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Surveying the public acceptability of carbon pricing

E4BEL steering committee

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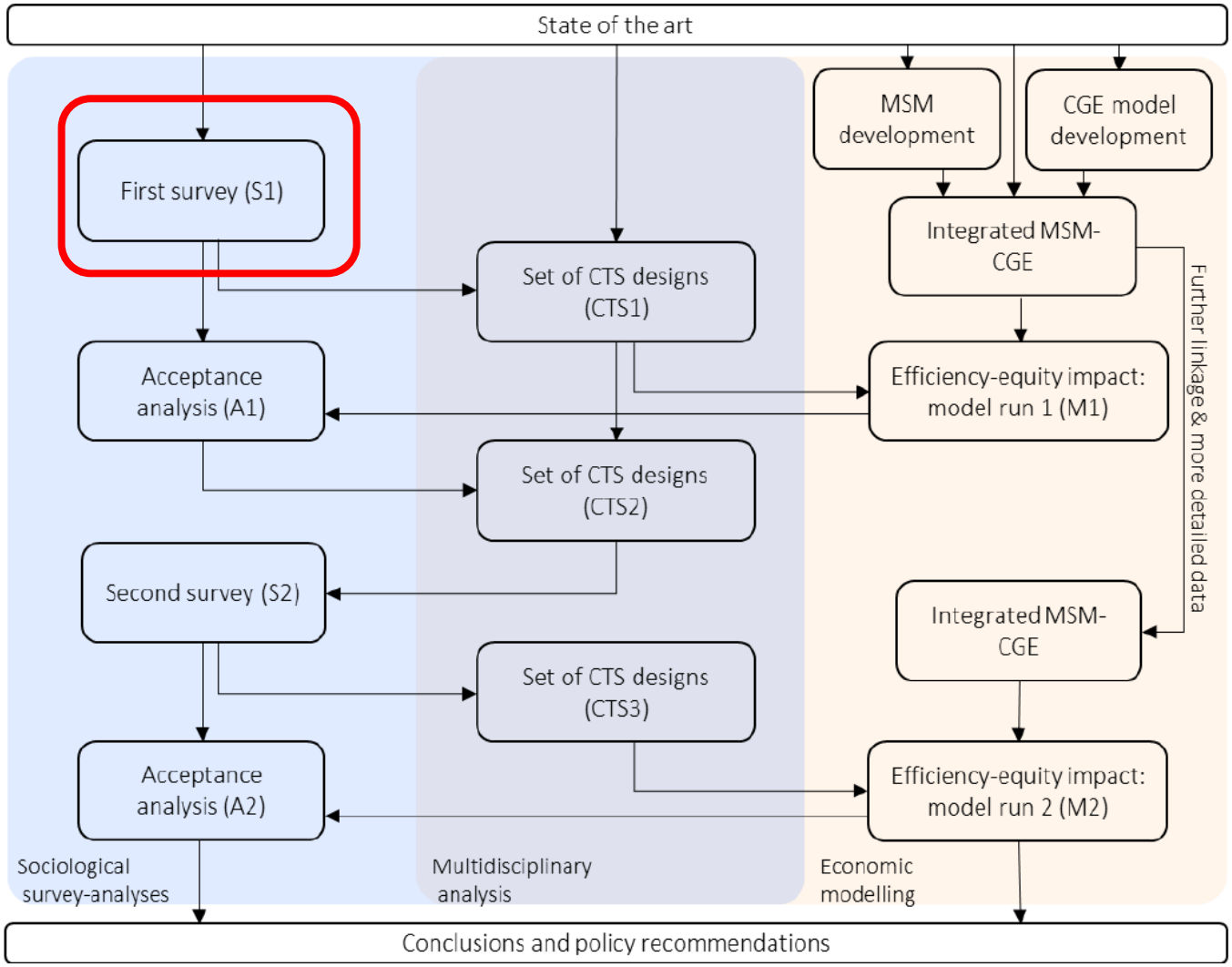
January 17, 2024

Outline

- Overview
- Surveys
- Survey 1
  - Research objectives
  - Design
  - Results
- Planning

Overview of E4BEL project



Surveys

Two surveys among Belgian population will be conducted to explore the public acceptability of carbon pricing.

Survey 1: general survey

- Explore the attitudes towards climate change, climate policy and carbon pricing
- Elicit preferences about revenue use

Survey 2: discrete choice experiment

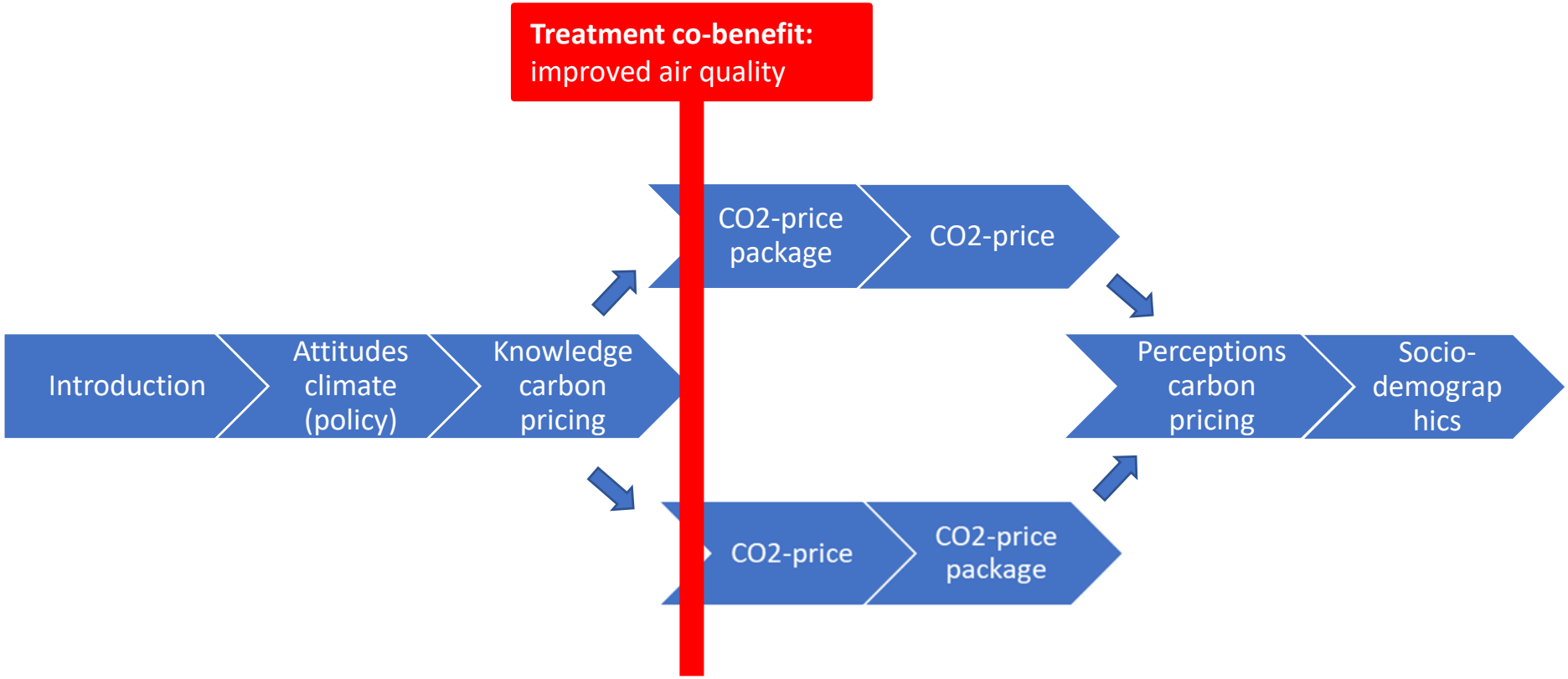
- Explore relative importance that people attach to different attributes of a carbon pricing policies
- Testing whether providing information might affect public acceptability

Survey 1 – research objectives

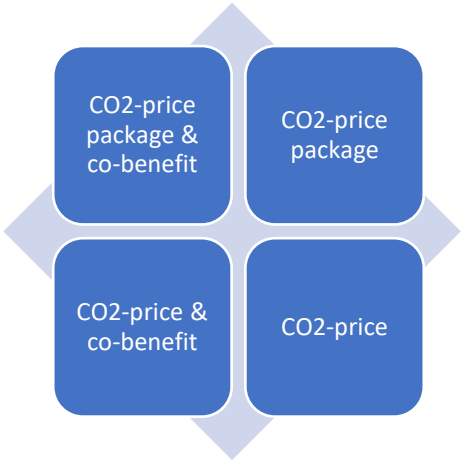
Identifying which factors affect the level of public acceptability of carbon pricing, by focusing on policy design

- Testing the impact of revenue use on the public acceptability of carbon pricing, including mixed revenue recycling
- Testing the effect of providing information on local co-benefits, e.g. air quality

Survey 1 – design



Survey 1 - 2x2 factorial design



1) CO2 price vs CO2 price package

Group 1: CO2-price → CO2-price package

This group first receives questions about CO2 pricing without mentioning how the revenues will be used, and then questions about a CO2 pricing policy with explicit mentioning revenue use.

Group 2: CO2-price package → CO2-price

This group first receives questions on CO2 pricing policy with explicit mentioning how the revenue will be used, and further in survey CO2 pricing without mentioning revenue use.

2) Communication on local co-benefits: improved air quality

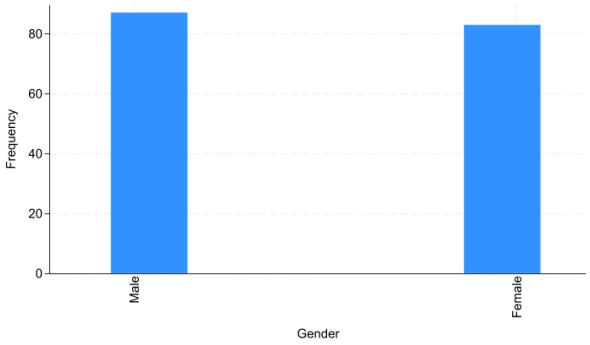
We choose co-benefits that are short-term and with a local impact: improved air quality (as opposed to emission reductions that have global effects on climate change).

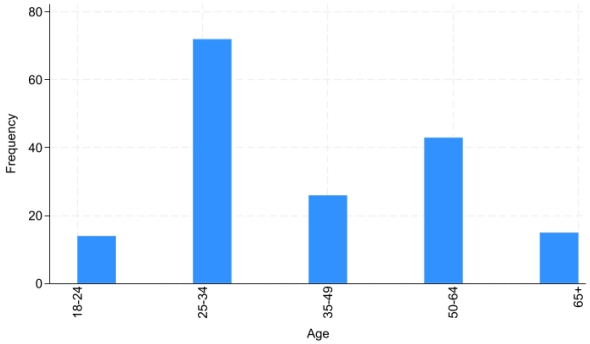
A carbon price also has benefits other than reducing emissions. An important short-term local benefit is improved air quality, which reduces mortality and disease from air pollution.

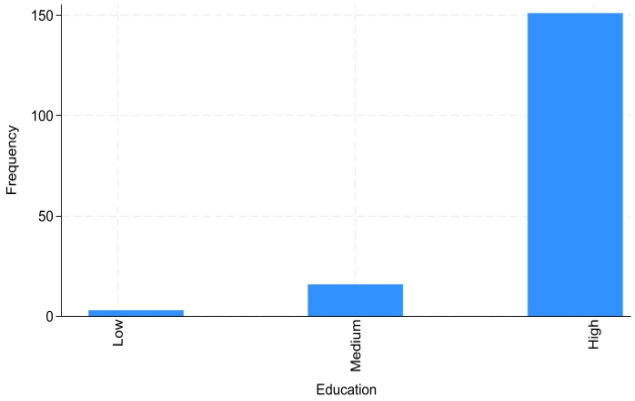
All respondents are given the same questionnaire, but the positive effects on air quality are highlighted for one half while not mentioned for the other half.

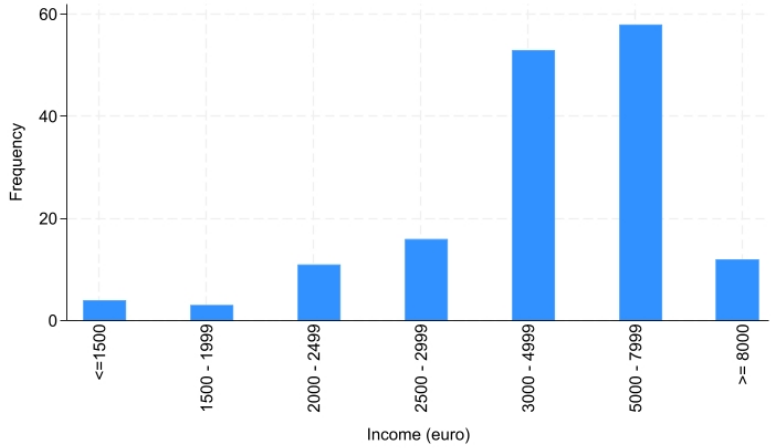
Pilot survey

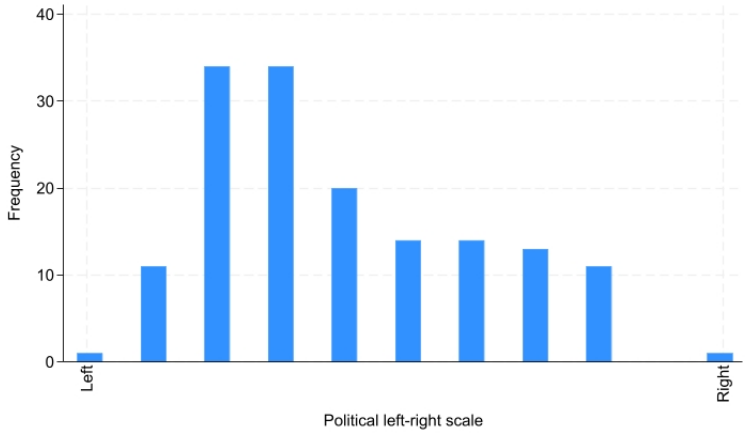
- Test survey (N = 172)
- Not representative in terms of gender, age, income, education and political preferences
- Final survey (N = 2000) will have quota on age, gender, region and education





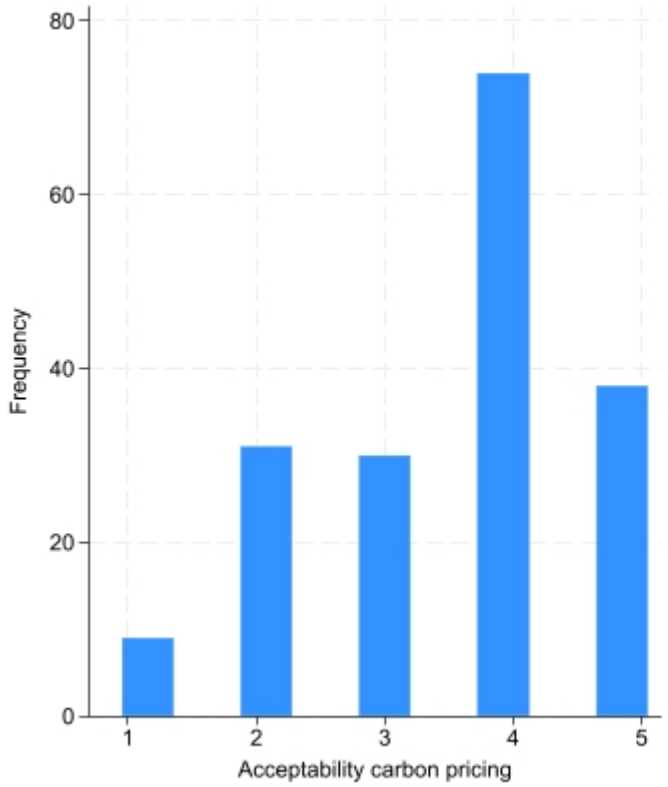


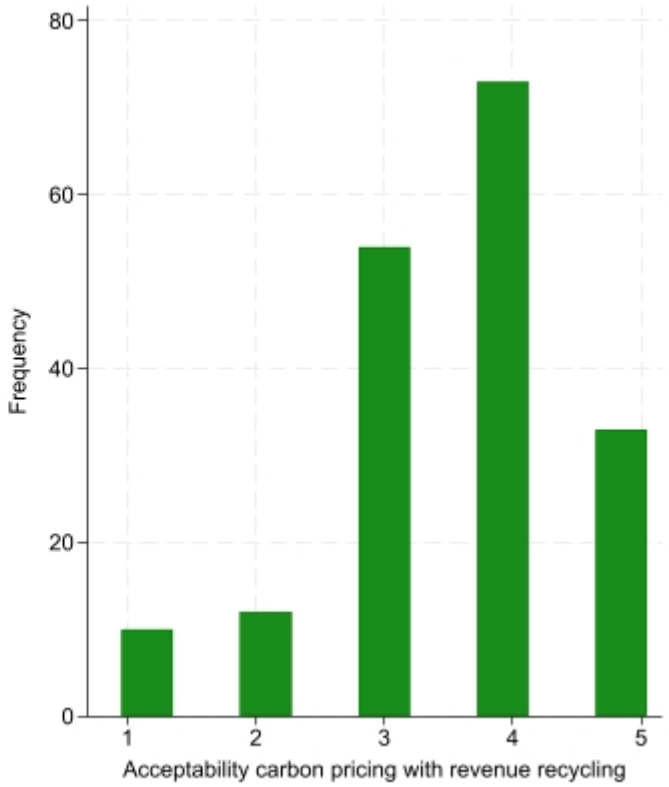




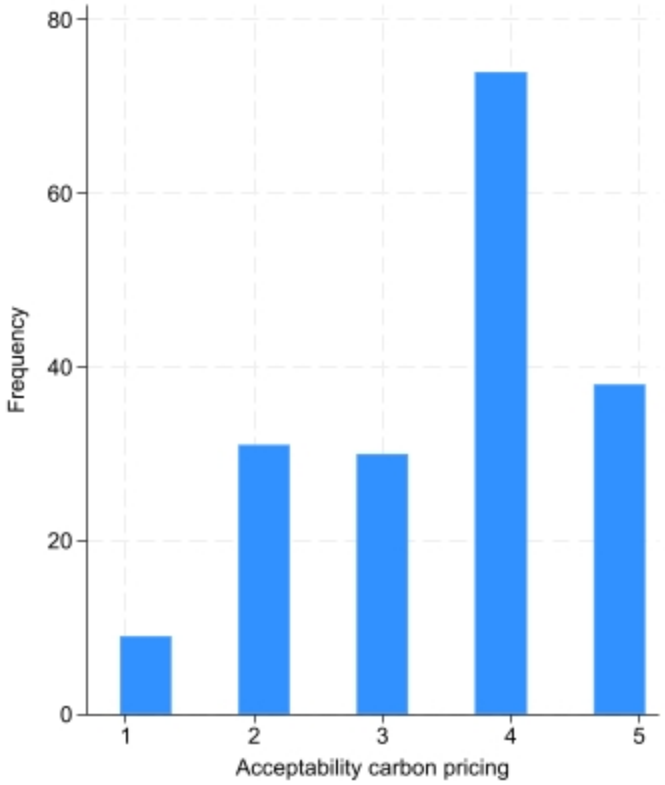
Results: acceptability carbon pricing

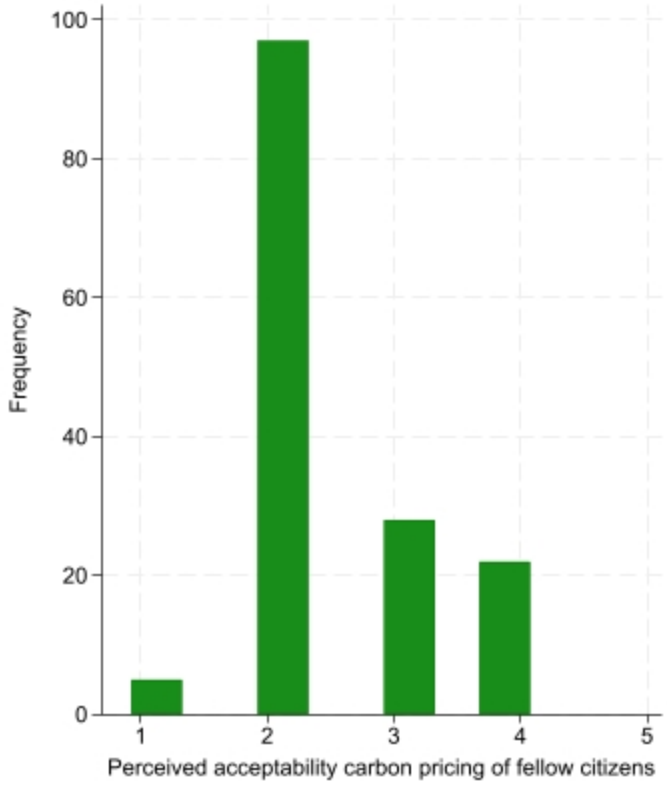
Acceptability of carbon pricing with revenue recyling is higher.



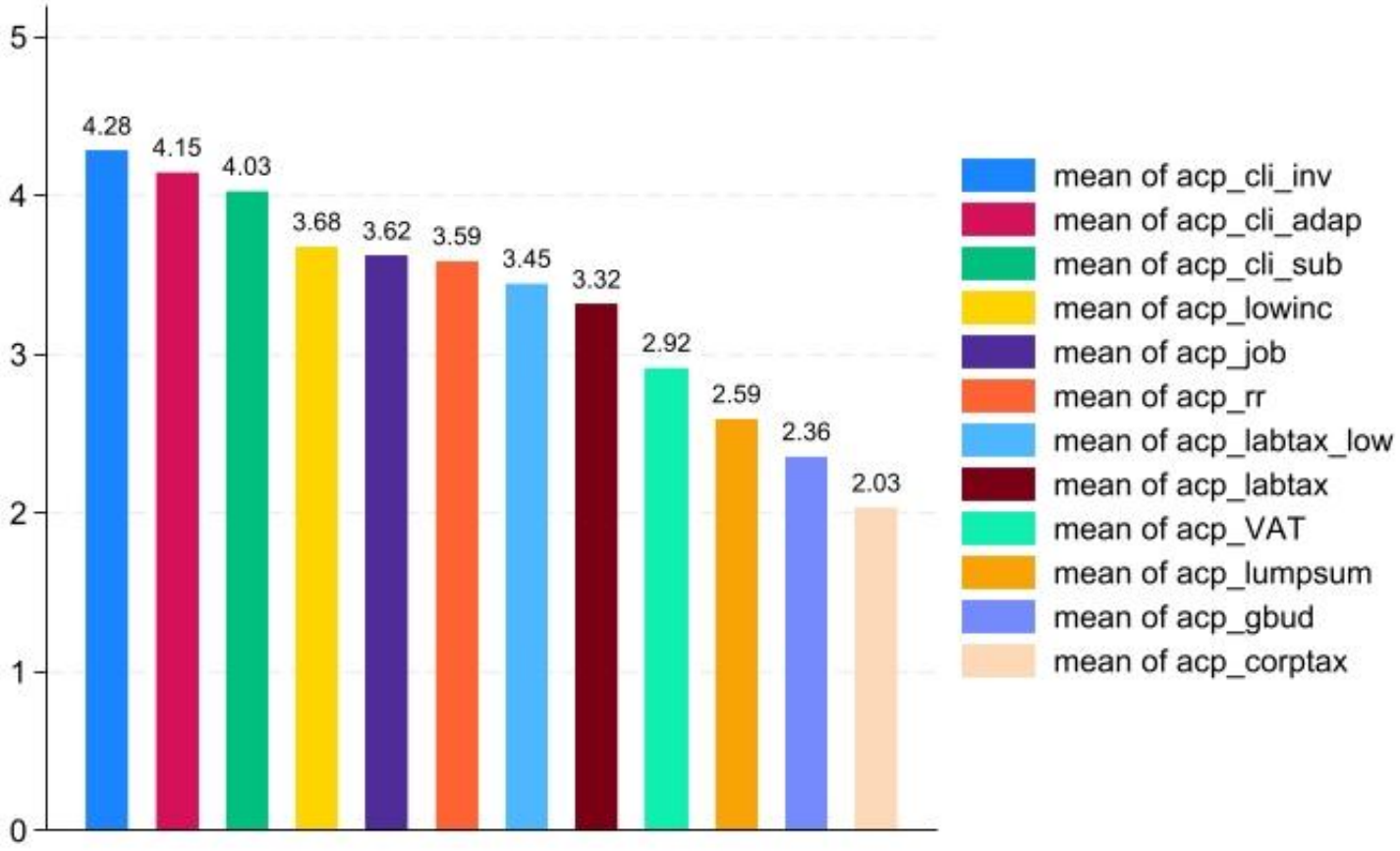


Results: acceptability vs perceived acceptability

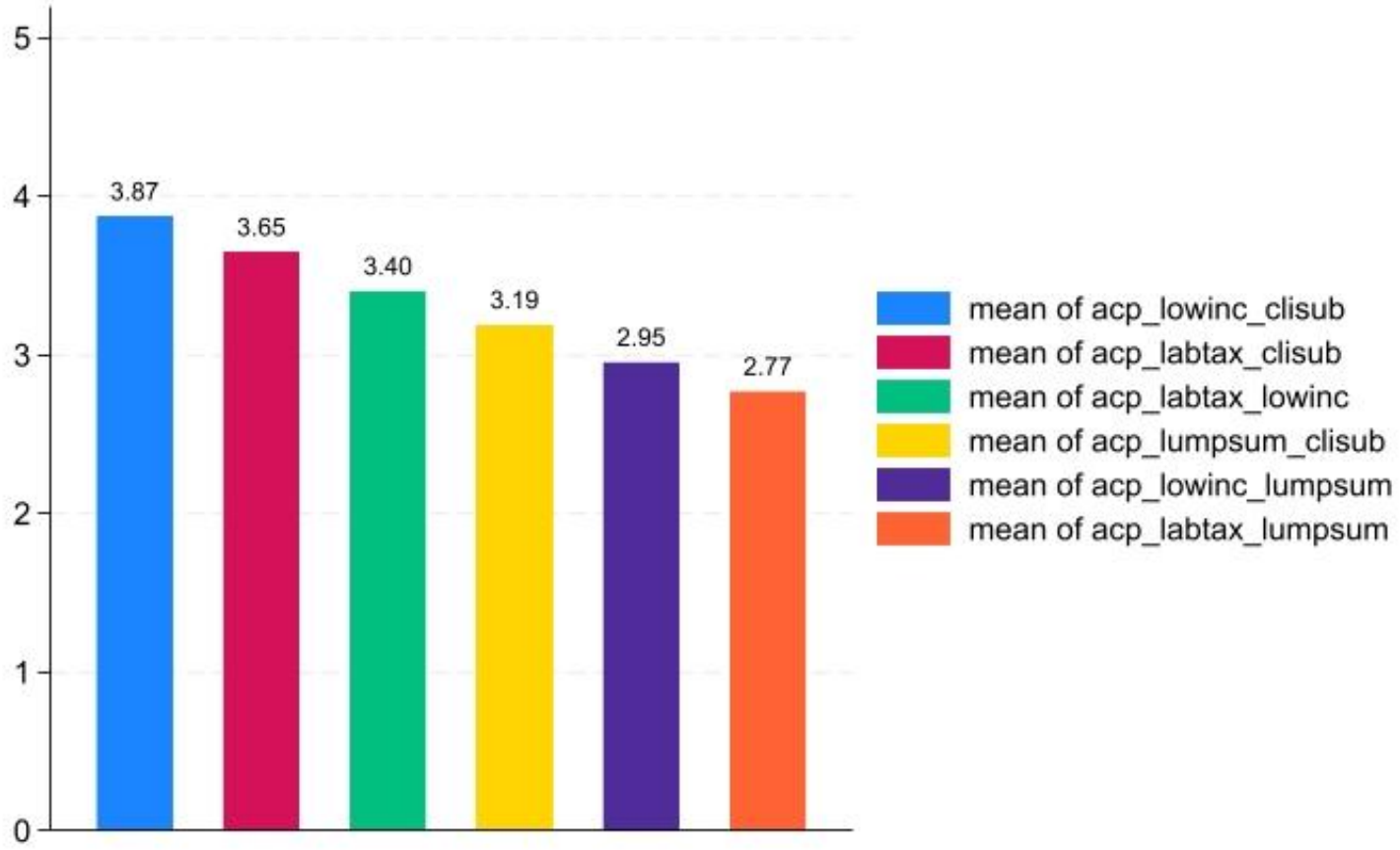




Results: acceptability of carbon pricing with revenue recycling



Results: acceptability of carbon pricing with revenue recycling mixes



Results: What drives acceptability of carbon pricing?

Ordinal probit model

$Y^* = \mathbf{X\beta} + \varepsilon.$

Y is the latent (unobserved) variable (e.g. acceptability), but we only observe 5 levels:*

Y	= 1 if $y^* \leq \mu_1$	Prob(y = 1 | x) = $\Phi(\mu_1 - x\beta)$
	= 2 if $\mu_1 < y^* \leq \mu_2$	Prob(y = 2 | x) = $\Phi(\mu_2 - x\beta) - \Phi(\mu_1 - x\beta)$:
	= 3 if $\mu_2 < y^* \leq \mu_3$	Prob(y = 3 | x) = $\Phi(\mu_3 - x\beta) - \Phi(\mu_2 - x\beta)$
	= 4 if $\mu_3 < y^* \leq \mu_4$	Prob(y = 4 | x) = $\Phi(\mu_4 - x\beta) - \Phi(\mu_3 - x\beta)$
	= 5 if $\mu_4 \leq y^*$	Prob(y = 5 | x) = $1 - \Phi(\mu_4 - x\beta)$

Reference: Greene, W. (2018) Econometric Analysis. 8th Edition, Pearson Education Limited, London.

Results: What drives acceptability of carbon pricing

1.1 Table 1: acceptability of carbon pricing

VARIABLES	(1) acp	(2) acp	(3) acp	(4) acp	(5) acp	(6) acp
believe_effect	0.267**	0.269**	0.326***	0.294**	0.257**	0.246**
	(0.106)	(0.106)	(0.120)	(0.120)	(0.122)	(0.113)
believe_fair	0.714***	0.700***	0.653***	0.664***	0.667***	0.651***
	(0.143)	(0.143)	(0.159)	(0.155)	(0.156)	(0.158)
fin_imp_own		0.00465	-0.0350	-0.0386	-0.0417	-0.0377
		(0.0740)	(0.0795)	(0.0801)	(0.0804)	(0.0865)
pol_scale			-0.173***	-0.164***	-0.153***	-0.136**
			(0.0495)	(0.0494)	(0.0560)	(0.0577)
trust_parties				0.170	0.188*	0.168
				(0.120)	(0.112)	(0.113)
cli_wor					0.0743	0.0495
					(0.156)	(0.156)
sex					-0.124	-0.117
					(0.183)	(0.193)
age					-0.0126	0.00513
					(0.0689)	(0.0722)
edu					0.0952	0.0825
					(0.111)	(0.115)
income					0.00183	0.00251
					(0.00427)	(0.00482)
risk						-0.0367
						(0.105)
know_index						0.249
						(0.260)
n_cars						-0.125
						(0.133)
Observations	172	170	152	152	152	152

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Ordered probit model with acceptability (acp) as outcome variable.

- Believe in effectiveness of carbon pricing
- Belief in fairness of carbon pricing
- Political preferences

Marginal effect of believe in effectiveness of carbon pricing

	dy/dx	Delta-method std. err.
believe_effect _predict		
1	-.0158285	.0086767
2	-.0295339	.0134718
3	-.0177372	.0086162
4	.0070996	.0062762
5	.0560001	.0255549

Results: What drives acceptability of carbon pricing?

1.2 Table 2 - acceptability of carbon pricing

VARIABLES	(1) acp	(2) acp	(3) acp	(4) acp	(5) acp	(6) acp
believe_effect	0.257**	0.246**	0.215*	0.194*	0.283**	0.274**
	(0.122)	(0.113)	(0.122)	(0.113)	(0.124)	(0.114)
believe_fair	0.667***	0.651***	0.663***	0.656***	0.622***	0.602***
	(0.156)	(0.158)	(0.153)	(0.155)	(0.156)	(0.158)
fin_imp_own	-0.0417	-0.0377	-0.00163	0.00682	-0.0506	-0.0489
	(0.0804)	(0.0865)	(0.0743)	(0.0821)	(0.0820)	(0.0884)
pol_scale	-0.153***	-0.136**	-0.125**	-0.119**	-0.122**	-0.100*
	(0.0560)	(0.0577)	(0.0572)	(0.0589)	(0.0588)	(0.0605)
coerciveness			0.297***	0.302***		
			(0.0779)	(0.0792)		
chg_life					0.278**	0.304***
					(0.116)	(0.117)
trust_parties	0.188*	0.168	0.209*	0.195	0.157	0.131
	(0.112)	(0.113)	(0.120)	(0.120)	(0.113)	(0.113)
cli_wor	0.0743	0.0495	0.0628	0.0392	-0.0195	-0.0579
	(0.156)	(0.156)	(0.156)	(0.158)	(0.153)	(0.154)
sex	-0.124	-0.117	-0.127	-0.134	-0.189	-0.191
	(0.183)	(0.193)	(0.183)	(0.193)	(0.187)	(0.199)
age	-0.0126	0.00513	-0.0484	-0.0272	-0.0315	-0.0124
	(0.0689)	(0.0722)	(0.0738)	(0.0774)	(0.0701)	(0.0734)
edu	0.0952	0.0825	0.181	0.166	0.0955	0.0841
	(0.111)	(0.115)	(0.124)	(0.130)	(0.103)	(0.106)
income	0.00183	0.00251	0.00208	0.00204	0.00242	0.00326
	(0.00427)	(0.00482)	(0.00414)	(0.00468)	(0.00414)	(0.00473)
risk		-0.0367		-0.0681		-0.0563
		(0.105)		(0.107)		(0.104)
know_index		0.249		0.320		0.286
		(0.260)		(0.251)		(0.270)
n_cars		-0.125		-0.0571		-0.143
		(0.133)		(0.142)		(0.133)
Observations	152	152	152	152	152	152

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Ordered probit model with acceptability (acp) as outcome variable.

- Believe in effectiveness
- Belief in fairness
- Political preferences

- Coerciveness of a climate policy (banning vs. subsidies)
- Willingness to change lifestyle to mitigate climate change

Results: What drives acceptability of carbon pricing with revenue recycling?

1.3 Table 3 - acceptability of carbon pricing with revenue recycling

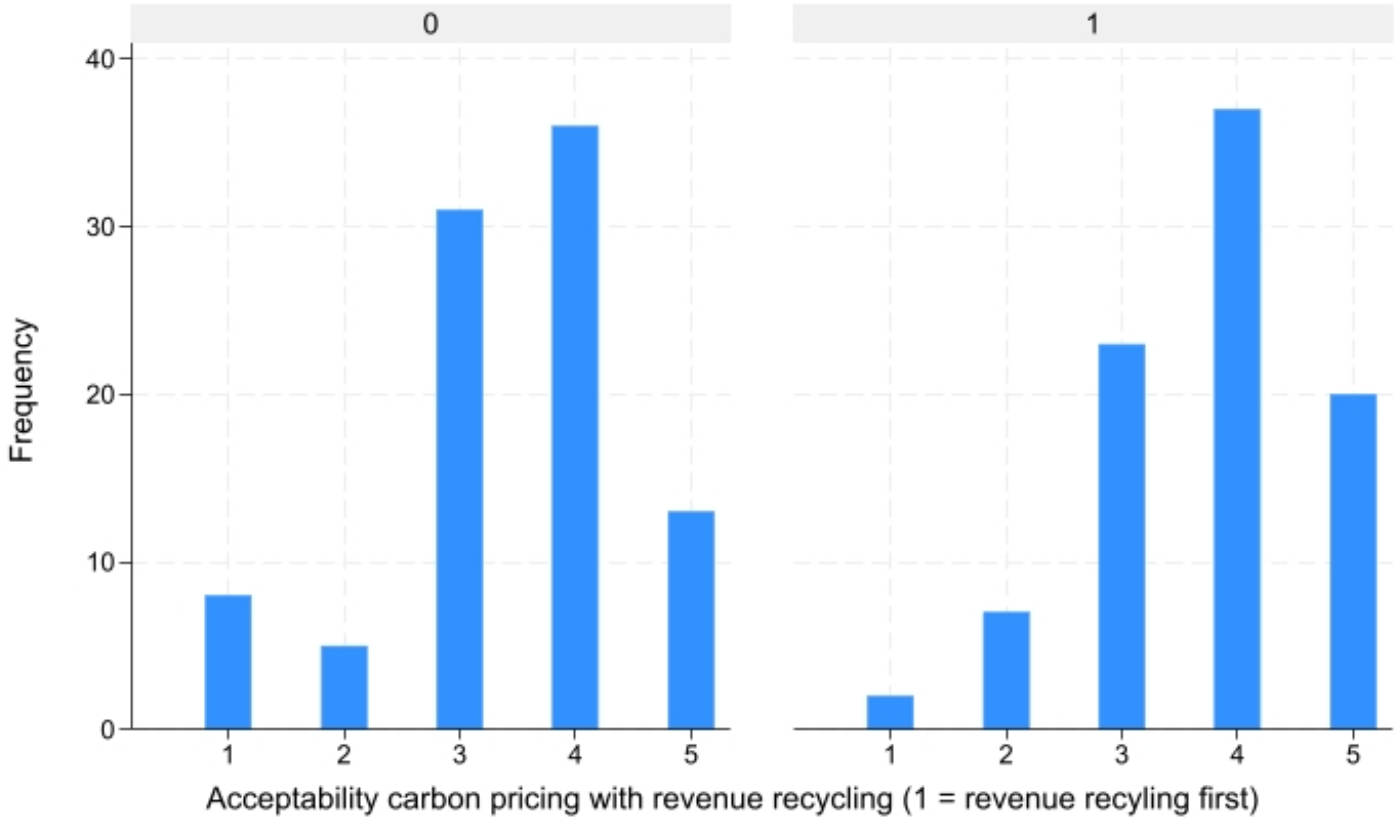
VARIABLES	(1) acp_rr	(2) acp_rr	(3) acp_rr	(4) acp_rr	(5) acp_rr
believe_effect	0.348***	0.370***	0.327***	0.261**	0.263**
	(0.101)	(0.106)	(0.104)	(0.113)	(0.109)
believe_fair	0.197*	0.108	0.114	0.121	0.129
	(0.101)	(0.103)	(0.101)	(0.102)	(0.104)
fin_imp_own	-0.00519	-0.0217	-0.0257	-0.0269	-0.0370
	(0.0900)	(0.0953)	(0.0967)	(0.0938)	(0.0960)
pol_scale		-0.0672	-0.0533	-0.0638	-0.0652
		(0.0413)	(0.0403)	(0.0518)	(0.0587)
trust_parties			0.232**	0.229**	0.226**
			(0.113)	(0.115)	(0.115)
cli_wor				0.0178	0.00399
				(0.153)	(0.157)
sex				-0.434**	-0.469**
				(0.190)	(0.193)
age				-0.0675	-0.0587
				(0.0777)	(0.0790)
edu				0.125	0.144
				(0.163)	(0.172)
income				-0.000946	-0.000922
				(0.00414)	(0.00449)
risk					-0.110
					(0.108)
know_index					0.0675
					(0.238)
n_cars					-0.0134
					(0.150)
Observations	170	152	152	152	152

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Ordered probit model with acceptability as outcome variable.

- Believe in effectiveness
- Trust in political parties

Results: carbon pricing policy package

Acceptability of carbon pricing with revenue recycling



Results: carbon pricing package

VARIABLES	(1) acp_rr	(2) acp_rr	(3) acp_rr
treat_rr_first	0.385**	0.360**	0.328*
	(0.159)	(0.169)	(0.174)
believe_effect	0.328***	0.314***	0.256**
	(0.100)	(0.102)	(0.111)
believe_fair	0.229**	0.140	0.153
	(0.102)	(0.101)	(0.103)
fin_imp_own	0.00578	-0.0186	-0.0311
	(0.0882)	(0.0946)	(0.0948)
pol_scale		-0.0561	-0.0683
		(0.0402)	(0.0570)
trust_parties		0.230**	0.227**
		(0.111)	(0.114)
cli_wor			0.00903
			(0.155)
sex			-0.439**
			(0.194)
age			-0.0553
			(0.0775)
edu			0.165
			(0.161)
income			-0.00118
			(0.00447)
risk			-0.0972
			(0.110)
know_index			0.0167
			(0.249)
n_cars			0.00849
Observations	170	152	152

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Presenting carbon pricing as a policy package (with revenue recycling) first has a positive effect on acceptability of carbon pricing with revenue recycling.

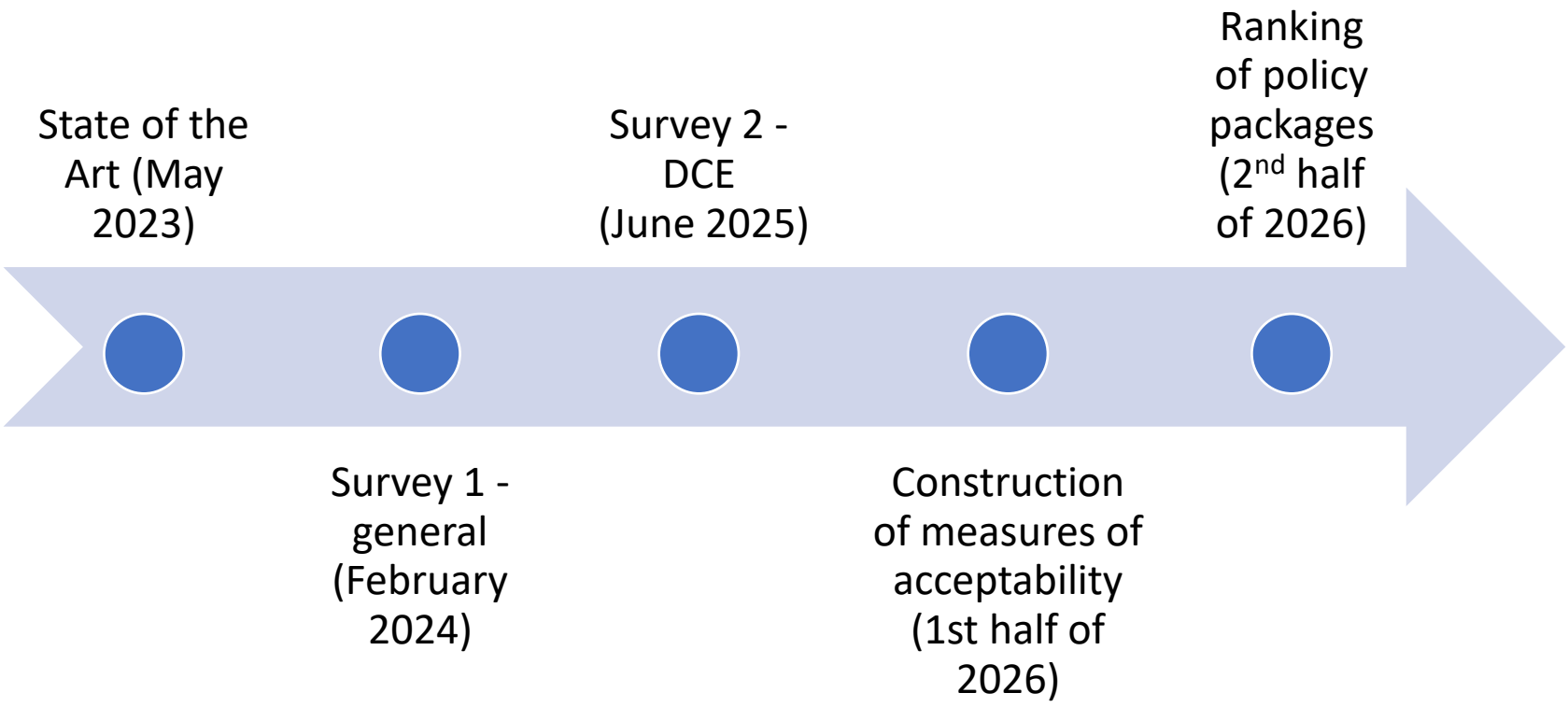
Result: information treatment - air quality

VARIABLES	(1) acp	(2) acp	(3) acp
treat_air	-0.124	-0.144	-0.188
	(0.169)	(0.181)	(0.183)
believe_effect	0.269**	0.293**	0.240**
	(0.106)	(0.120)	(0.114)
believe_fair	0.709***	0.671***	0.660***
	(0.145)	(0.159)	(0.161)
fin_imp_own	0.00840	-0.0349	-0.0292
	(0.0735)	(0.0793)	(0.0842)
pol_scale		-0.160***	-0.126**
		(0.0485)	(0.0570)
trust_parties		0.170	0.169
		(0.121)	(0.114)
cli_wor			0.0561
			(0.154)
sex			-0.102
			(0.196)
age			0.00337
			(0.0723)
edu			0.0617
			(0.115)
income			0.00317
			(0.00481)
risk			-0.0219
			(0.104)
know_index			0.289
			(0.254)
n_cars			-0.135
			(0.134)
Observations	170	152	152

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Information-based treatment about local air quality did not affect acceptability.

Planning


State of the Art (May 2023)
Survey 1 - general (February 2024)
Survey 2 - DCE (June 2025)
Construction of measures of acceptability (1st half of 2026)
Ranking of policy packages (2nd half of 2026)

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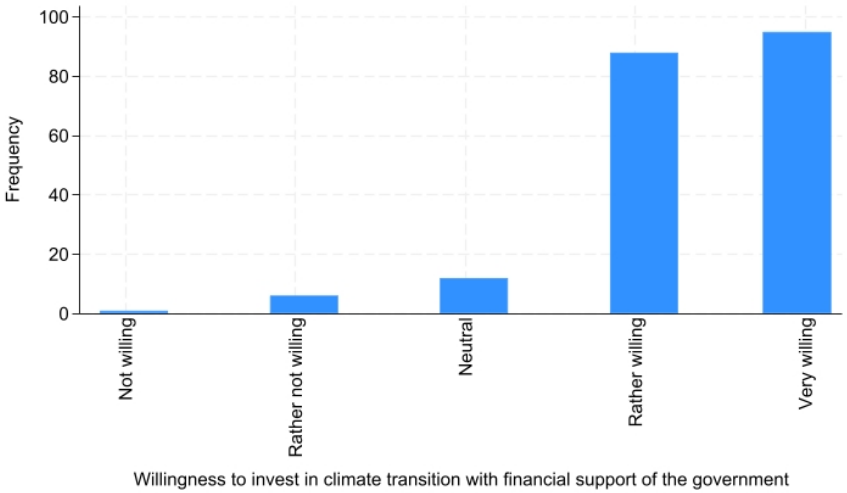
Results: correlation matrix

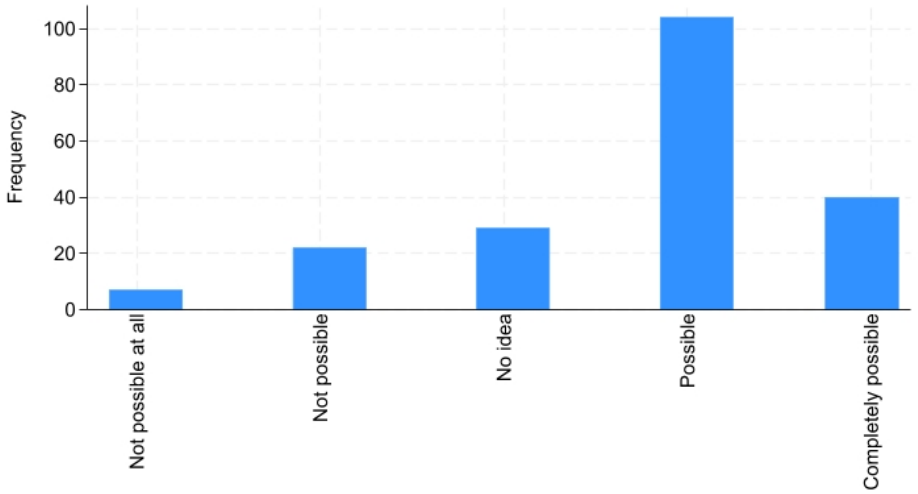
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) acp	1.000														
(2) cli_wor	0.286***	1.000													
(3) cli_pr	0.246***	0.395***	1.000												
(4) believe_effect	0.396***	0.172**	0.134*	1.000											
(5) believe_fair	0.604***	0.202***	0.289***	0.406***	1.000										
(6) fin_imp_own	0.079	0.067	-0.040	0.023	0.107	1.000									
(7) chg_life	0.407***	0.456***	0.609***	0.091	0.313***	0.025	1.000								
(8) n_cars	-0.307***	-0.252***	-0.246***	-0.050	-0.240***	-0.101	-0.305***	1.000							
(9) pol_scale	-0.309***	-0.457***	-0.340***	-0.057	-0.068	-0.061	-0.474***	0.515***	1.000						
(10) trust_parties	0.243***	0.001	0.053	0.275***	0.133*	0.013	0.171**	-0.203***	-0.187**	1.000					
(11) risk	0.155**	0.007	0.055	0.171**	0.199***	-0.139*	0.104	-0.028	-0.009	0.099	1.000				
(12) sex	-0.030	0.201***	0.248***	-0.261***	-0.058	0.027	0.272***	-0.105	-0.255***	-0.090	-0.213***	1.000			
(13) age	-0.066	0.110	0.029	-0.111	-0.016	-0.081	0.029	0.072	0.196**	-0.026	0.060	-0.049	1.000		
(14) income	-0.119	-0.077	-0.039	-0.014	-0.180**	-0.099	-0.127*	0.331***	0.068	-0.127*	-0.051	0.066	-0.134*	1.000	
(15) edu	0.235***	0.264***	0.345***	0.223***	0.216***	0.057	0.222***	-0.120	-0.238***	0.117	0.200***	0.017	-0.009	-0.116	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Results: willingness to invest in climate transition



Willingness to invest in climate transition with financial support of the government



Possibility to invest financially in climate transition

	Not possible at all	Not possible	No idea	Possible	Completely possible	Total
Not willing	0	0	0	0	1	1
Rather not willing	2	1	1	1	1	6
Neutral	1	4	3	4	0	12
Rather willing	3	11	18	50	6	88
Very willing	1	6	7	49	32	95
Total	7	22	29	104	40	202

Results: acceptability of climate policies