Shocking views on Climate Action

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April 2024

What drives Support for Climate Policies?

- We test if major events serve as a potential shock to these opinions
  - akin to the Schumpeter waves of innovation

1. Russian invasion of Ukraine in 2022.
   - **Information Shock**: you learn about war → both pro and antiwar people go into propaganda overdrive → Either there is a de-polarisation OR entrenched ideologies reinforce existing stances
   - **Price Shock**: even if you somehow are isolated from all of this you can experience that suddenly fuel prices went up (actually speaking of this: can we see how much there was variation in the fuel price shock in 21-22 across states, ?) which might affect your views on climate action
   - **Interaction**
2. COVID
3. Other shocks

Preview

- Russian Invasion had an **anti-climate** effect on **men** and **racists**, but those experiencing price shock went **pro-climate**
  - **Pro-lifers**, **Anti-Vaxxers**, **Anti-Immigration** folks became **techno-optimists** after experiencing the price-shock

- COVID had a generally **anti-climate** effect on **anti-Redistribution**, but those experiencing higher severity of COVID went **pro-climate**
  - **Racists** and **Anti-Tax** folks became less **techno-optimists** after witnessing COVID severity. **Men** had the opposite effect.

Data

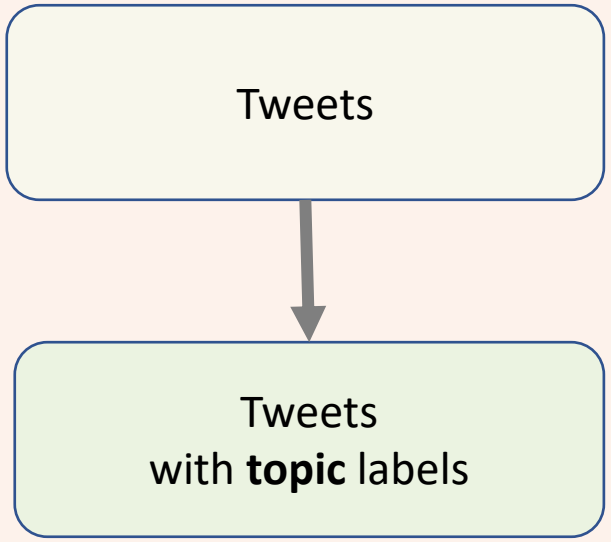
1. **Twitter**
   - Panel of 300K random US users from 2013-2022
   - Features extracted via LLMs on user tweets, RTs, comments, names.
   - Unlike traditional polls, we can observe within-user changes

2. Motor gasoline average **price** (State by year) by Department of Energy (EIA)
   - Most salient experience of price change

3. COVID **cases** by JHU

Tweets

- Evidence from **300,000 random users from US**
- Includes their tweets, retweets, comments, bio, and more
- Several features of users extracted via LLMs.
- Ability to track individuals over time
- Allows for within-user changes in expression



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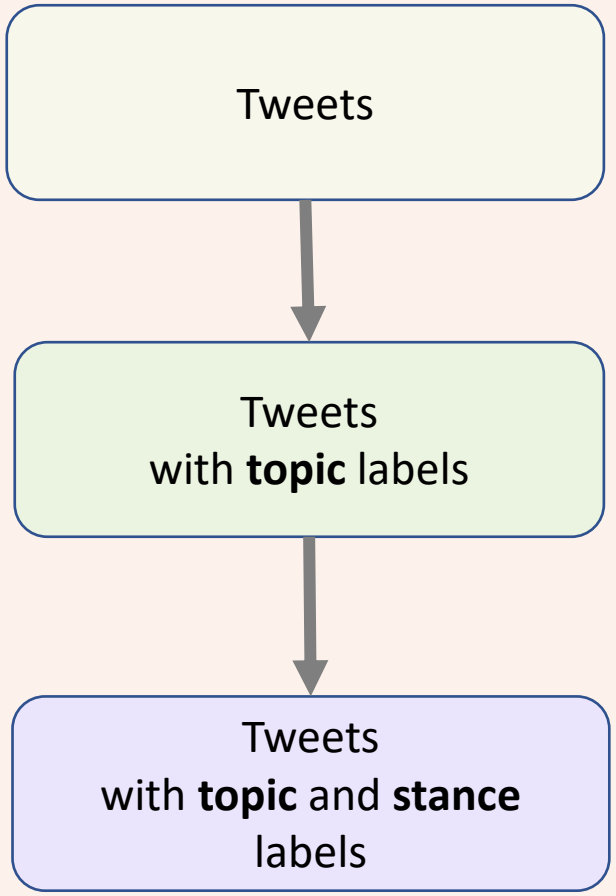
Topic Retrieval

Topics, $\tau \in$ {**Climate Action**, Income Redistribution, Free Trade, Welfare State, Tax Policy, Immigration, Vaccines, Abortion Rights, Racism or Race Relations}



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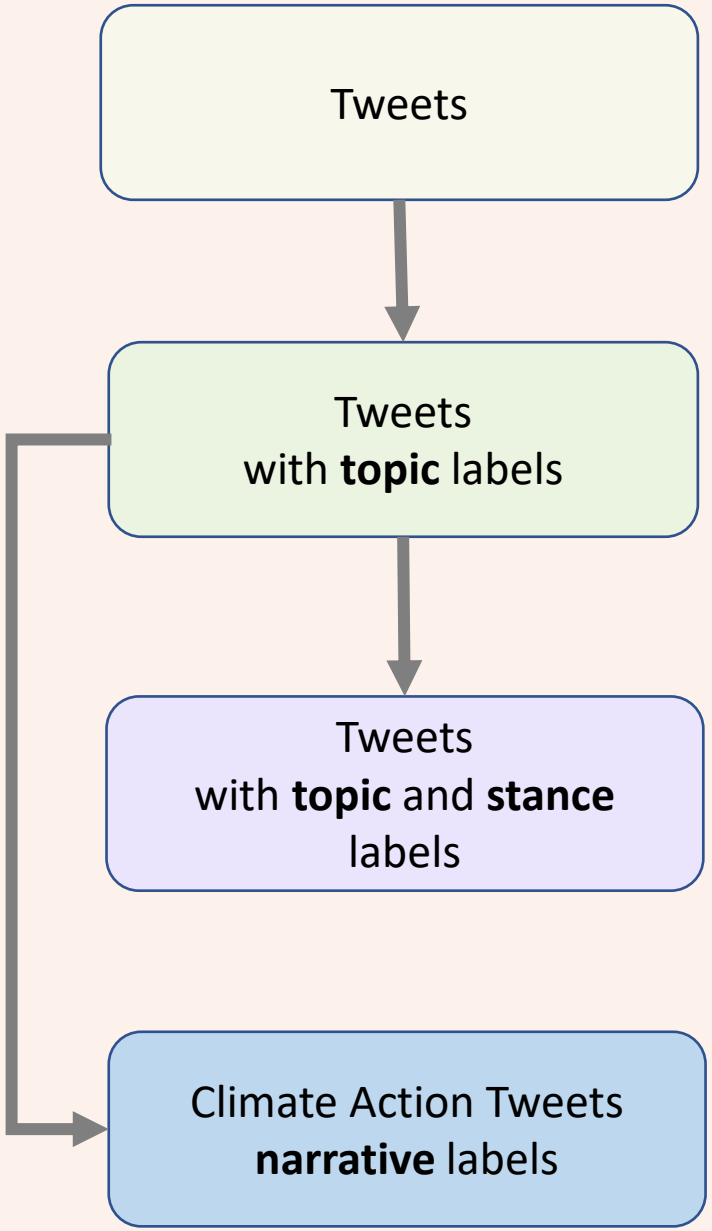
Stance detection

Stance$^{(\tau)} \in \{pro^{(\tau)}, anti^{(\tau)}, neutral^{(\tau)}\}$



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Narrative detection

Narrative $\in$ {Techno−Optimist, Behavioural Adjustment Advcate, Both, Neither}

Detecting climate topics, stances and narratives

- LLM-augmented keyword dictionary for **topic** retrieval (GPT-4, temp=0.8):

  Provide a list of *<ngrams>* related to the topic of *<topic>* in the year *<year > <twitter fine tuning>.* Provide the *<ngrams>* as a comma-separated list.'

- **Stance** detection (GPT3.5T, temp = 0.2)

  Classify this tweet's stance towards <topic> as 'pro', 'anti', 'neutral', or 'unrelated'. Tweet: *<tweet>*.'

- **Narrative** extraction (GPT3.5T, temp = 0.2)

  Review the tweet provided and determine if it aligns more with the perspective of a Technology Optimist (who focuses on technological innovations and advancements as key solutions to climate change), a Behavioural Adjustment Advocate (who emphasizes the importance of individual and societal behavior changes for environmental sustainability), both, or neither. Use the following format for your response: 'Classification: [Technology Optimist/Behavioural Adjustment Advocate/Both/Neither]

  Tweet: '*<tweet>*'.

1. Climate Action Opinion in US - **Across Users**

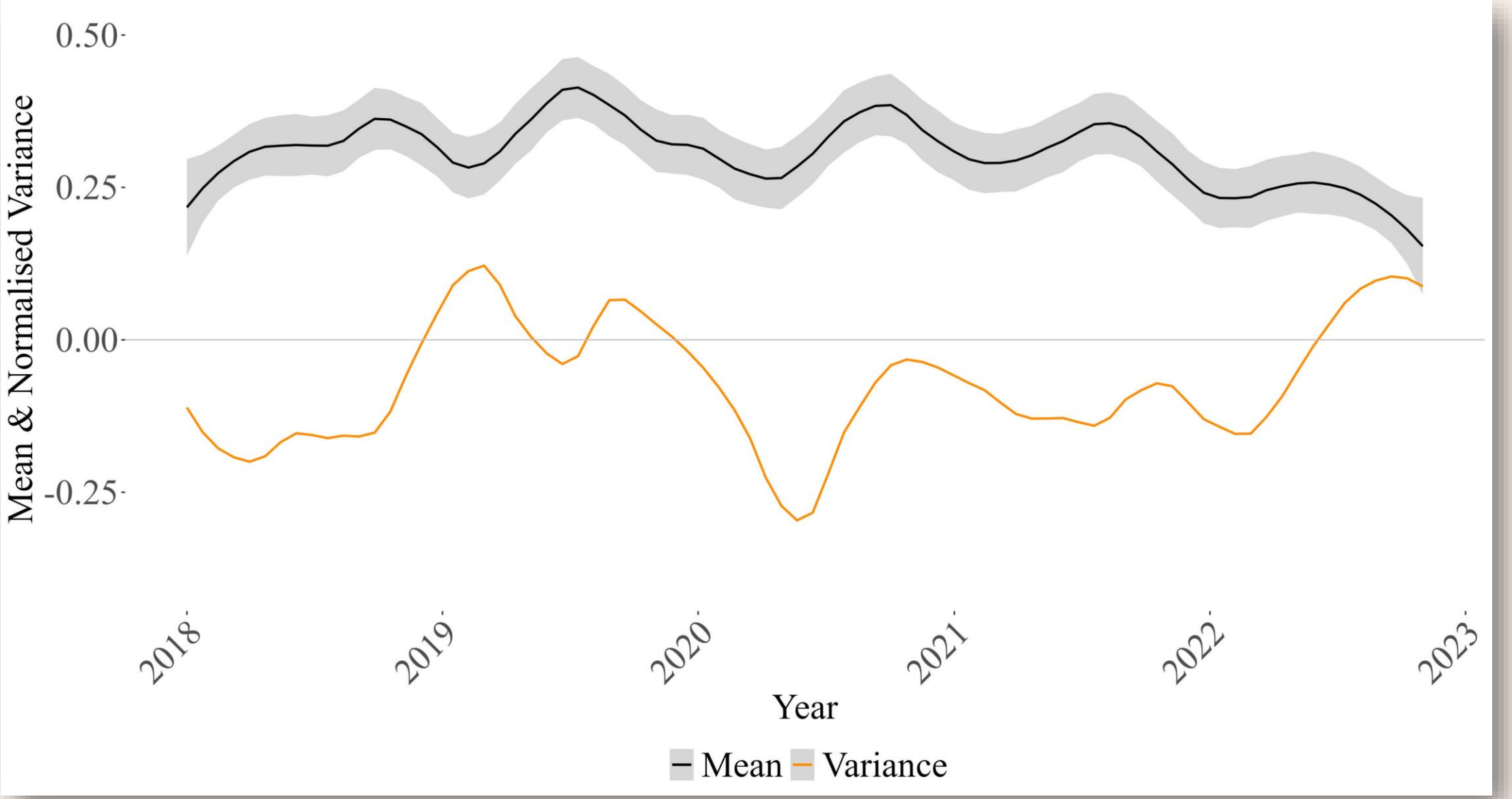
Panel at the level of user (u) by year-month (t) by topic (τ)

$$\text{Stance}_{ut}^{(\tau)} \equiv \frac{pro_{ut}^{(\tau)} - anti_{ut}^{(\tau)}}{pro_{ut}^{(\tau)} + anti_{ut}^{(\tau)} + neutral_{ut}^{(\tau)}}$$

Descriptive measures

- Mean → To measure **Average Public opinion**
- Variance → To measure **Polarization** across users.

Support for and Polarization in Climate Action Opinion in the US during 2018-2022



2. Climate Action Opinion - **Within-user** Trend

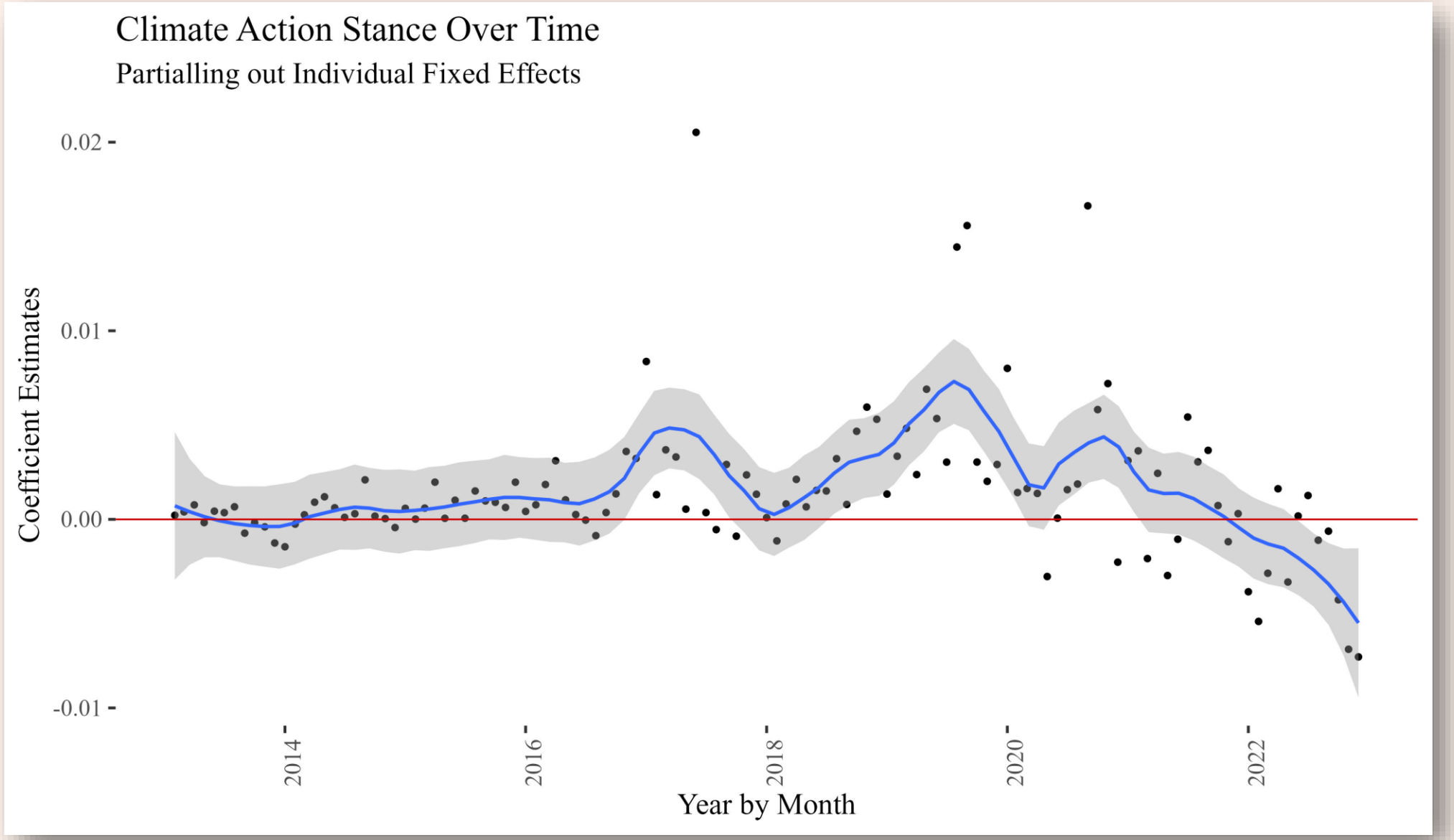
Partialling Out Individual Fixed Effects

$$\text{Stance}_{ut}^{(\tau)} = \alpha + \beta_t(Time_t) + \mu_u + \epsilon_{ut}$$

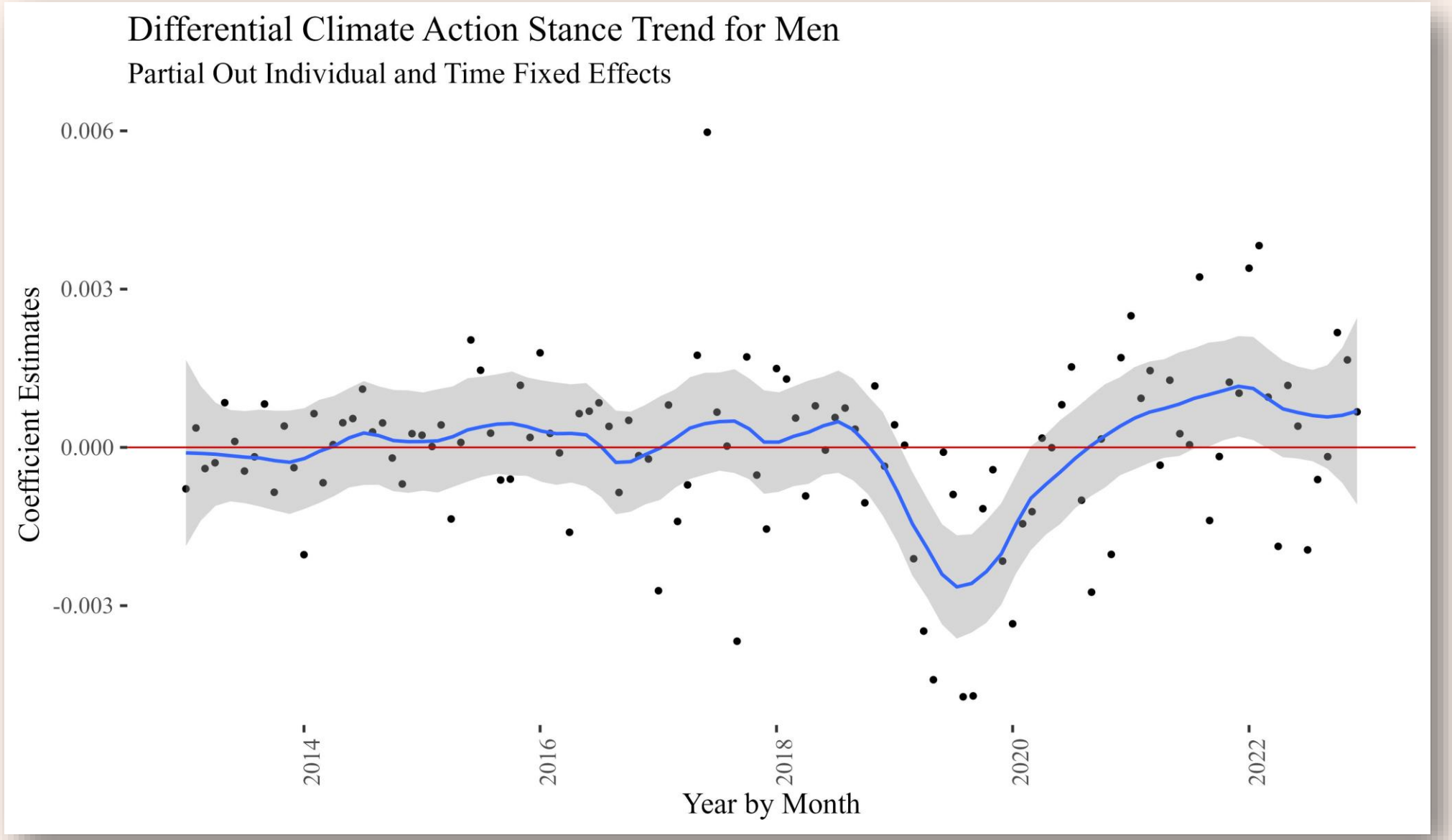
- $\beta_t(Time_t)$ is “effect” of a time-period (year x month)
- μ_u is the user-specific F.E

Plotting the $\boldsymbol{\beta_t}$

$$\text{Stance}_{ut}^{(\tau)} = \alpha + \boldsymbol{\beta_t}(Time_t) + \mu_u + \epsilon_{ut}$$



$$\text{Stance}_{ut}^{(\tau)} = \alpha + \beta_t(Time_t \times Identity_u) + \mu_u + \lambda_t + \epsilon_{ut}$$



Other Measures

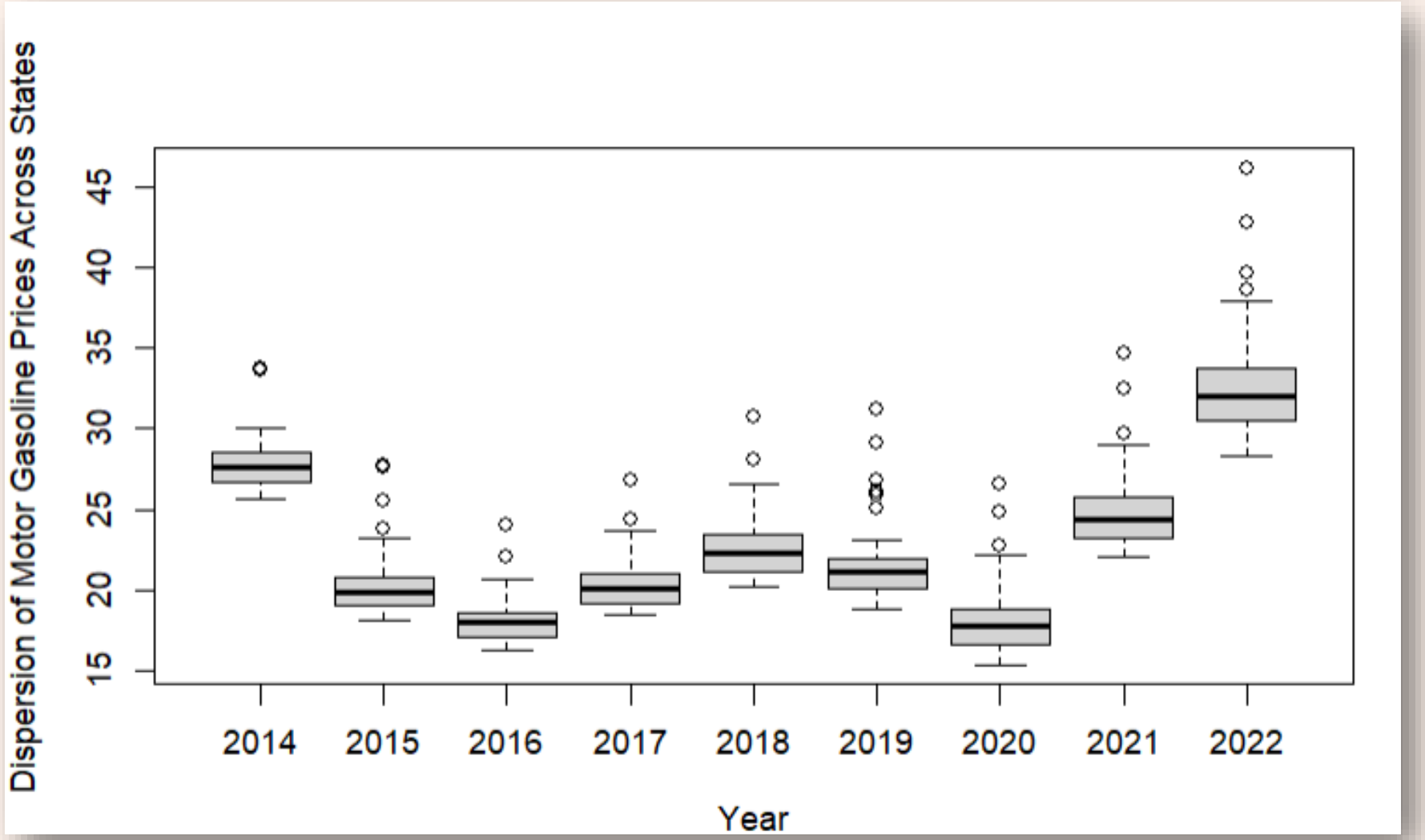
- **Location**: GPS (15% users) + user supplied location extracted from bio using LLM (38% users). Match between GPS and USL is 85%. Union is 42% of users.
- **Gender**: Extracted from profile names for 44% users using LLM. 48(f):52(m) split.
- **Behavioural**: (i) toxicity, (ii) egocentrism and (iii) emotionality

What explains the change in climate opinion?

$$\Delta\text{Stance}_u^{(\tau)} = \alpha + \beta_1 \rho_s + \beta_2 X_u + \beta_3 \rho_s X_u + \epsilon_u$$

- $\Delta\text{Stance}_u^{(\tau)} = \text{Stance}_{u,Post}^{(\tau)} - \text{Stance}_{u,Pre}^{(\tau)}$
- Build 6 months window around for *Pre* and *Post* periods
- $\rho_s = \log(P_{s,Post}) - \log(P_{s,Pre})$ ← %change in state-level price of motor gasoline:
- X_u are twice-lagged indicators for whether user is
  - (1) Trump Supporter, (2) Racist, (3) Pro-Life, (4) Climate Skeptic, (5) Anti-Vaxxer, (6) Anti-Tax, (8) Anti-Redistribution, (9) Anti-Immigration,
  - (10) Male,
  - (11) Toxic, (12) Emotional, (13) Egocentric

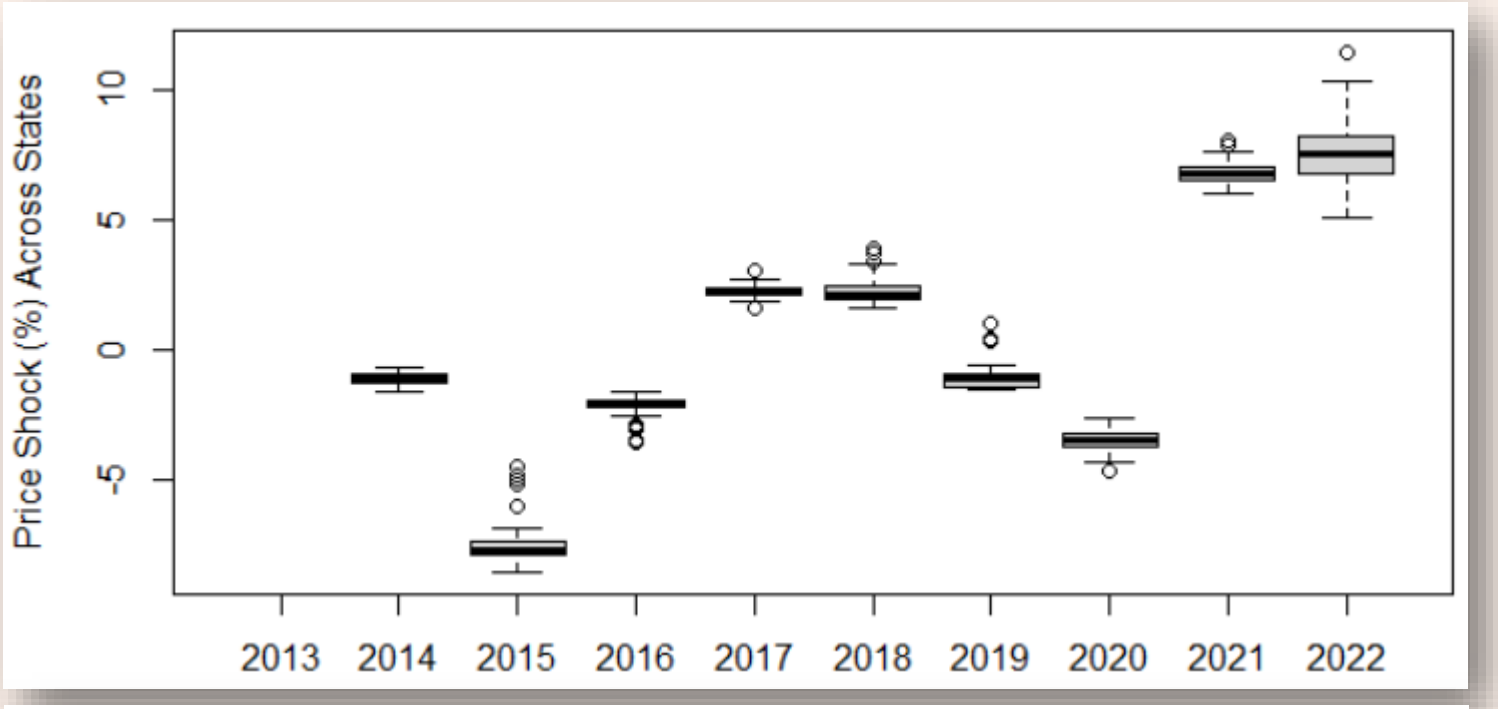
Variation in Motor Gasoline Prices Across States

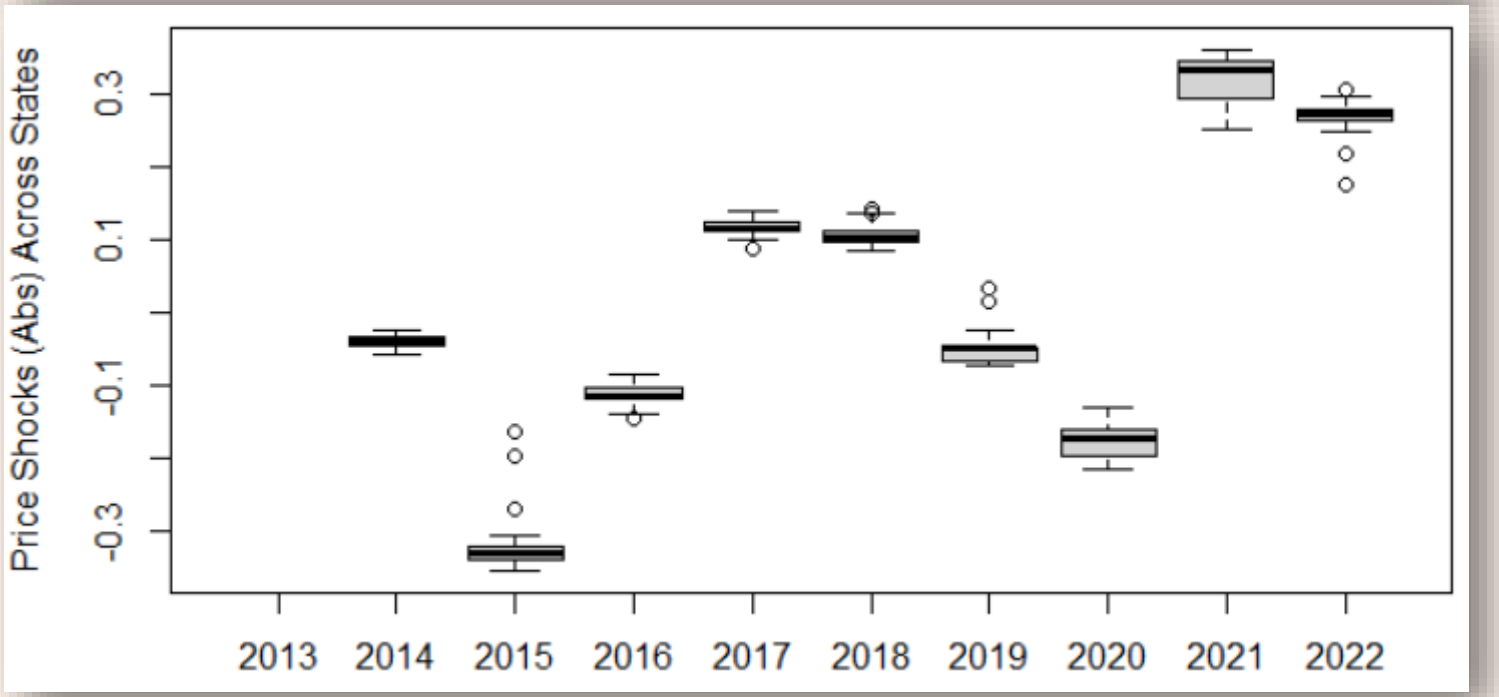


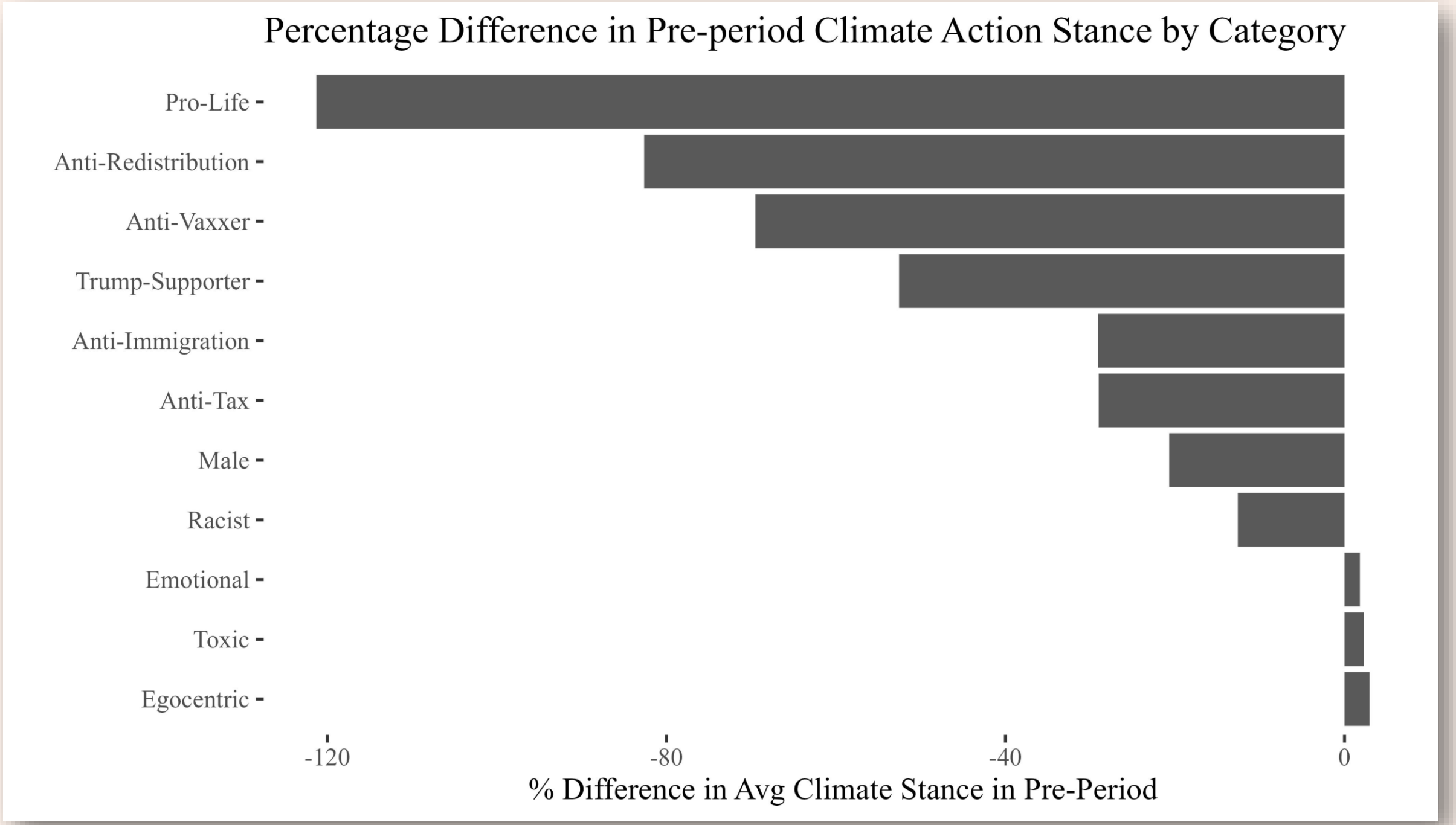
Variation in Price Shocks Across States

1. % change
   - ✓ scale independence

2. Absolute change
   - ✓ direct budgetary impact

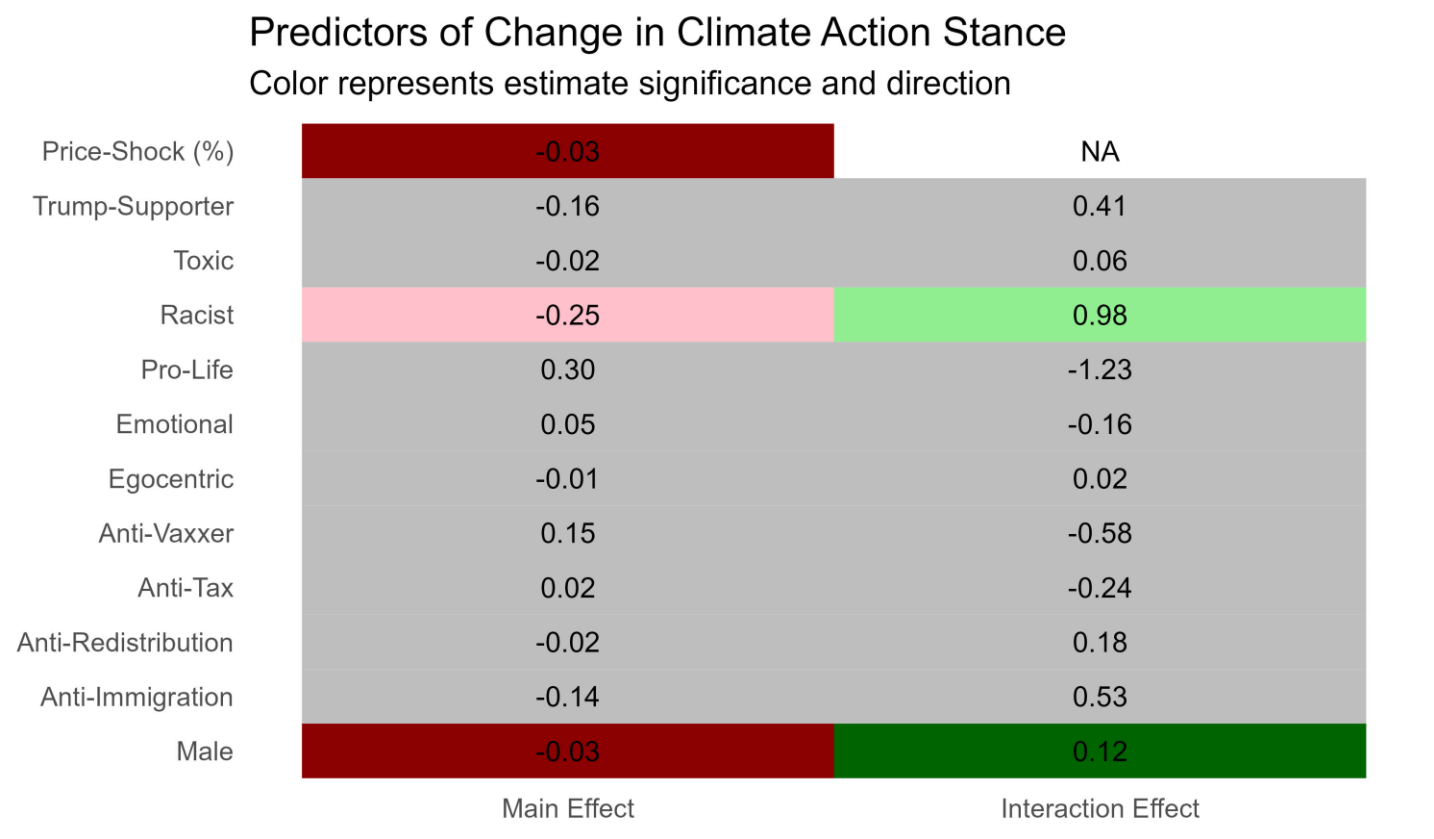





Percentage Difference in Pre-period Climate Action Stance by Category
Pro-Life
Anti-Redistribution
Anti-Vaxxer
Trump-Supporter
Anti-Immigration
Anti-Tax
Male
Racist
Emotional
Toxic
Egocentric
-120
-80
-40
0
% Difference in Avg Climate Stance in Pre-Period

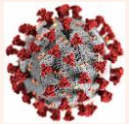
Shock #1 Russian Invasion

$$\Delta \text{Stance}_u^{(\tau)} = \alpha + \beta_0 \rho_s + \sum_i^N \beta_i X_{ui} + \beta_{i+N} \rho_s X_{ui} + \epsilon_u$$



Dependent Variable:	Delta-Stance		
Model:	(1)	(2)	(3)
Variables			
Constant	0.02***	0.02***	0.009***
	(0.003)	(0.003)	(0.003)
Male	-0.03***	-0.03***	
	(0.007)	(0.007)	
Racist	-0.22		-0.22
	(0.14)		(0.14)
Price-Shock (%)	-0.06***	-0.06***	-0.03***
	(0.01)	(0.01)	(0.01)
Male × Price-Shock (%)	0.11***	0.11***	
	(0.03)	(0.03)	
Racist × Price-Shock (%)	0.88		0.87
	(0.53)		(0.53)
Fit statistics			
Observations	126,814	126,814	126,814
R^2	0.00019	0.00011	9.58×10^{-5}
Adjusted R^2	0.00015	8.68×10^{-5}	7.22×10^{-5}

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Shock #2 COVID  and cases

$$\Delta\text{Stance}_u^{(\tau)} = \alpha + \beta_0 \rho_s + \sum_i^N \beta_i X_{ui} + \beta_{i+N} \rho_s X_{ui} + \epsilon_u$$

Predictors of Change in Climate Stance after COVID Shock

Color represents estimate significance and direction

	Main Effect	Interaction Effect
%Change Cases	0.00	NA
Trump-Supporter	-0.15	0.04
Toxic	0.03	-0.01
Racist	-0.11	0.02
Pro-Life	0.30	-0.05
Emotional	-0.07	0.01
Egocentric	0.02	-0.01
Anti-Vaxxer	-0.20	0.03
Anti-Tax	-0.10	0.01
Anti-Redistribution	-0.26	0.06
Anti-Immigration	0.11	-0.02
Male	0.00	-0.00
(Intercept)	-0.00	NA

Dependent Variable:	Delta-Stance				
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Constant	0.0004		-0.009***	-0.009**	0.0004
	(0.002)		(0.003)	(0.004)	(0.002)
Egocentric	0.02	0.02	-0.008		
	(0.02)	(0.02)	(0.01)		
Anti-Redistribution	-0.26	-0.26		-0.27*	
	(0.16)	(0.16)		(0.16)	
Emotional	-0.04***	-0.04***			-0.03**
	(0.01)	(0.01)			(0.01)
%Change Cases	0.0004		0.002***	0.002*	0.0004
	(0.0005)		(0.0006)	(0.0008)	(0.0005)
Egocentric × %Change Cases	-0.006*	-0.006*	-0.0002		
	(0.003)	(0.003)	(0.003)		
Anti-Redistribution × %Change Cases	0.06*	0.06**		0.06**	
	(0.03)	(0.03)		(0.03)	
Emotional × %Change Cases	0.006**	0.006**			0.003
	(0.003)	(0.003)			(0.002)
Fixed-effects					
State		Yes			
Fit statistics					
Observations	126,814	126,814	126,814	126,814	126,814
R^2	0.00184	0.00232	0.00080	0.00068	0.00097
Within R^2		0.00179			

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

What Shifts Climate Narrative?

Do we see a Schumpeter wave of Ideological Innovation?

Two broad camps within Climate Action

Techno Optimists

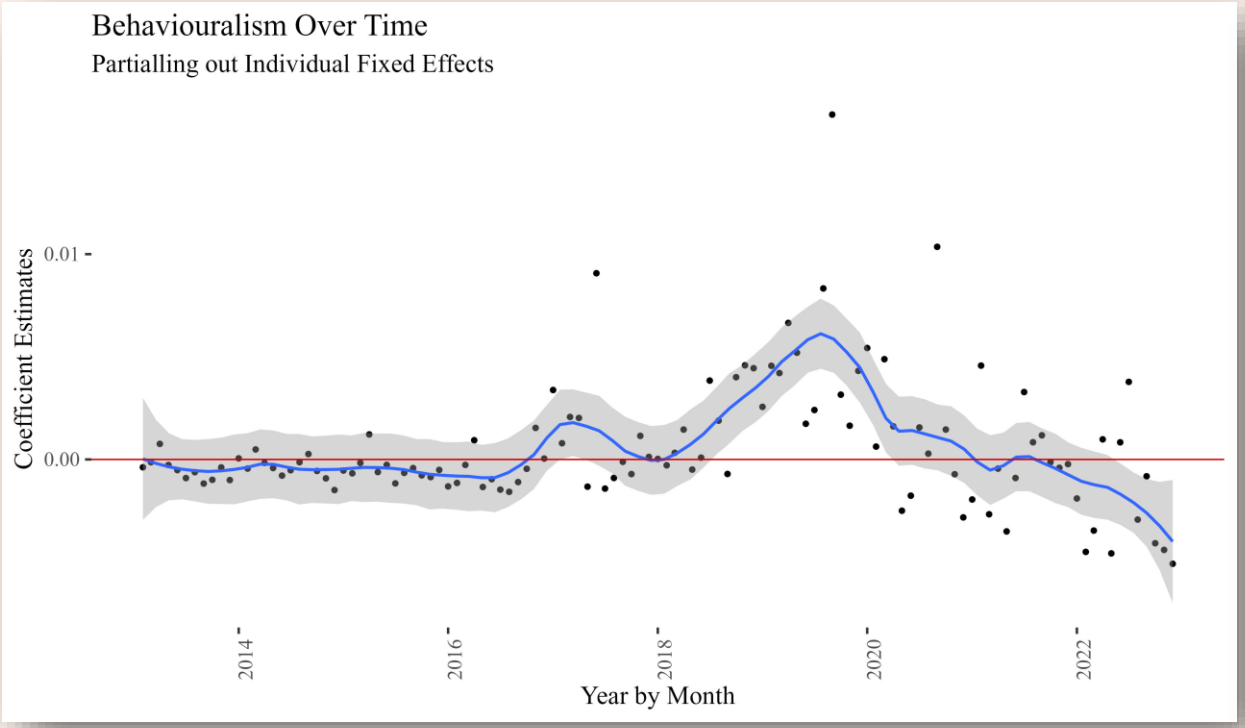
Behavioural Adjustment Advocates

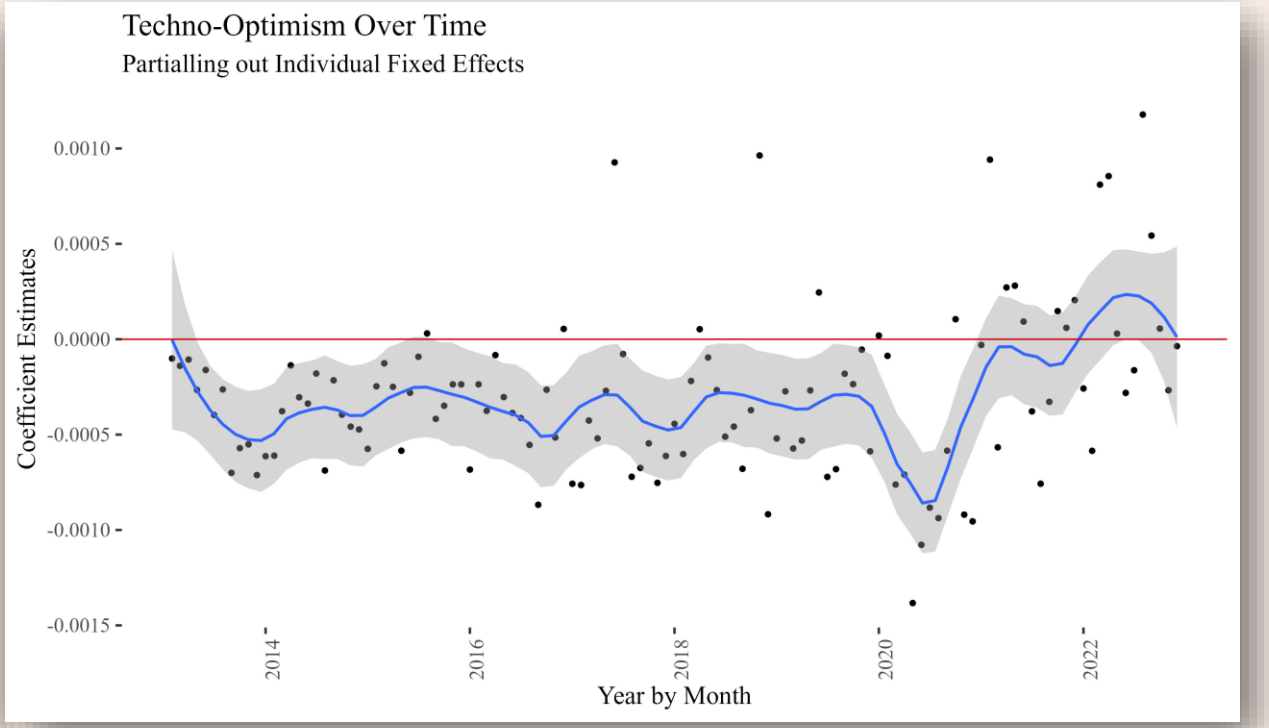
Narrative descriptives

Narrative	Example	Share
Techno-optimism	@CarlLippert actually I have the answer. Ag needs to focus on good marketing and product innovation, just like every other business has to. Ignore the misinformation for the most part. Modernize, continue to embrace sustainability and technological innovation. Oh, and don't be a**holes...	12%
Behavioural change	Don’t waste food. Save energy. Recycle. What is your #ClimateAction for a #Zero Hunger world? We all need to act now! EarthDay #WeLoveTheEarth	26%
Both	More consumer choice = more consumer freedom. DEP is drafting rules to make electric and zero emissions vehicles more available to PA drivers. And through the #DrivingPAForward program we are installing more chargers in more places across PA!	14%
Neither	The anti-vax movement is listed by the WHO as a key global health threat, along with pathogens such as dengue and pandemic #flu and crises including antibiotic resistance and climate change.	47%

Plotting the $\boldsymbol{\beta_t}$

$$\text{Narrative}_{ut}^{(\tau)} = \alpha + \boldsymbol{\beta_t}(Time_t) + \mu_u + \epsilon_{ut}$$

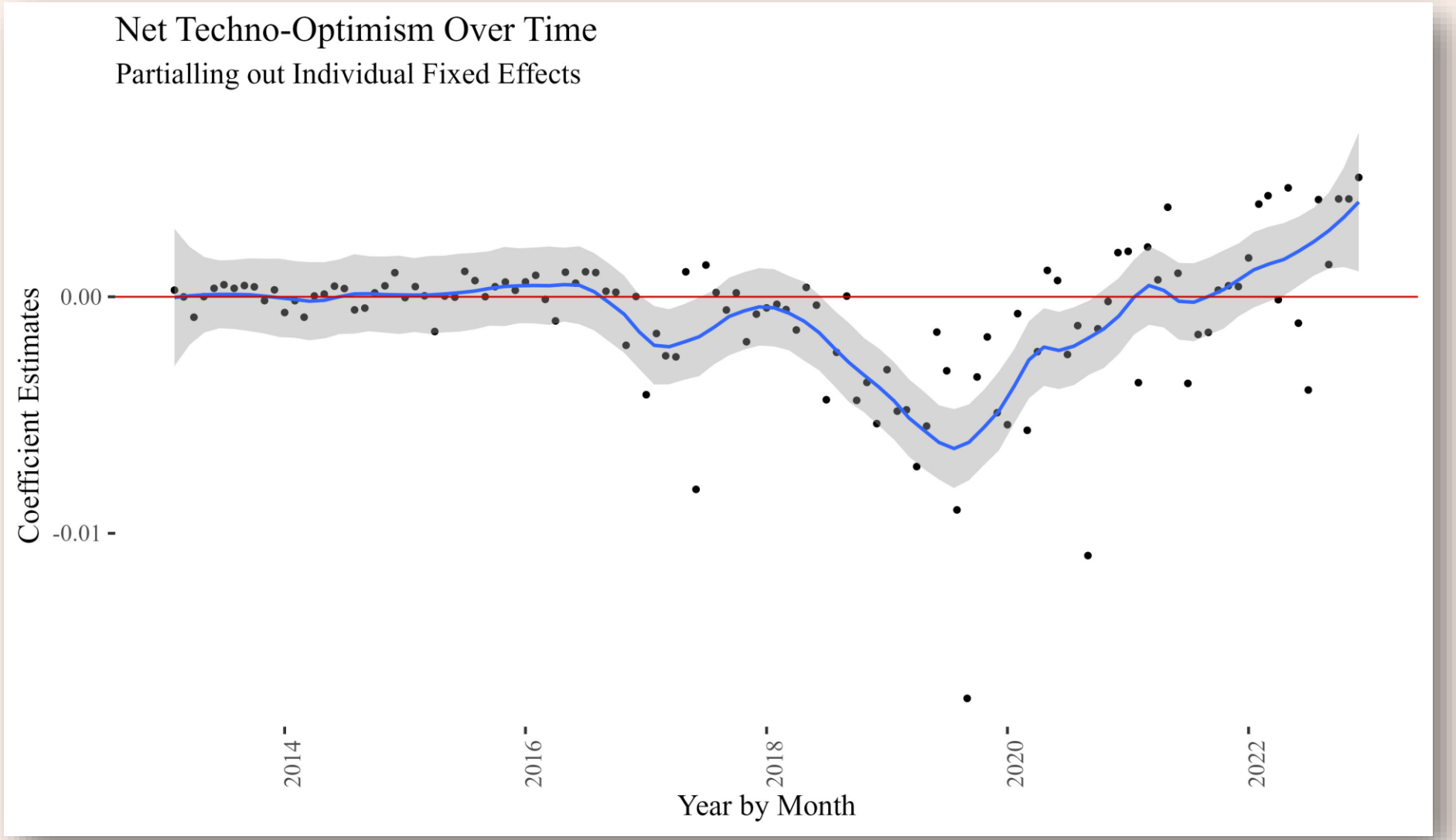




$$\text{Narrative}^{Beh} \equiv \frac{Beh}{Tech + Beh + Both + Neither}$$

$$\text{Narrative}^{Tech} \equiv \frac{Tech}{Tech + Beh + Both + Neither}$$

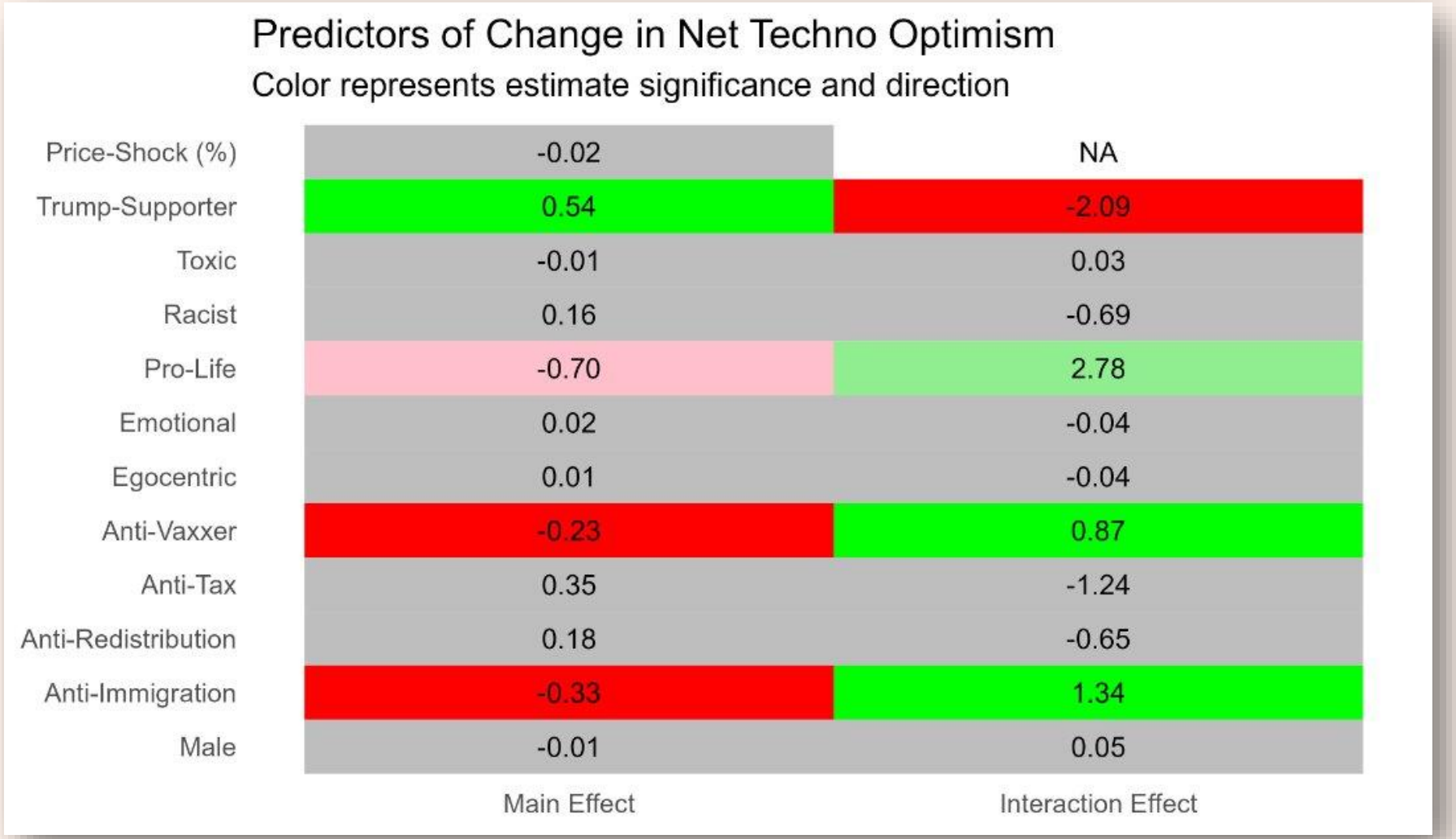
$$\text{Narrative}_{ut}^{(\tau)} = \alpha + \boldsymbol{\beta_t}(Time_t) + \mu_u + \epsilon_{ut}$$



$$\text{Narrative}^{NetTech} \equiv \frac{Tech\ -Beh}{Tech + Beh + Both + Neither}$$

Shock 1: Russian Invasion

$$\Delta\text{Narrative}_u^{(\tau)} = \alpha + \beta_0\rho_s + \sum_i^N \beta_i X_{ui} + \beta_{i+N}\rho_s X_{ui} + \epsilon_u$$



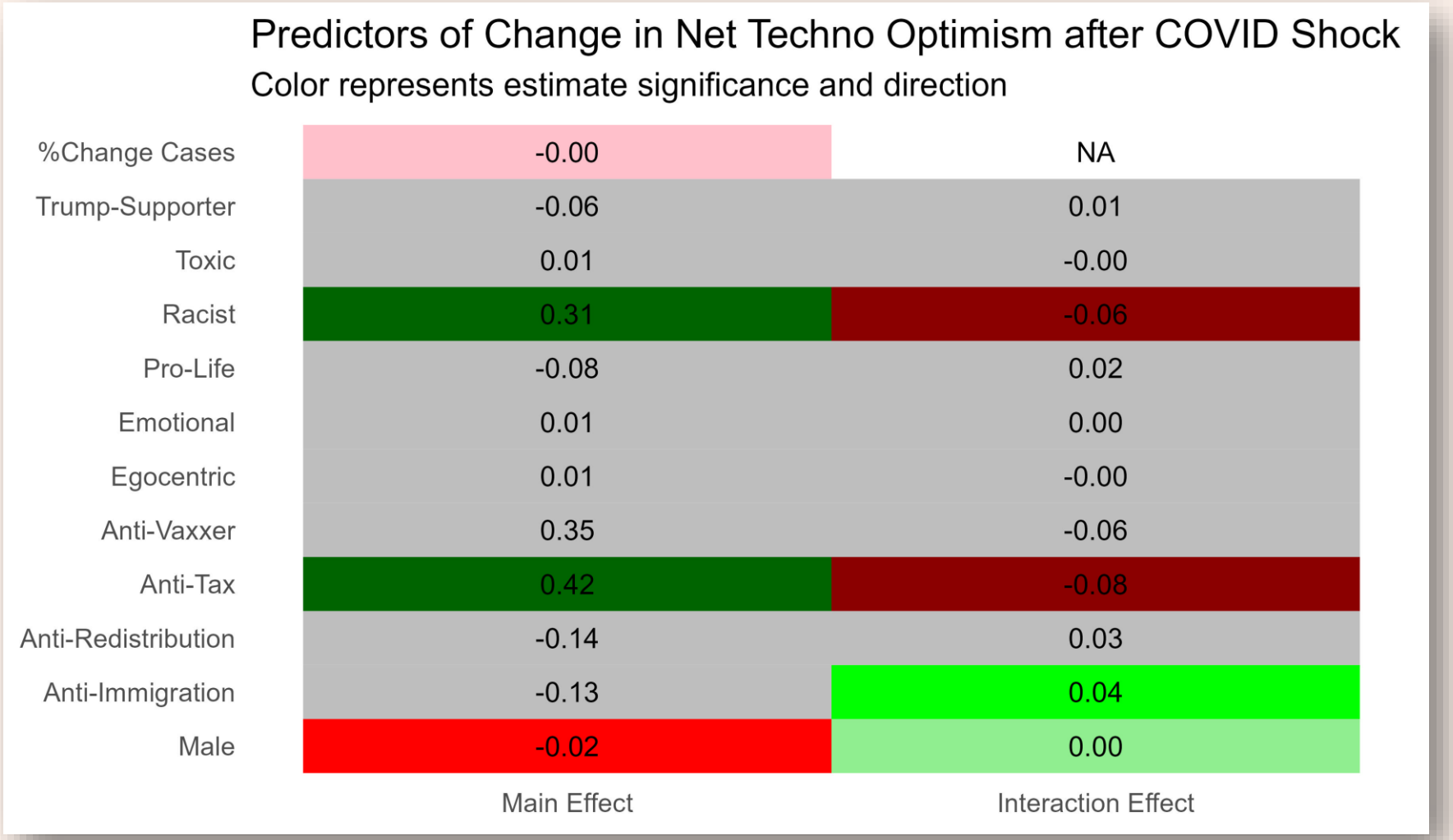
Dependent Variable:	Delta-Narrative					
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Constant	0.005*		0.0009	0.003	0.004	0.004
	(0.003)		(0.003)	(0.003)	(0.003)	(0.003)
Trump-Supporter	0.56**	0.55**	0.34			
	(0.27)	(0.27)	(0.23)			
Pro-Life	-0.57	-0.57		-0.62*		
	(0.36)	(0.36)		(0.37)		
Anti-Immigration	-0.23*	-0.23*			-0.28***	
	(0.14)	(0.14)			(0.09)	
Anti-Vaxxer	-0.18*	-0.18*				-0.20**
	(0.10)	(0.10)				(0.08)
Price-Shock (%)	-0.02*		-0.004	-0.01	-0.02	-0.02
	(0.01)		(0.01)	(0.01)	(0.01)	(0.01)
Trump-Supporter × Price-Shock (%)	-2.1**	-2.1**	-1.2			
	(1.0)	(1.0)	(0.84)			
Pro-Life × Price-Shock (%)	2.3*	2.3*		2.6*		
	(1.4)	(1.4)		(1.4)		
Anti-Vaxxer × Price-Shock (%)	0.69*	0.70*				0.78**
	(0.38)	(0.38)				(0.32)
Anti-Immigration × Price-Shock (%)	0.96*	0.97*			1.2***	
	(0.52)	(0.52)			(0.36)	
Fixed-effects						
State		Yes				
Fit statistics						
Observations	126,814	126,814	126,814	126,814	126,814	126,814
R^2	0.00156	0.00191	9.32×10^{-5}	0.00074	0.00072	0.00026
Within R^2		0.00156				

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Shock 2: COVID and cases

$$c_s = \log(Cases_{s,Post}) - \log(Cases_{s,Pre})$$

$$\Delta\text{Narrative}_u^{(\tau)} = \alpha + \beta_0 c_s + \sum_i^N \beta_i X_{ui} + \beta_{i+N} c_s X_{ui} + \epsilon_u$$



Dependent Variable:	Delta-Narrative					
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Constant	0.01***		0.007	0.006	0.009**	0.01**
	(0.004)		(0.005)	(0.004)	(0.004)	(0.005)
Racist	0.32***	0.32***	0.31***			
	(0.10)	(0.10)	(0.10)			
Anti-Tax	0.39***	0.39***		0.34**		
	(0.14)	(0.14)		(0.14)		
Anti-Immigration	-0.14	-0.14			-0.08	
	(0.08)	(0.08)			(0.09)	
Male	-0.02*	-0.02*				-0.02*
	(0.008)	(0.008)				(0.008)
%Change Cases	-0.002***		-0.001	-0.0009	-0.002**	-0.002**
	(0.0008)		(0.0009)	(0.0009)	(0.0007)	(0.0009)
Racist × %Change Cases	-0.06***	-0.06***	-0.06***			
	(0.02)	(0.02)	(0.02)			
Anti-Tax × %Change Cases	-0.07***	-0.07***		-0.06**		
	(0.03)	(0.03)		(0.03)		
Anti-Immigration × %Change Cases	0.04**	0.04**			0.03	
	(0.02)	(0.02)			(0.02)	
Male × %Change Cases	0.003*	0.003*				0.003*
	(0.002)	(0.002)				(0.002)
Fixed-effects						
State		Yes				
Fit statistics						
Observations	126,814	126,814	126,814	126,814	126,814	126,814
R^2	0.00292	0.00335	0.00022	0.00049	0.00239	4.11×10^{-5}
Within R^2		0.00289				

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Appendix

1. Measurement:
    - Topic detection
    - Stance detection and accuracy
    - Public Opinion on other topics
    - Geographic change in Climate Opinion post War
    - Twitter vs. Opinion Polls
    - Raw Narrative Trends (e.g. Techno-Optimism)
2. Results for other Shocks
    - Overview of results by Event Split-samples
    - Detailed interactions with select stances
    - Covid and Prices

Topics	Number of tweets	% of all topical tweets	% of all tweets
Abortion rights	272,019	4.35%	0.08%
Climate change (incl. policy)	1,220,941	19.60%	0.36%
Immigration (incl. policy)	1,360,435	21.72%	0.40%
Racism or race relations	1,230,517	19.65%	0.37%
Donald Trump	929,637	14.84%	0.28%
Income Redistribution	572,360	9.14%	0.17%
Welfare state	494,829	7.89%	0.15%
Progressive Taxation	539,416	8.61%	0.16%
Vaccines	182,285	2.90%	0.05%
All topical tweets	6,263,023	100%	1.86%
All tweets	336,718,325	-	-

Table 1: Tweets detected per Topic

Topics	% Pro	% Neut-ral	% Anti	No. of tweets	% of topical tweets
Abortion rights	34%	51%	16%	272,019	4.35%
Climate Action	40%	53%	7%	1,220,941	19.60%
Immigration	13%	62%	25%	1,360,435	21.72%
Racism	7%	18%	75%	1,230,517	19.65%
Donald Trump	9%	39%	52%	929,637	14.84%
Income Redistribution	22%	66%	12%	572,360	9.14%
Welfare state	19%	68%	12%	494,829	7.89%
Progressive Taxation	14%	69%	17%	539,416	8.61%
Vaccines	15%	69%	16%	182,285	2.9%
All topical tweets	20%	53%	27%	6,263,023	100%
All tweets	-	-	-	336,718,325	100.00%

Table 2: Stance composition of Topical Tweets

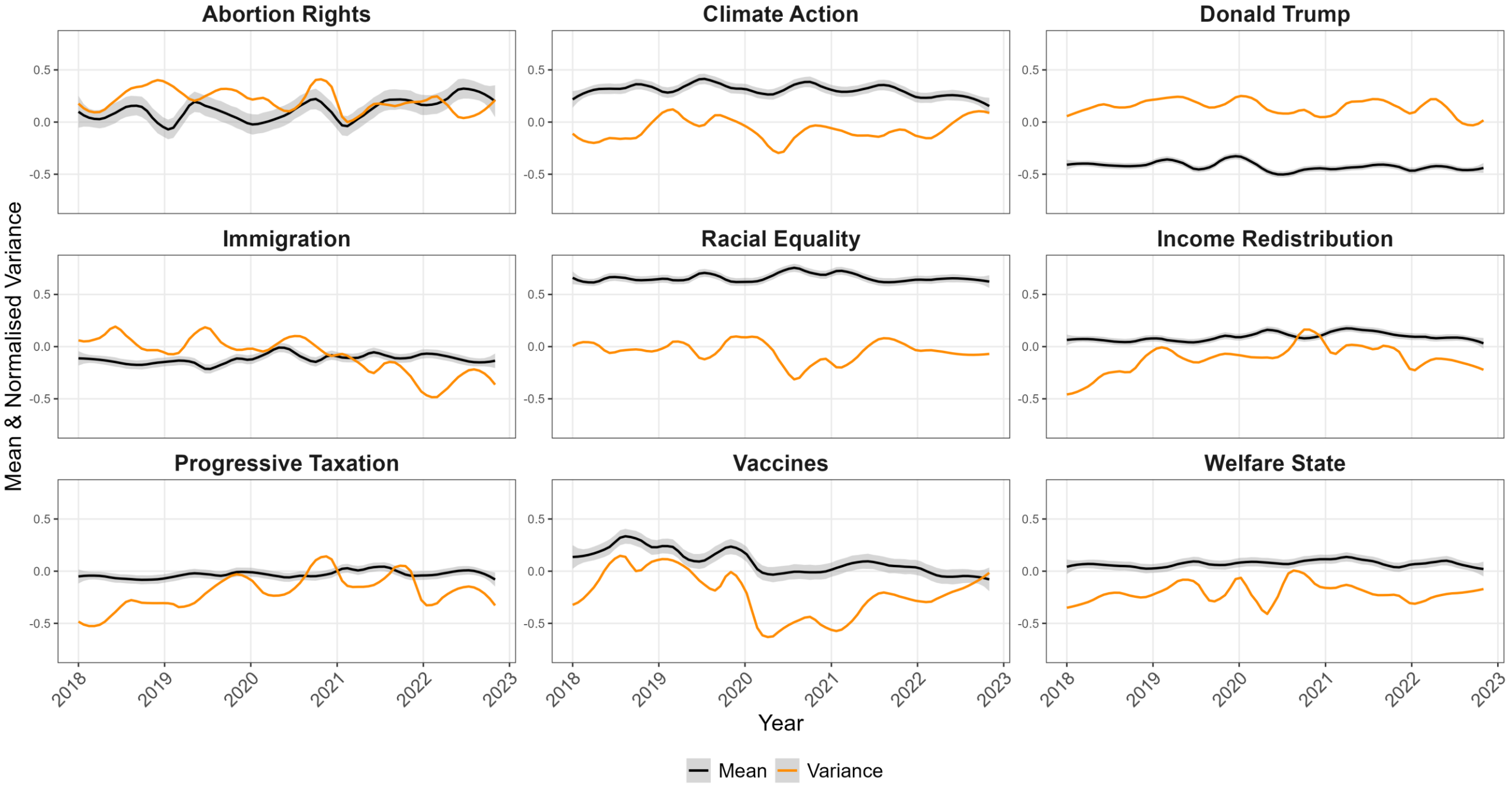
Example prompts and GPT responses

Prompts	Response
*Classify this tweet's stance: Is it supporting **racism** ('pro'), opposing racism ('anti'), neutral on the topic, or unrelated to racism? Tweet:* Still waiting on the Florida Governor to reject the endorsement of a neo-nazi, white supremacist.	Anti
*Classify this tweet's stance towards **fighting climate change** as 'pro' or 'anti' or 'neutral' or 'unrelated'? Tweet*: For the 1st time since 1984, renewables surpass nuclear as a percentage of US energy generation via @FortuneMagazine	Neutral
*Classify this tweet's stance towards **immigration** as 'pro' or 'anti' or 'neutral' or 'unrelated'? Tweet:* @ICEgov Your raids & deportations of long-term community members are unconscionable & violate our sacred values. #HereToStay @LaRed_PICO	Pro

Task	**Target**	**GPT 3.5 Turbo** (F_{avg})	**Winning team** (F_{avg})	**Winning team model**
A	Feminism	92.44	62.09	Transfer Learning using RNNs
A	Hillary Clinton	89.57	67.12	Genetic Algorithm Based Ensemble
A	Abortion	79.52	63.32	Character and Word-Level CNNs
B	Donald Trump	84.18	56.28	Rule-based deep CNNs

Table 1: Evaluation Metrics: GPT 3.5 Turbo vs. Winning Team in SemEval-2016

Aggregate trends for Users with Geo Data

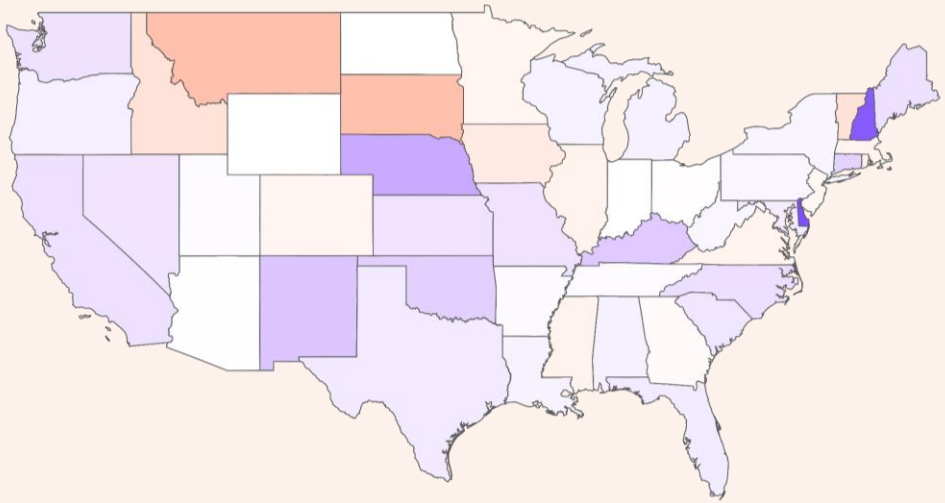


Russian Invasion

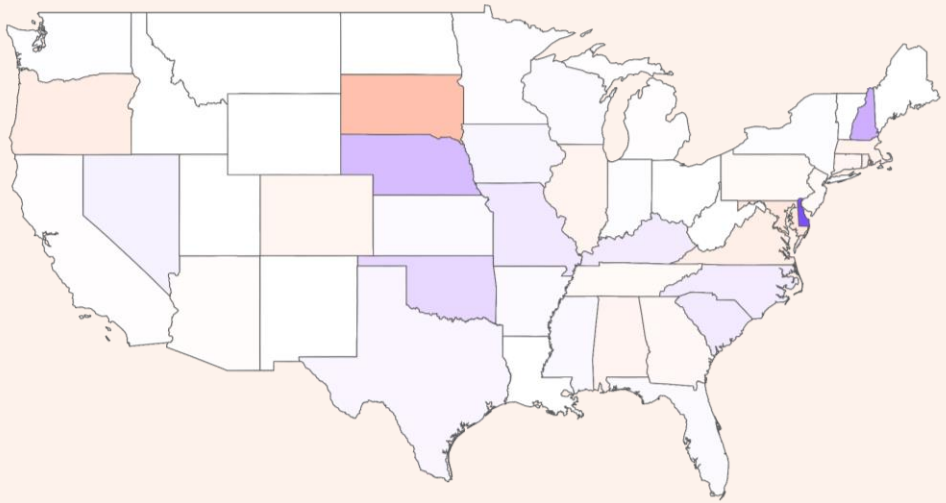
Before/after (1Y window)

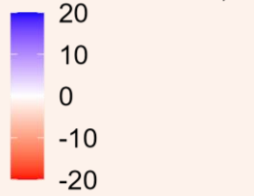
Pro → Anti

1 SD Shifts



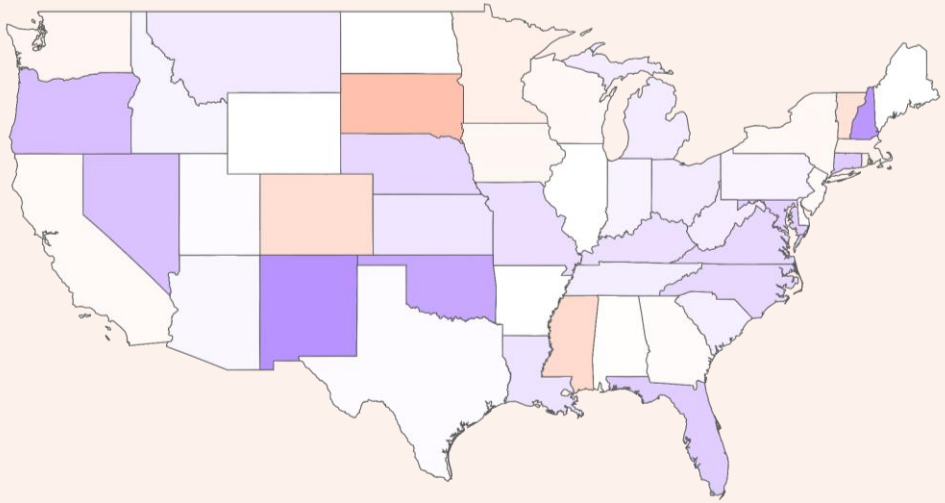
2 SD Shifts



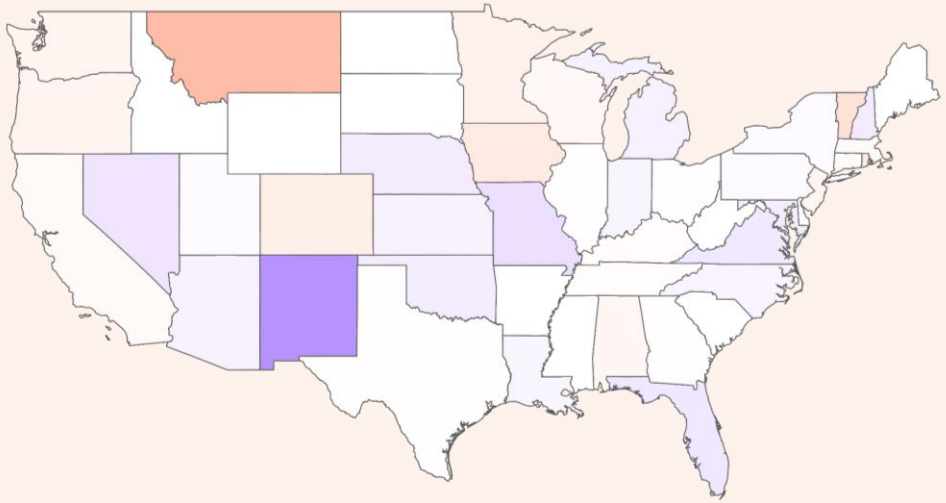


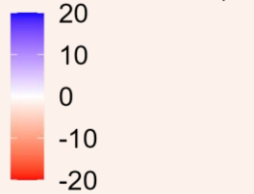
Anti → Pro

1 SD Shifts



2 SD Shifts

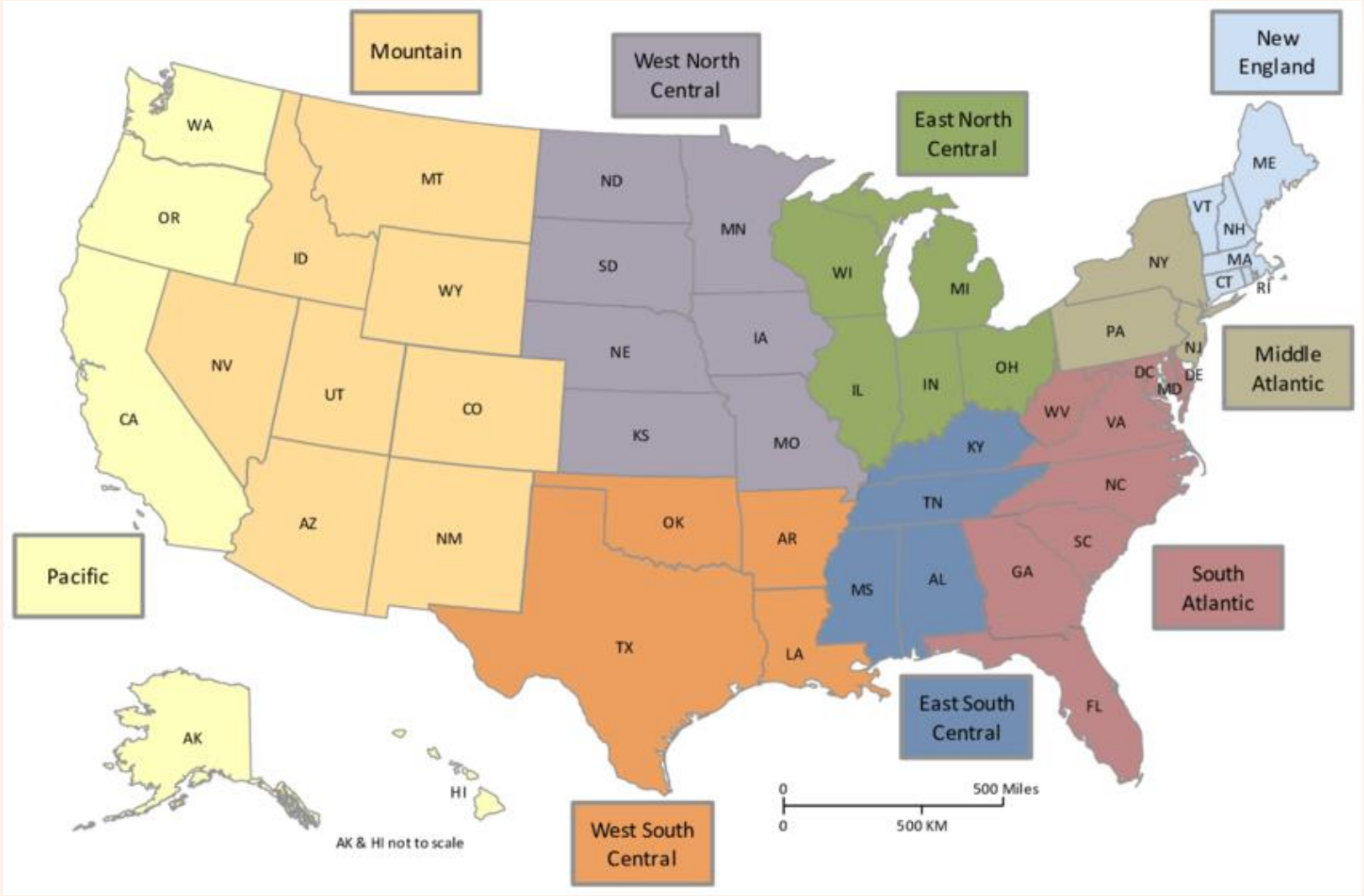




Comparison with Opinion Polls

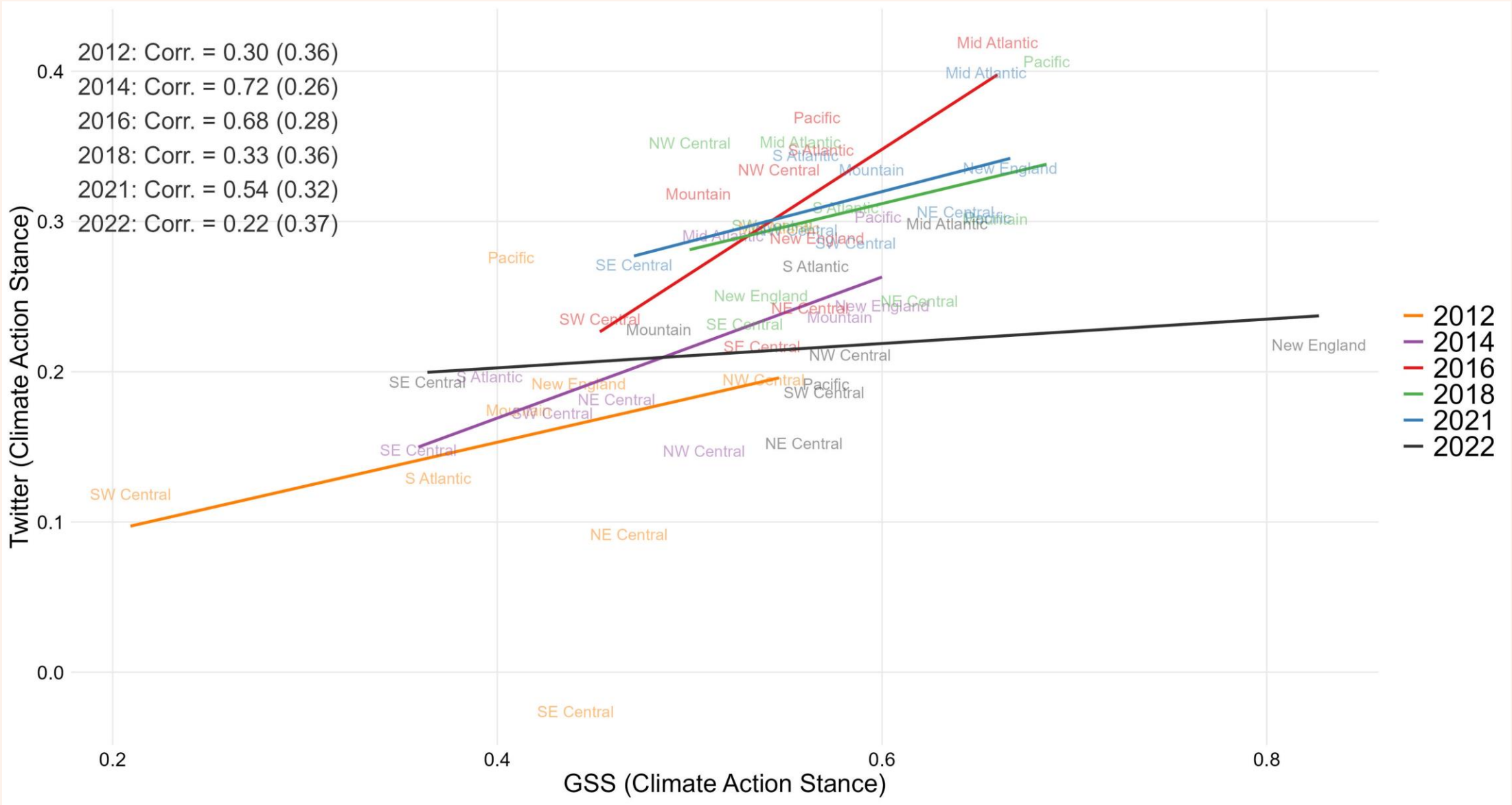
General Social Survey (GSS)

- **Years**: 2012, 2014, 2016, 2018, 2021, 2022
- **Geo**: 9 regions of US
- **Avg. sample size:** 2800 people



Climate Action: *Are we spending* $Too\ Much$, $Too\ Little$, *or* $About\ Right$ *amount on Improving and protecting the environment*

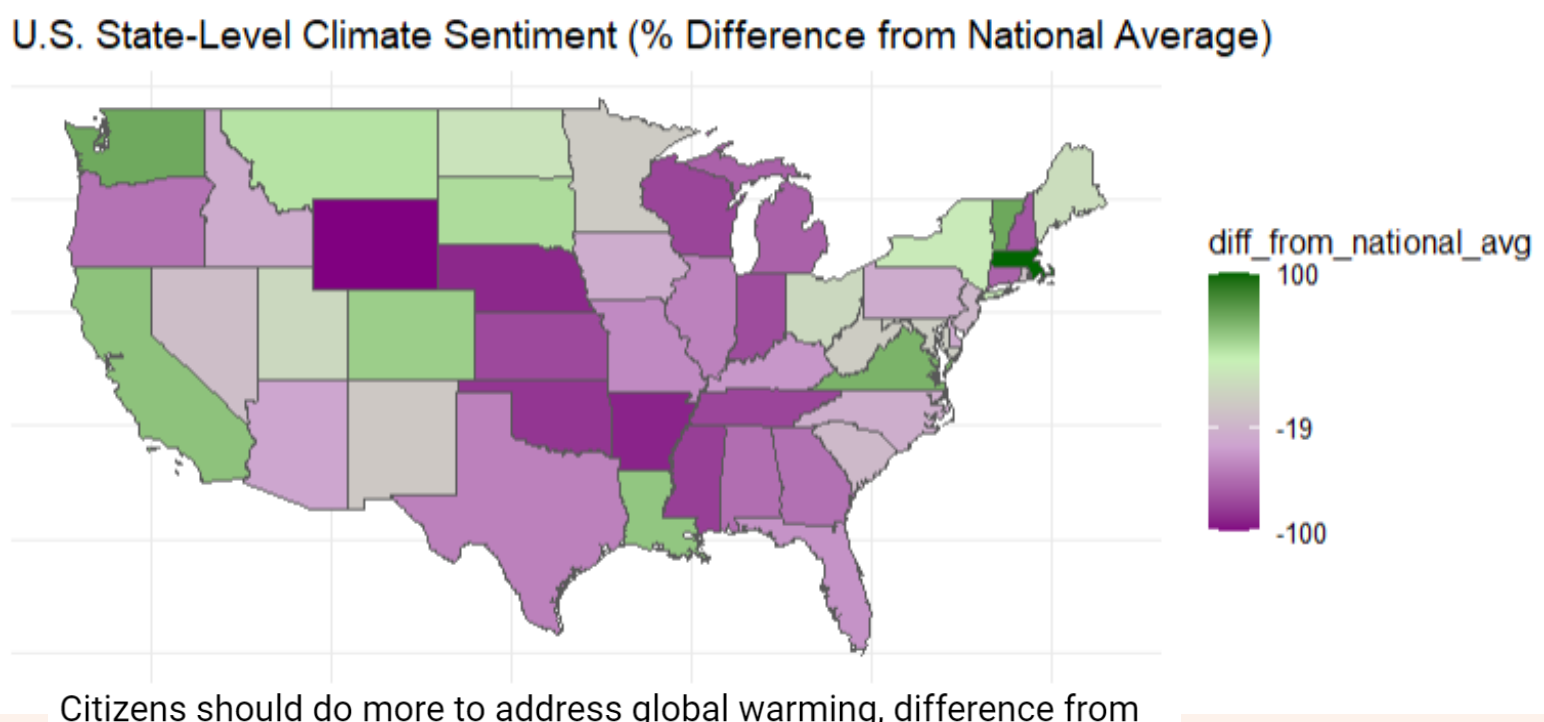
$$Stance \equiv \frac{Too\ Little - Too\ Much}{Too\ Little + Too\ Much + About\ Right}$$

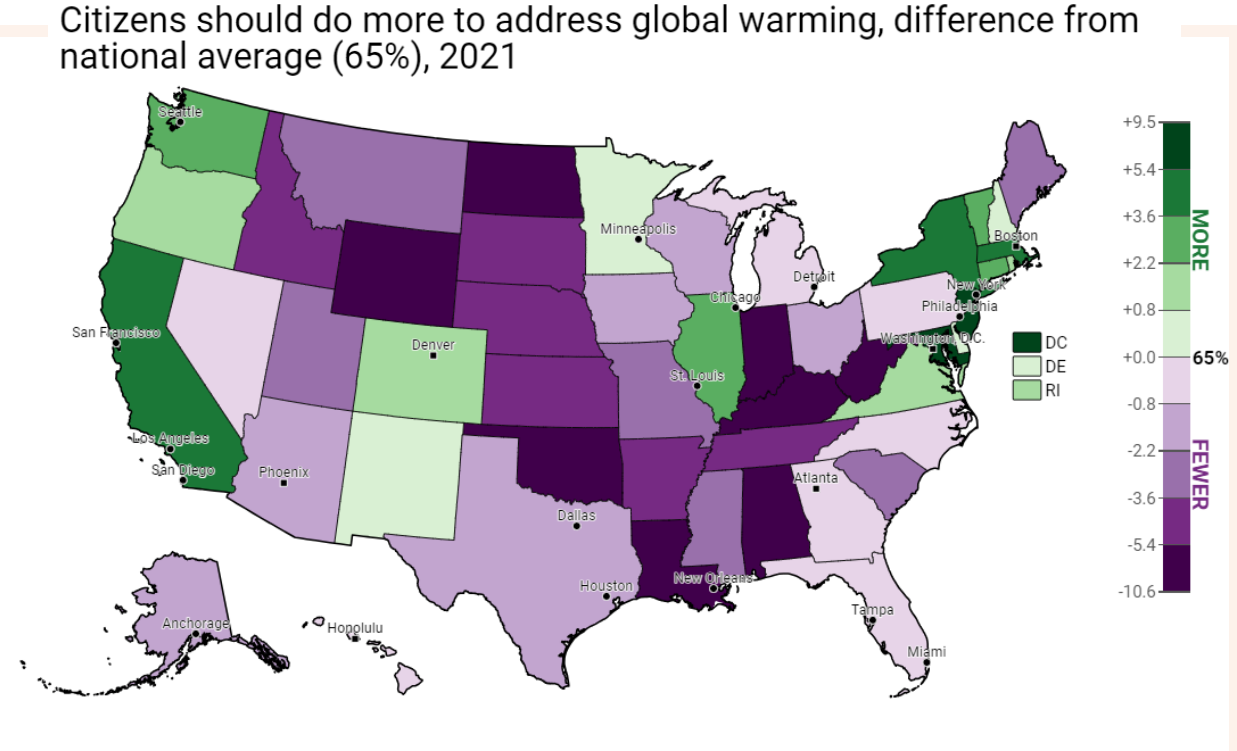


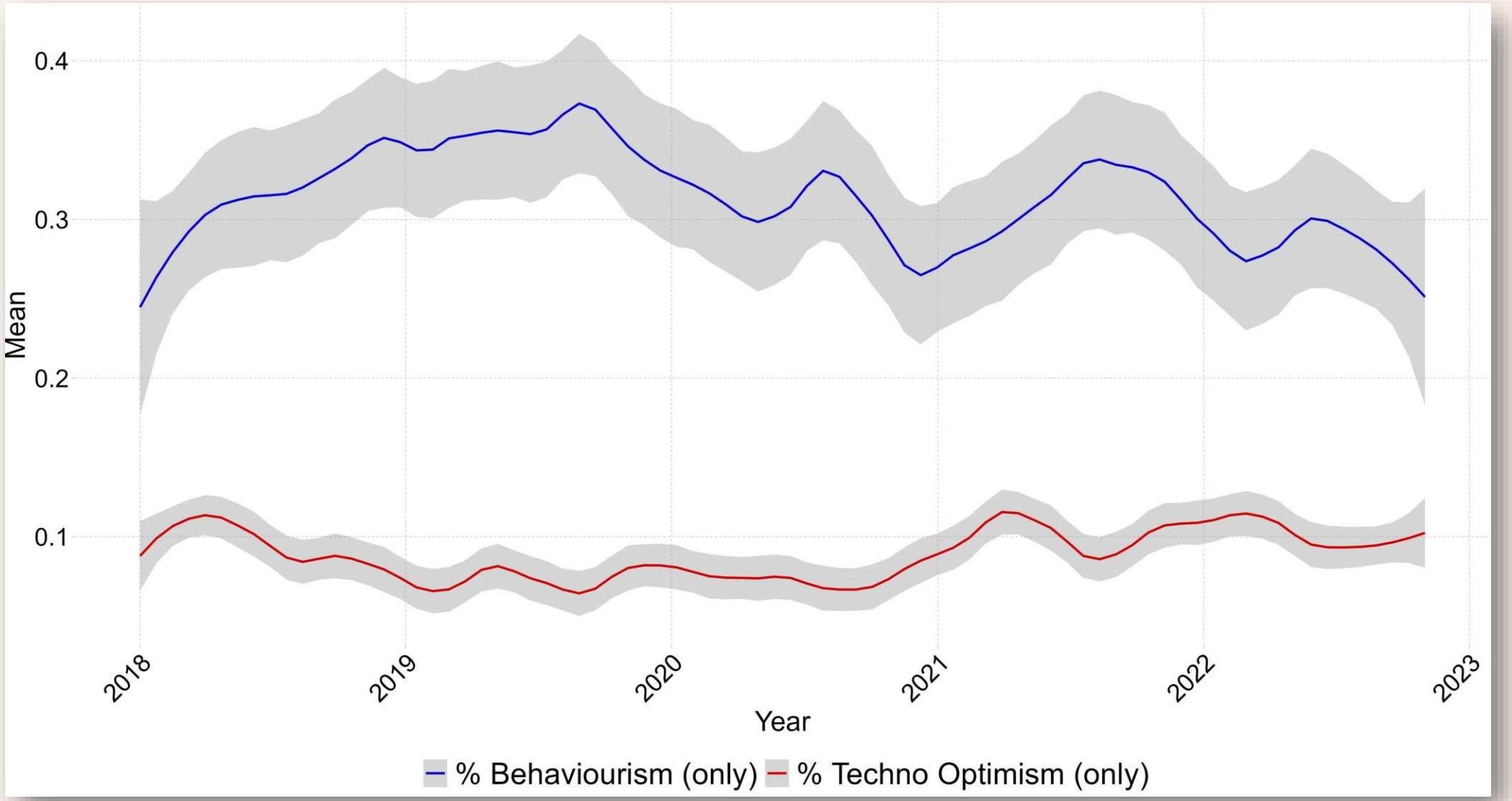
State level climate stance

vs.

Yale Climate opinion

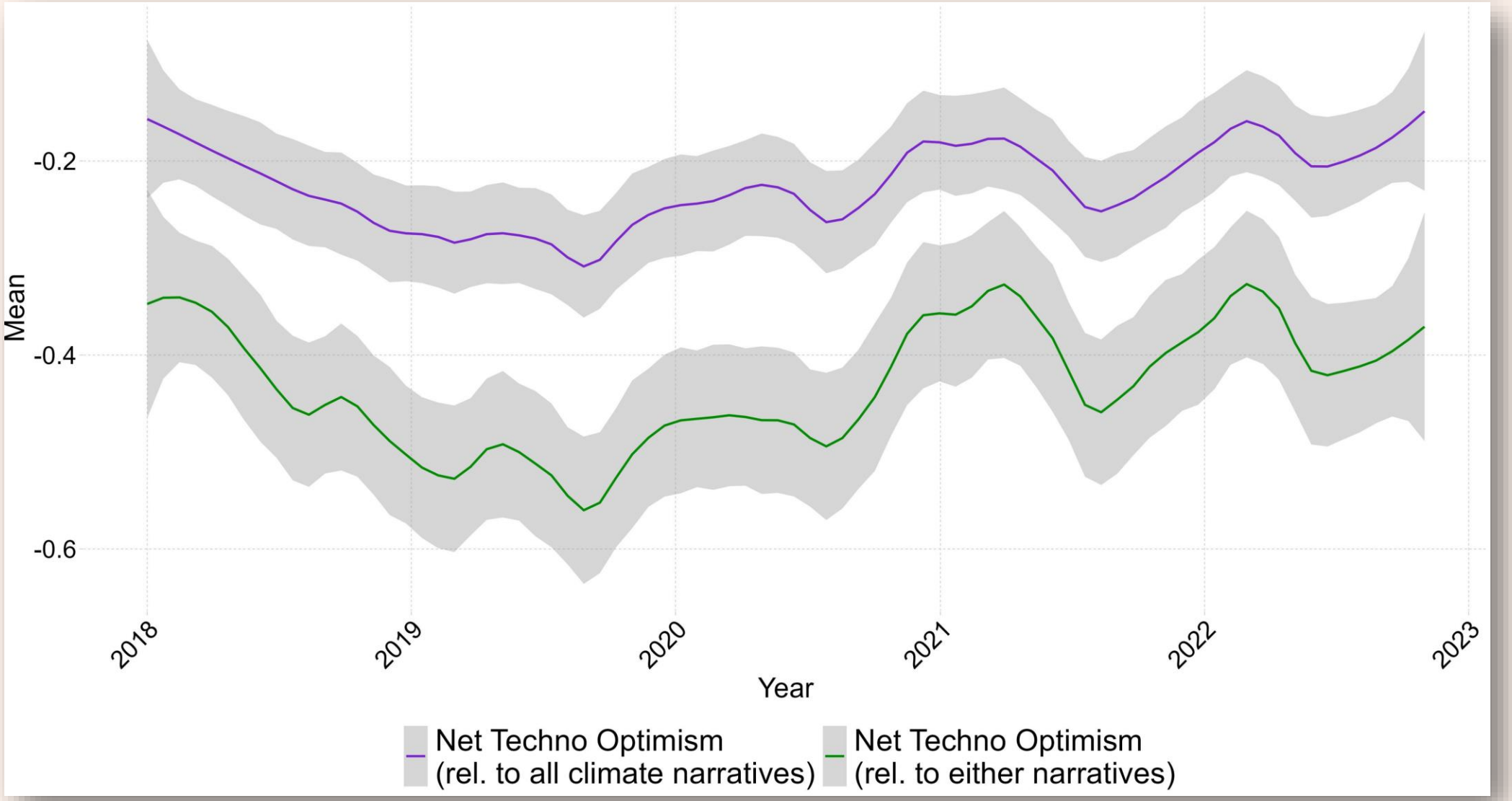






$$\frac{Beh}{Tech + Beh + Both + Neither}$$

$$\frac{Tech}{Tech + Beh + Both + Neither}$$

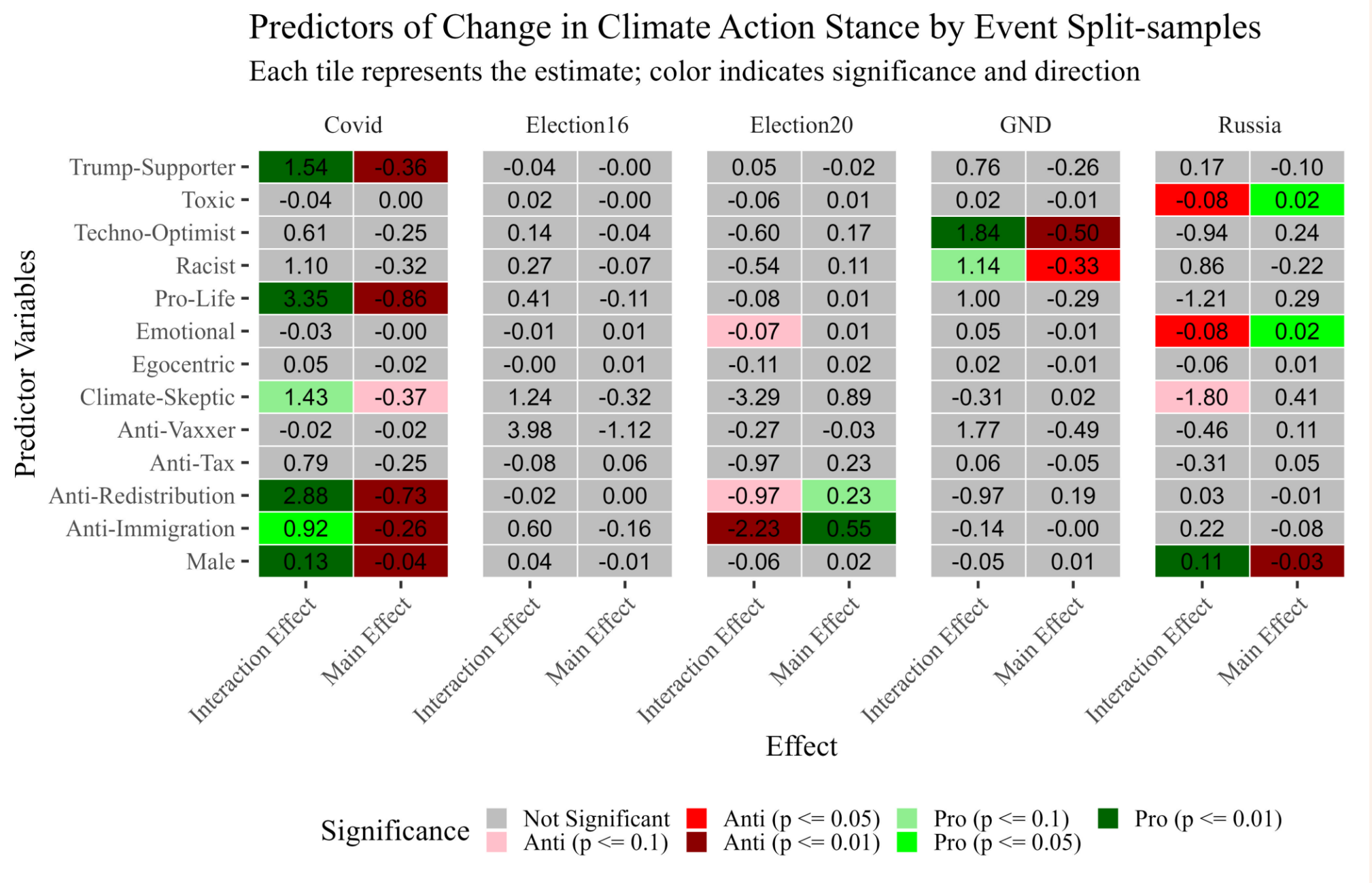


$$\frac{Tech - Beh}{Tech + Beh + Both + Neither}$$

$$\frac{Tech - Beh}{Tech + Beh + Both}$$

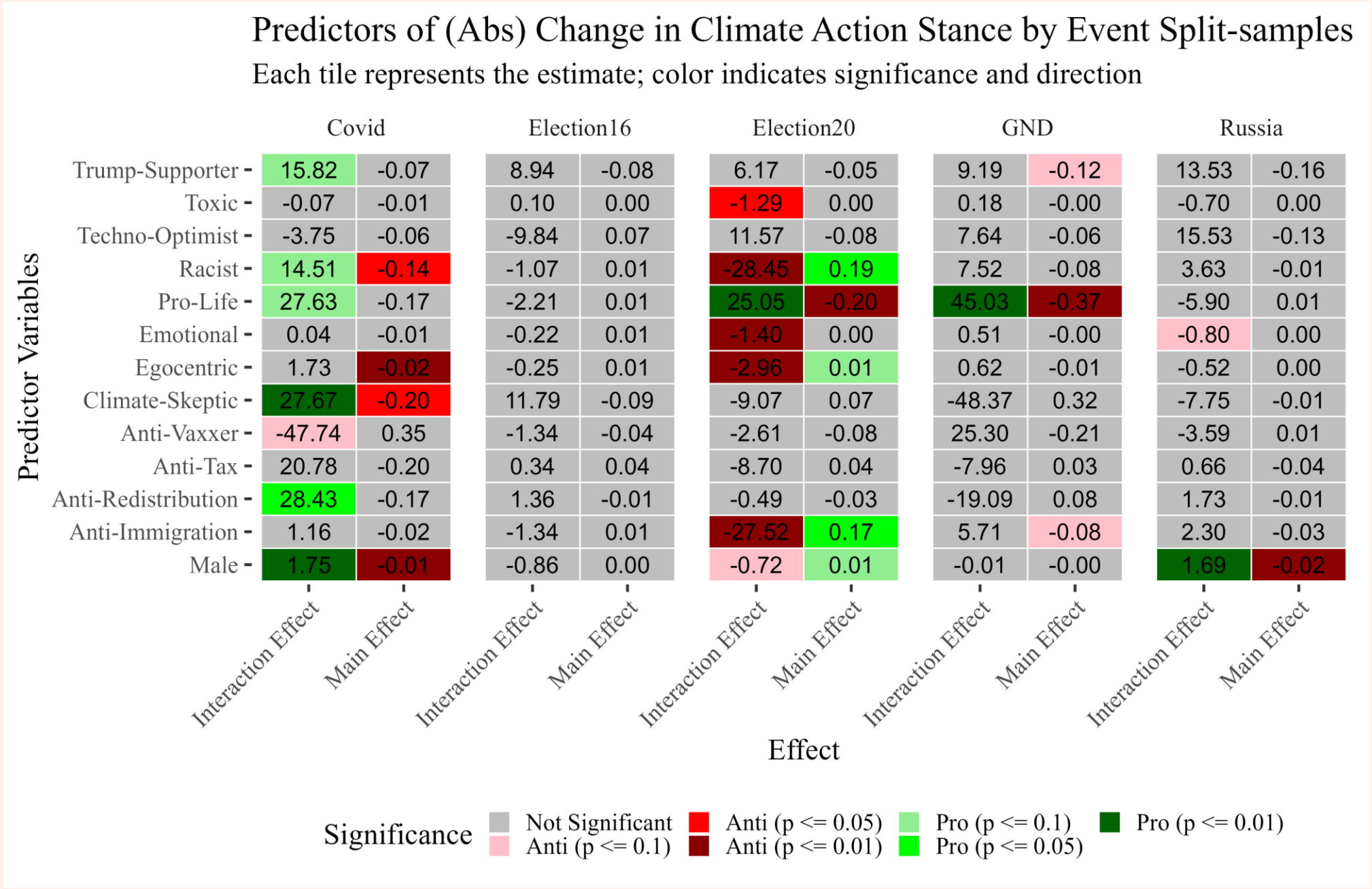
DV is **% Change**

Each predictor variable run separately for each event, includes State FE



DV is **Absolute Change**

Each predictor variable run separately for each event, includes State FE



When are Price Changes Polarising?

Dependent Variable:	Delta-Stance									
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables										
Constant	-0.006	-0.003	-0.002	-0.009**	0.0001	0.006*	0.001	-0.0007	0.002	0.008
	(0.003)	(0.007)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)	(0.007)	(0.002)	(0.005)
Price-Shock (abs)	0.66		0.45		0.04		0.48		-0.51**	
	(0.47)		(0.29)		(0.19)		(0.29)		(0.22)	
Climate Stance	-0.04	-0.04	-0.02	0.05	0.13***	0.23**	-0.02	0.13	-0.07	-0.16
	(0.06)	(0.15)	(0.05)	(0.12)	(0.04)	(0.09)	(0.09)	(0.11)	(0.06)	(0.21)
Price-Shock (abs) × Climate Stance	-4.0		0.82		-16.2***		6.1		2.0	
	(6.7)		(5.9)		(5.3)		(10.6)		(7.2)	
Price-Shock (%)		0.01		0.04**		-0.02*		0.02		-0.04*
		(0.03)		(0.01)		(0.01)		(0.03)		(0.02)
Price-Shock (%) × Climate Stance		-0.12		-0.22		-0.84**		-0.39		0.38
		(0.56)		(0.45)		(0.35)		(0.42)		(0.79)
Shock Name	Covid	Covid	GND	GND	Russia	Russia	Trump 2016	Trump 2016	US Elec 2020	US Elec 2020
Shock Time	Mar-20	Mar-20	Feb-19	Feb-19	Feb-22	Feb-22	Nov-16	Nov-16	Nov-20	Nov-20
Fit statistics										
Observations	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814
R^2	0.00384	0.00379	5.17×10^{-5}	6.33×10^{-5}	0.00034	0.00021	0.00042	0.00039	0.00205	0.00207
Adjusted R^2	0.00382	0.00377	2.81×10^{-5}	3.97×10^{-5}	0.00032	0.00018	0.00039	0.00037	0.00202	0.00205

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

When do prices polarise Trump Supporters?

Dependent Variable:	Delta-Stance									
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables										
Constant	-0.005	-0.0003	-0.001	-0.006*	0.002	0.008***	0.001	8×10^{-5}	0.003*	0.007**
	(0.004)	(0.008)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.008)	(0.002)	(0.003)
Price-Shock (abs)	0.42		0.38		-0.19		0.51*		-0.68***	
	(0.55)		(0.27)		(0.18)		(0.29)		(0.20)	
Trump-Supporter	-0.07	-0.36***	-0.12*	-0.25	-0.16	-0.10	-0.08	-0.002	-0.06	-0.02
	(0.07)	(0.12)	(0.07)	(0.18)	(0.15)	(0.31)	(0.07)	(0.11)	(0.04)	(0.15)
Price-Shock (abs) × Trump-Supporter	15.6*		9.0		13.6		9.0		6.3	
	(9.0)		(8.6)		(18.2)		(9.0)		(5.4)	
Price-Shock (%)		-0.006		0.03**		-0.03***		0.02		-0.03***
		(0.03)		(0.01)		(0.01)		(0.03)		(0.01)
Price-Shock (%) × Trump-Supporter		1.5***		0.75		0.17		-0.04		0.05
		(0.45)		(0.66)		(1.2)		(0.41)		(0.55)
Shock Name	Covid	Covid	GND	GND	Russia	Russia	Election16	Election16	Election20	Election20
Shock Time	Mar-20	Mar-20	Feb-19	Feb-19	Feb-22	Feb-22	Nov-16	Nov-16	Nov-20	Nov-20
Fit statistics										
Observations	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814
R^2	0.00078	0.00093	0.00086	0.00088	0.00056	0.00054	0.00014	7.1×10^{-5}	8.41×10^{-5}	4.22×10^{-5}
Adjusted R^2	0.00075	0.00090	0.00084	0.00086	0.00054	0.00051	0.00012	4.73×10^{-5}	6.04×10^{-5}	1.86×10^{-5}

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Prices **depolarising** for Men during Russian Invasion and COVID

Dependent Variable:	Delta-Stance									
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables										
Constant	-0.002	0.007	-0.001	-0.01*	0.005***	0.02***	-0.0005	0.003	0.0009	0.002
	(0.004)	(0.01)	(0.003)	(0.006)	(0.002)	(0.003)	(0.003)	(0.008)	(0.002)	(0.005)
Price-Shock (abs)	0.007		0.46		-0.56**		0.80**		-0.43*	
	(0.54)		(0.37)		(0.22)		(0.31)		(0.23)	
Male	-0.01***	-0.04***	-0.003	0.01	-0.01***	-0.03***	0.005	-0.01	0.007*	0.02
	(0.004)	(0.01)	(0.004)	(0.01)	(0.004)	(0.007)	(0.005)	(0.010)	(0.004)	(0.01)
Price-Shock (abs) × Male	1.8***		-0.02		1.7***		-0.89		-0.71*	
	(0.50)		(0.45)		(0.44)		(0.63)		(0.40)	
Price-Shock (%)		-0.03		0.05**		-0.06***		0.009		-0.02
		(0.04)		(0.02)		(0.01)		(0.03)		(0.02)
Price-Shock (%) × Male		0.13***		-0.05		0.11***		0.04		-0.06
		(0.05)		(0.05)		(0.03)		(0.04)		(0.05)
Shock Name	Covid	Covid	GND	GND	Russia	Russia	Election16	Election16	Election20	Election20
Shock Time	Mar-20	Mar-20	Feb-19	Feb-19	Feb-22	Feb-22	Nov-16	Nov-16	Nov-20	Nov-20
Fit statistics										
Observations	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814
R^2	6.9×10^{-5}	6.19×10^{-5}	8.05×10^{-5}	9.39×10^{-5}	0.00010	0.00011	8.37×10^{-5}	5.01×10^{-5}	5.41×10^{-5}	4.41×10^{-5}
Adjusted R^2	4.54×10^{-5}	3.82×10^{-5}	5.69×10^{-5}	7.03×10^{-5}	8.06×10^{-5}	8.68×10^{-5}	6.01×10^{-5}	2.64×10^{-5}	3.04×10^{-5}	2.04×10^{-5}

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Prices **depolarising** for Racists during COVID and Green New Deal announcement, but **Polarising** during 2020 election

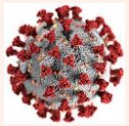
Dependent Variable:	Delta-Stance									
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables										
Constant	-0.005	-0.002	-0.002	-0.007*	0.002	0.009***	0.0007	0.0002	0.002	0.007**
	(0.004)	(0.009)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)	(0.008)	(0.002)	(0.003)
Price-Shock (abs)	0.43		0.43		-0.15		0.57**		-0.55***	
	(0.55)		(0.29)		(0.19)		(0.27)		(0.20)	
Racist	-0.14**	-0.32	-0.08	-0.33*	-0.01	-0.22	0.01	-0.07	0.19**	0.11
	(0.06)	(0.30)	(0.08)	(0.16)	(0.06)	(0.14)	(0.06)	(0.16)	(0.09)	(0.20)
Price-Shock (abs) × Racist	14.6*		7.4		3.7		-1.2		-28.4***	
	(7.7)		(9.6)		(7.2)		(6.7)		(10.1)	
Price-Shock (%)		0.001		0.03**		-0.03***		0.02		-0.03**
		(0.04)		(0.01)		(0.01)		(0.03)		(0.01)
Price-Shock (%) × Racist		1.1		1.1*		0.87		0.27		-0.55
		(1.1)		(0.60)		(0.53)		(0.59)		(0.75)
Shock Name	Covid	Covid	GND	GND	Russia	Russia	Election16	Election16	Election20	Election20
Shock Time	Mar-20	Mar-20	Feb-19	Feb-19	Feb-22	Feb-22	Nov-16	Nov-16	Nov-20	Nov-20
Fit statistics										
Observations	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814
R^2	0.00012	9.95×10^{-5}	8.26×10^{-5}	0.00014	4.09×10^{-5}	9.58×10^{-5}	3.58×10^{-5}	1.42×10^{-5}	0.00032	0.00017
Adjusted R^2	9.55×10^{-5}	7.58×10^{-5}	5.9×10^{-5}	0.00012	1.73×10^{-5}	7.22×10^{-5}	1.21×10^{-5}	-9.49×10^{-6}	0.00030	0.00014

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

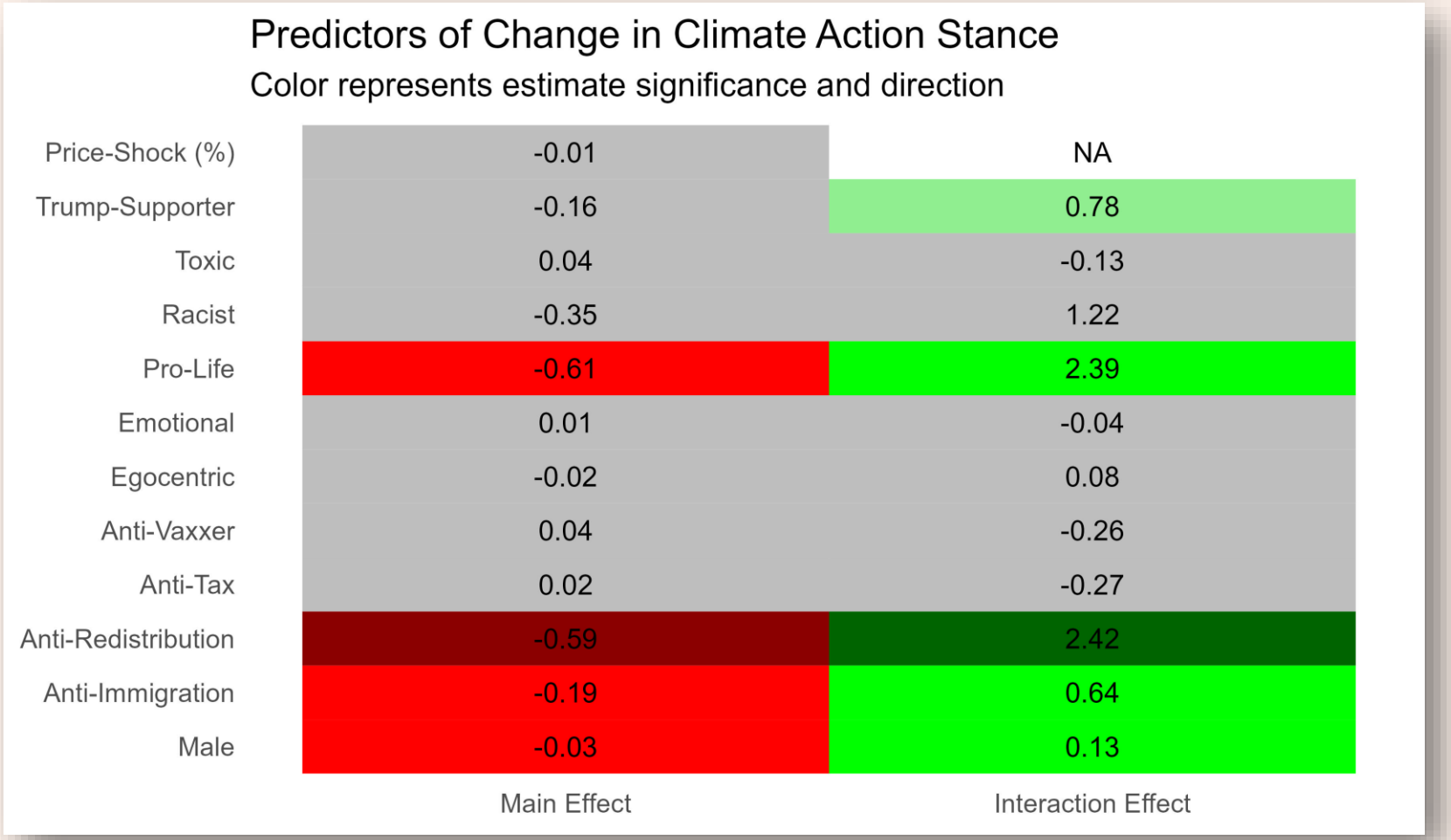
Prices **depolarising** for anti-Immigration folks during COVID, but **Polarising** during 2020 election

Dependent Variable:	Delta-Stance									
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables										
Constant	-0.005	0.002	-0.0010	-0.009**	0.002	0.009***	0.0007	0.001	0.0008	0.001
	(0.004)	(0.008)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.007)	(0.002)	(0.003)
Price-Shock (abs)	0.44		0.41		-0.16		0.58**		-0.32	
	(0.59)		(0.30)		(0.19)		(0.26)		(0.21)	
Anti-Immigration	-0.02	-0.26**	-0.08*	-0.001	-0.03	-0.07	0.01	-0.16	0.17**	0.55***
	(0.06)	(0.10)	(0.05)	(0.11)	(0.05)	(0.13)	(0.03)	(0.15)	(0.07)	(0.14)
Price-Shock (abs) × Anti-Immigration	1.2		5.7		2.3		-1.3		-27.5***	
	(6.6)		(5.1)		(5.4)		(3.7)		(8.5)	
Price-Shock (%)		-0.01		0.04***		-0.03***		0.01		-0.01
		(0.03)		(0.01)		(0.01)		(0.03)		(0.01)
Price-Shock (%) × Anti-Immigration		0.92**		-0.14		0.22		0.60		-2.2***
		(0.36)		(0.39)		(0.47)		(0.56)		(0.52)
Shock Name	Covid	Covid	GND	GND	Russia	Russia	Election16	Election16	Election20	Election20
Shock Time	Mar-20	Mar-20	Feb-19	Feb-19	Feb-22	Feb-22	Nov-16	Nov-16	Nov-20	Nov-20
Fit statistics										
Observations	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814	126,814
R^2	0.00016	0.00040	0.00112	0.00108	0.00011	0.00013	3.86×10^{-5}	7.19×10^{-5}	0.00170	0.00190
Adjusted R^2	0.00014	0.00038	0.00110	0.00106	9.06×10^{-5}	0.00011	1.5×10^{-5}	4.83×10^{-5}	0.00168	0.00188

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Shock #2 COVID  and fuel prices → Stance

$$\Delta\text{Stance}_u^{(\tau)} = \alpha + \beta_0\rho_s + \sum_i^N \beta_i X_{ui} + \beta_{i+N}\rho_s X_{ui} + \epsilon_u$$

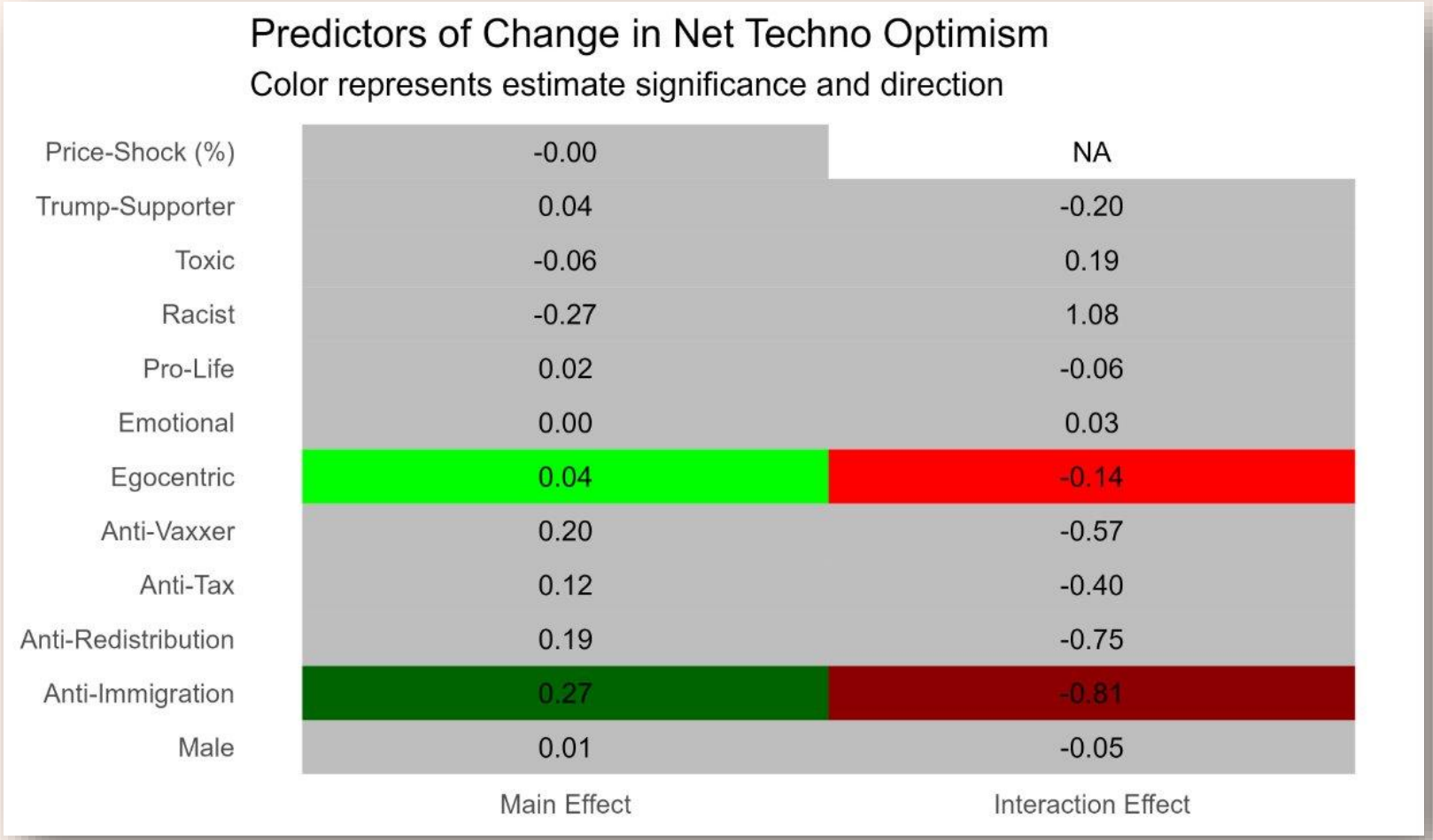


Dependent Variable:	Delta-Stance						
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables							
Constant	0.01*		0.007	0.0003	0.0008	0.002	-0.0003
	(0.008)		(0.01)	(0.008)	(0.009)	(0.008)	(0.008)
Male	-0.03**	-0.03**	-0.04***				
	(0.01)	(0.01)	(0.01)				
Pro-Life	-0.60**	-0.60**		-0.86***			
	(0.27)	(0.27)		(0.31)			
Anti-Redistribution	-0.58**	-0.58**			-0.73***		
	(0.23)	(0.23)			(0.22)		
Anti-Immigration	-0.17*	-0.17*				-0.26**	
	(0.09)	(0.09)				(0.10)	
Trump-Supporter	-0.16	-0.16					-0.36***
	(0.11)	(0.11)					(0.12)
Price-Shock (%)	-0.06**		-0.03	-0.007	-0.009	-0.01	-0.006
	(0.03)		(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
Male × Price-Shock (%)	0.13**	0.13**	0.13***				
	(0.05)	(0.05)	(0.05)				
Pro-Life × Price-Shock (%)	2.3**	2.3**		3.3***			
	(1.0)	(1.0)		(1.2)			
Anti-Redistribution × Price-Shock (%)	2.3***	2.3***			2.9***		
	(0.87)	(0.86)			(0.84)		
Anti-Immigration × Price-Shock (%)	0.54	0.54				0.92**	
	(0.33)	(0.33)				(0.36)	
Trump-Supporter × Price-Shock (%)	0.75*	0.75*					1.5***
	(0.43)	(0.43)					(0.45)
Fixed-effects							
State		Yes					
Fit statistics							
Observations	126,814	126,814	126,814	126,814	126,814	126,814	126,814
R^2	0.00272	0.00326	6.19×10^{-5}	0.00083	0.00104	0.00040	0.00093
Within R^2		0.00272					

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Shock 2: COVID and prices → Narrative

$$\Delta\text{Narrative}_u^{(\tau)} = \alpha + \beta_0 \rho_s + \sum_i^N \beta_i X_{ui} + \beta_{i+N} \rho_s X_{ui} + \epsilon_u$$



Dependent Variable:	Delta-Narrative	
Model:	(1)	(2)
Variables		
Constant	-0.009	
	(0.007)	
Egocentric	0.003	0.004
	(0.02)	(0.02)
Anti-Immigration	0.28***	0.28***
	(0.09)	(0.09)
Price-Shock (%)	0.03	
	(0.02)	
Egocentric × Price-Shock (%)	0.01	0.01
	(0.06)	(0.06)
Anti-Immigration × Price-Shock (%)	-0.87**	-0.86**
	(0.34)	(0.33)
Fixed-effects		
State		Yes
Fit statistics		
Observations	126,814	126,814
R^2	0.00286	0.00330
Within R^2		0.00284

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*