigarettes Smoked Per Day	-0.00	1.7	5.3
Alcohol Units Per Week	0.00	1.5	
Exercise Hours Per Week	-0.00	2.0	
<b>Health Preferences</b>			
- Risk Aversion	0.01	1.3	23.6
- Inequity Aversion: Disad.	0.05	3.9	
- Inequity Aversion: Advan.	0.13***	18.4	
<b>Political Views</b>			
- Left-Right	-0.02***	11.4	12.4
- Libertarian-Authoritarian	0.01	0.9	
<b>Beliefs</b>			
- Average QALE in UK	-0.00***	11.3	11.3
Constant	0.66***		

Figure: Median Inequality Aversion By QALE Beliefs

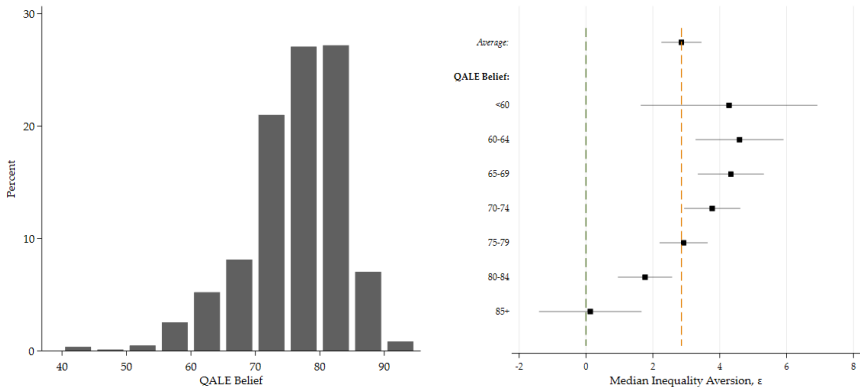


Figure: Left-Right and Libertarian-Authoritarian Values by Political View

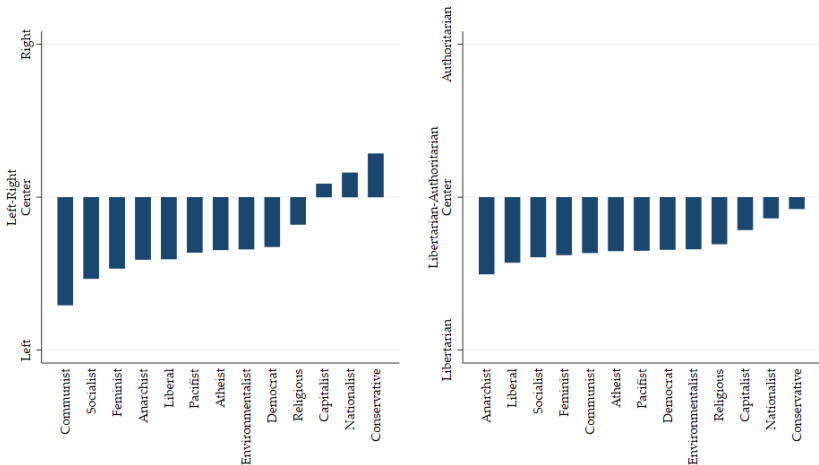


Figure: \*

Table: Inequality Aversion and Political Views

	(1)		
	Inequality	Aversion	Rank
	Coef.	N	R2
<b>Political Views</b>			
- Anarchist	0.034	832	0.000
- Communist	0.120*	832	0.003
- Socialist	0.039	832	0.003
- Feminist	0.082***	832	0.014
- Environmentalist	0.023	832	0.001
- Pacifist	0.066**	832	0.006
- Liberal	0.043*	832	0.004
- Democrat	0.031	832	0.002
- Capitalist	-0.062*	832	0.004
- Atheist	0.036	832	0.003
- Religious	-0.003	832	0.000
- Conservative	-0.004	832	0.000
- Nationalist	-0.077	832	0.003

Observations