Cobham
behavioural climate solutions

erc
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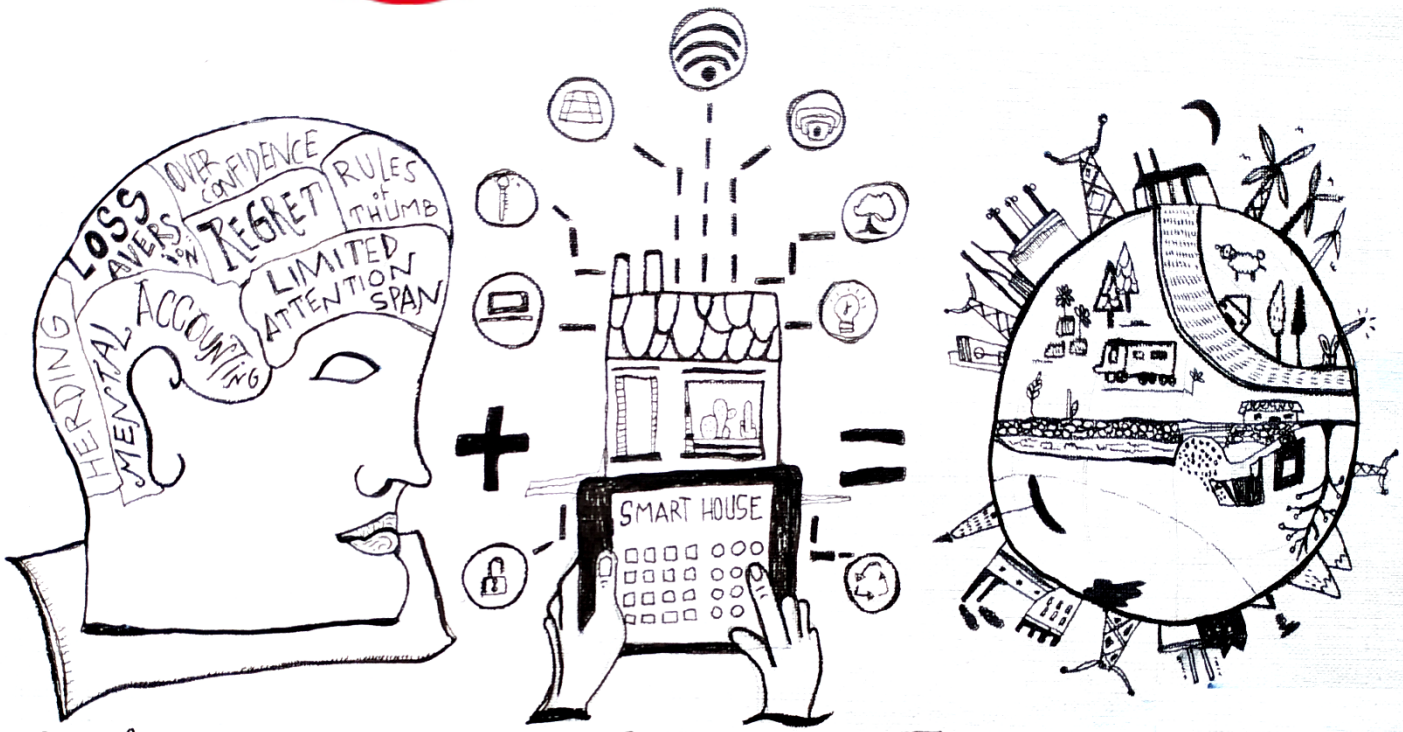


RFF CMCC European Institute on Economics and the Environment

POLITECNICO MILANO

Team

Behavioural economics

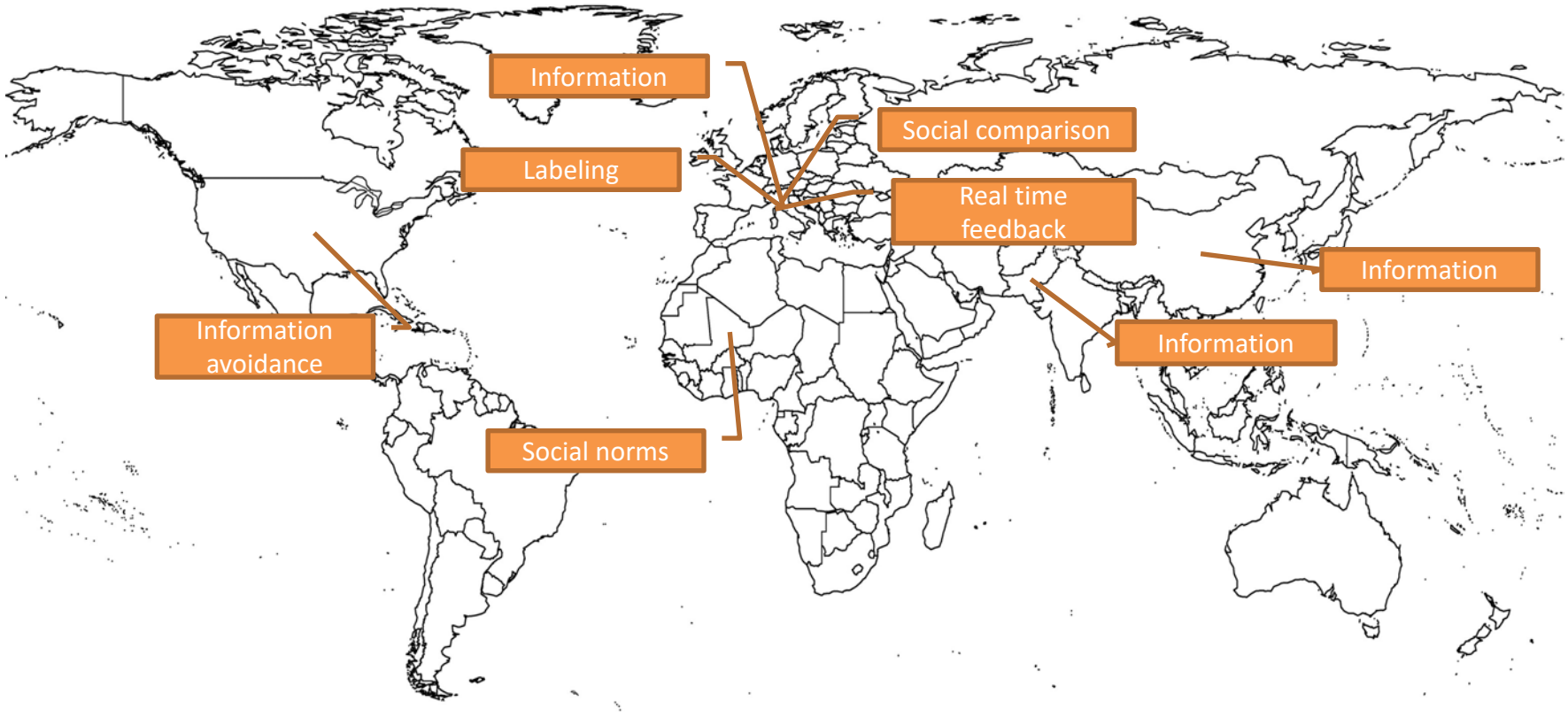



Data Science
Numerical Models

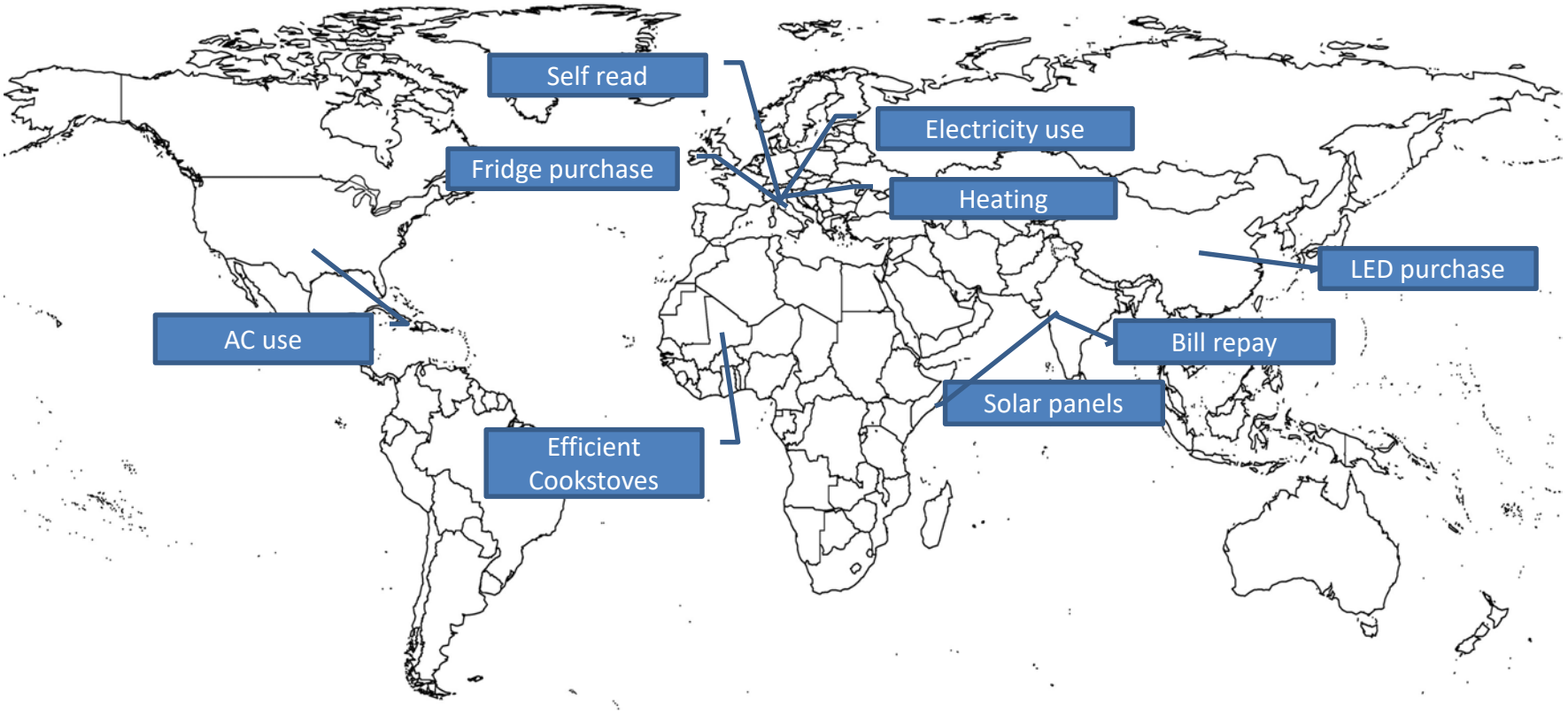



Experimental and behavioural economics

Field experiments: levers



Field experiments: applications



Key lessons

Information provision

- Increases willingness to pay for small purchases (ie lightbulbs)
- Can backfire for expensive items with long payback times (ie A+++ fridges): energy costs are higher than expected
- Deadlines help overcome procrastination
- People tend to avoid information when they would feel obliged to behave better
- Information effects decay exponentially

Social comparison and other nudges

- Works only on high users. Average effects are close to zero
- Environmental values matter: they can be primed, but might not lead to subsequent pro-environmental behavior
- Nudges and traditional policies can crowd out each other

Technology adoption

- Modifies attitudes towards the environment

Modeling climate compatible behaviour

Key lessons

The energy and climate transition

- Energy efficiency is key to attain the Paris climate objectives
- Demand side options have the highest synergies with the sustainable development goals
- Demand side strategies reduce the need for large scale negative emissions and improve inter-generational equity

Modeling demand side behavior in integrated assessment models

- Models should use lower consumption discount rates, consistent with climate policies analyzed
- Expand definition of welfare beyond consumption based utility
- Clustering of agents not a trivial task: use experimental data to calibrate agent based models
- Account for heterogeneity of behaviour

Five Policy Reccomendations

1. In order to lead to better choices, information should be perceived as important and get the attention needed.

- emphasize monetary savings and co-benefits (health, environment) of energy efficiency decisions right now
- frame carefully the content (make it salient and urgent, use moral appeals only when they are really relevant)

2. Behavioural interventions are no substitute to traditional policies such as market based, or standard and regulation. Account for policy interactions.

3. Beware of decaying effects of behavioural interventions over time: connect to topics which are perceived as relevant

4. Values count but cannot be easily induced: boosting at early age is key

5. Evaluate policies with randomized controlled trials (ex post) and with integrated assessment models (ex ante)

Contacts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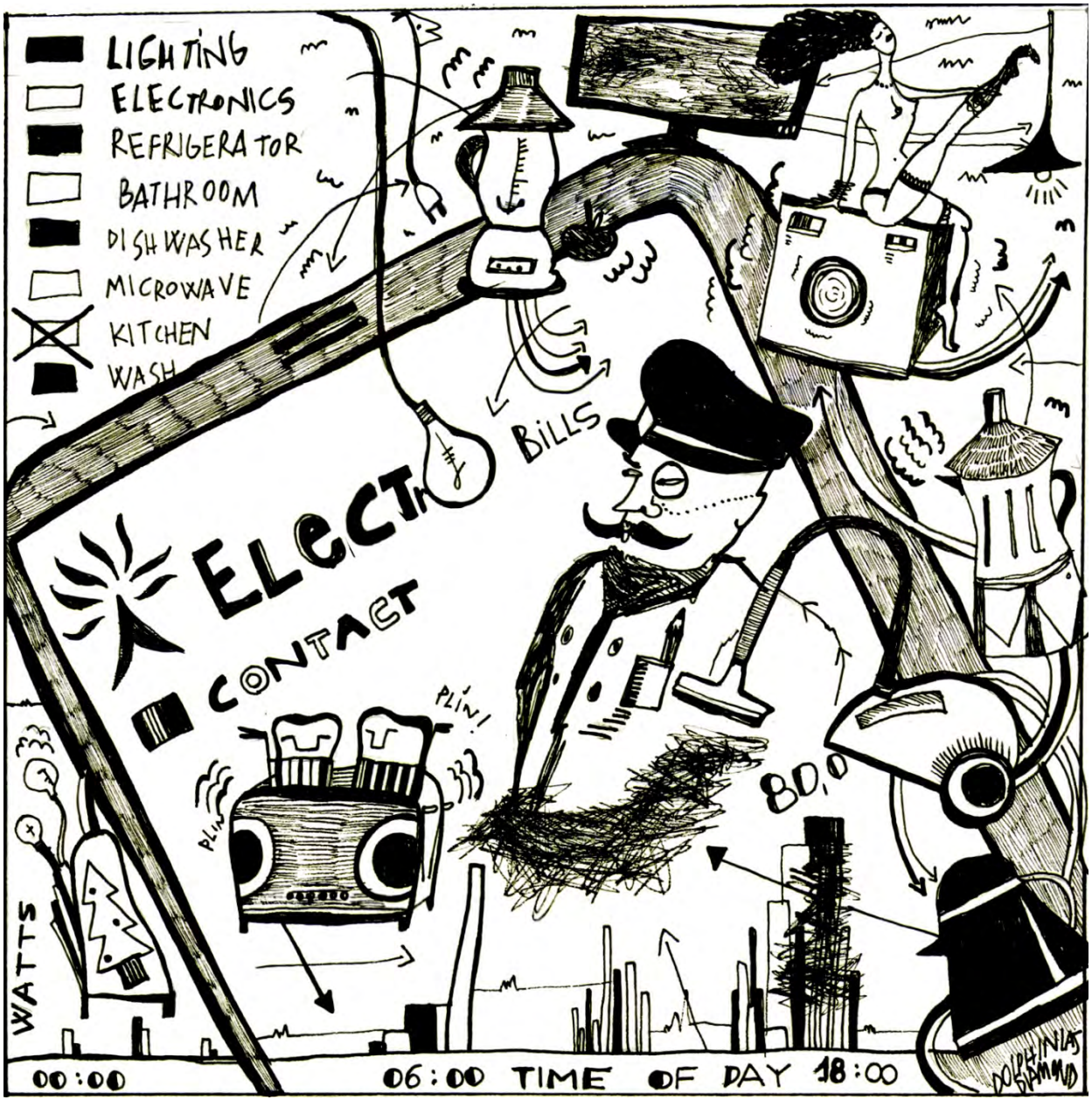
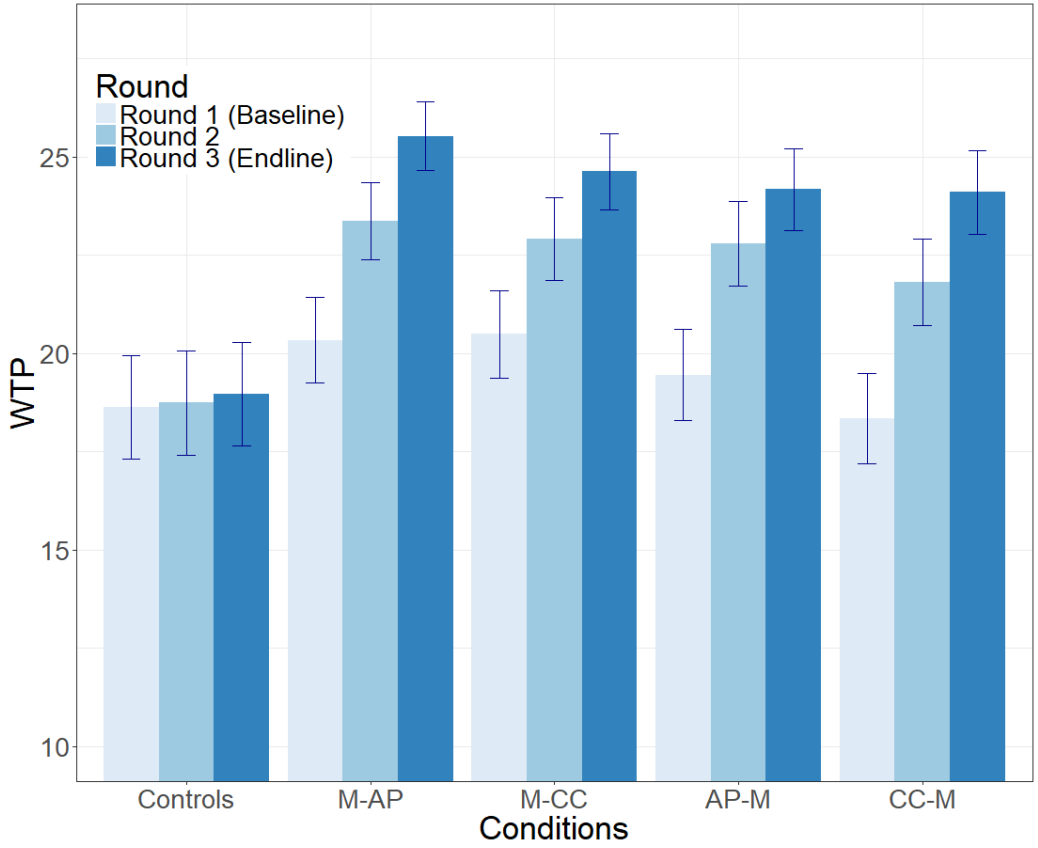
http://cobham-erc.eu

Detailed results

Information



Information provision and LED lightbulbs (China)

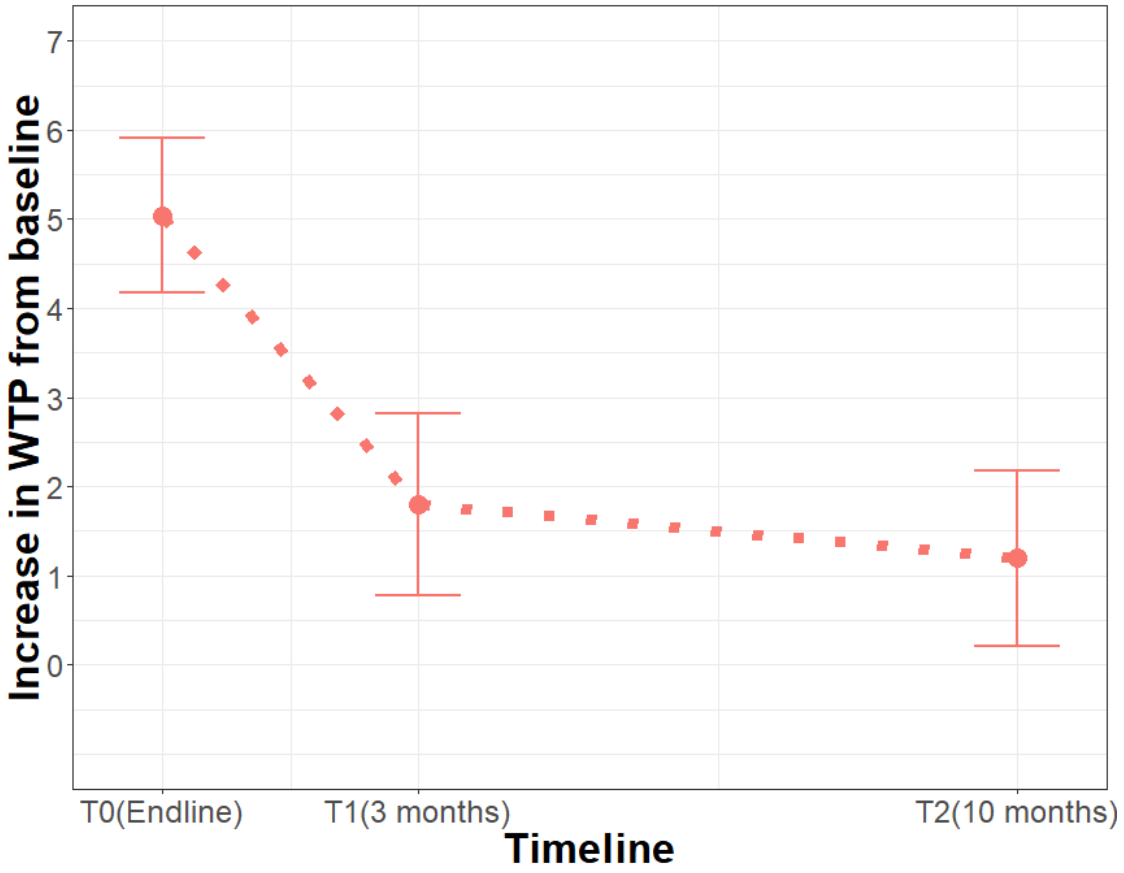


Treatments:
M=monetary gain
CC=climate change benefit
AP= air pollution benefit

Both monetary and environmental information increase willingness to pay for LED lightbulbs

Gao, d'Adda and Tavoni, 2019

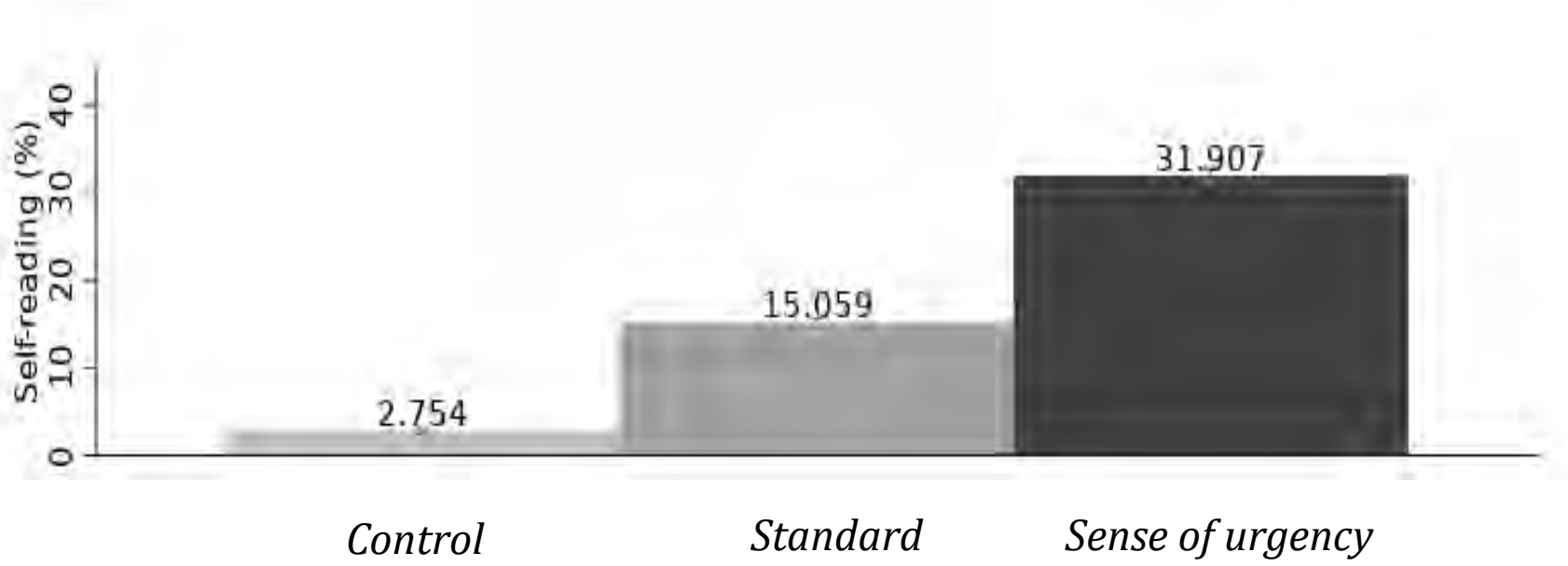
Information provision and LED lightbulbs (China)



Benefits of information provision decays exponentially over time

Gao, d'Adda and Tavoni, 2019

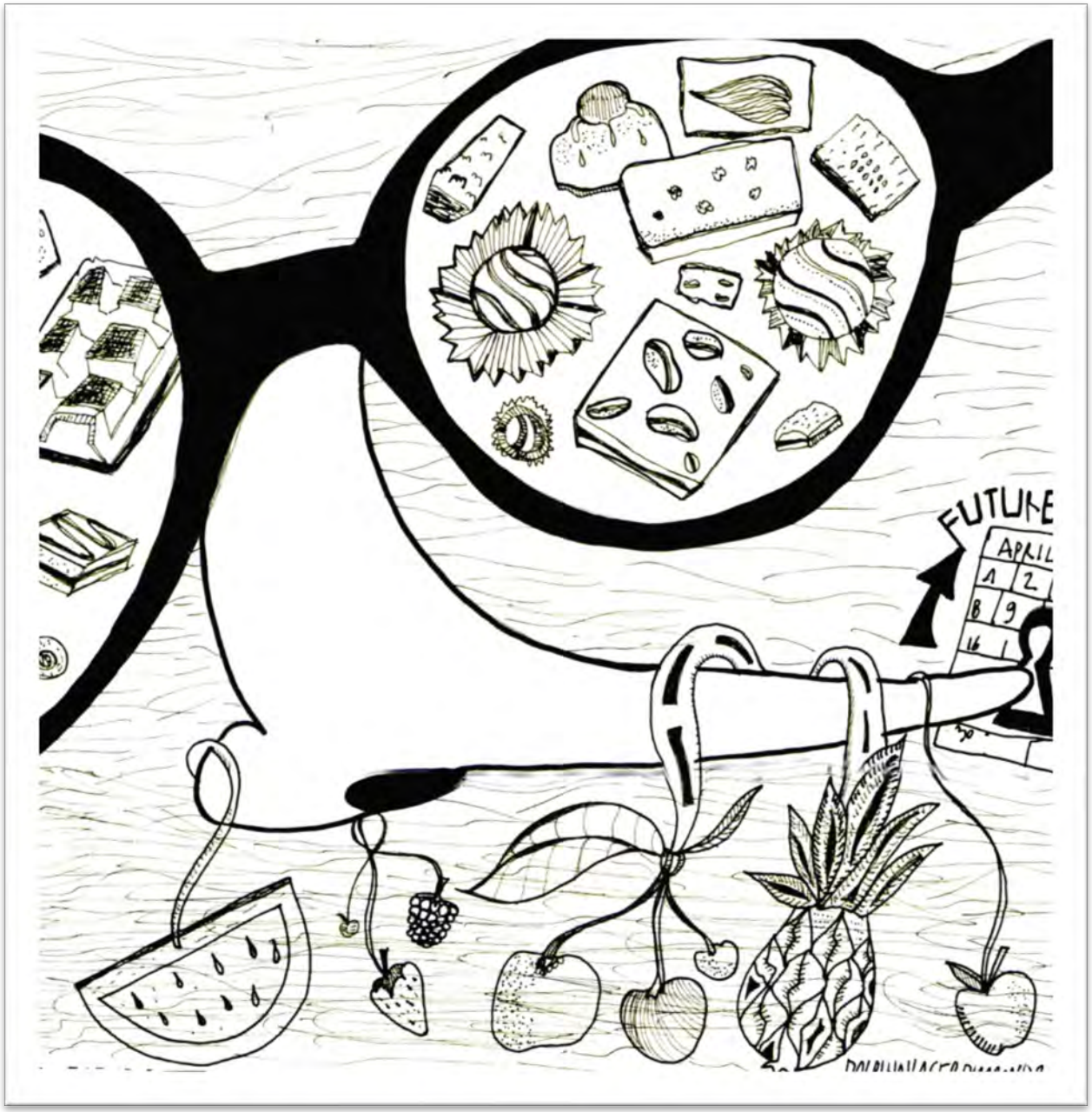
Information campaign and energy self reads (EU)



Providing a sense of urgency and usefulness significantly increases self reads of energy

Galliera, d'Adda and Tavoni, 2019

Behavioural biases

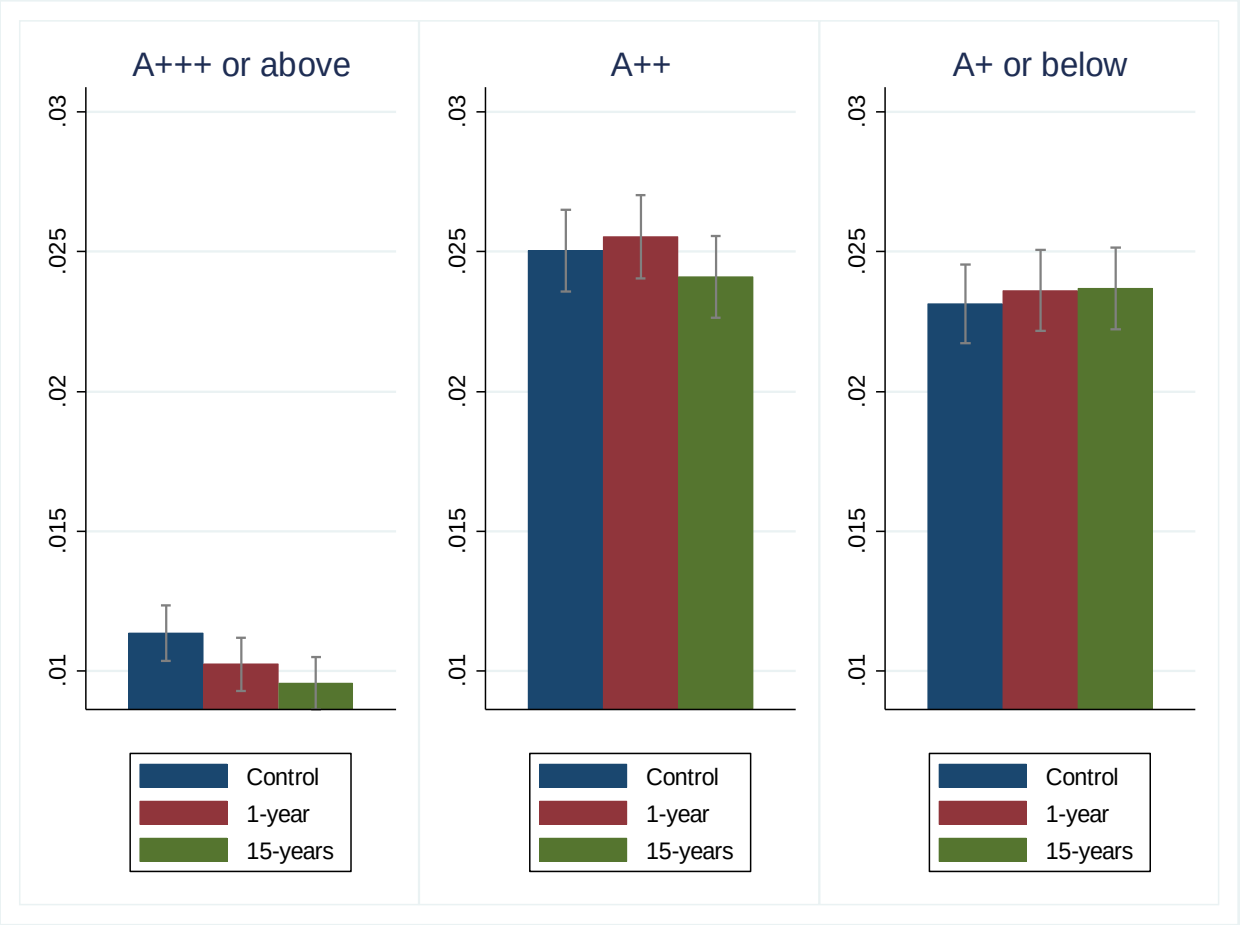


Information on energy costs and refrigerators purchase (EU)

We test the impact of displaying energy costs for one year or for the lifetime of the product

d'Adda, Gao, Goette and Tavoni, 2019

Information on energy costs and refrigerators purchase (EU)

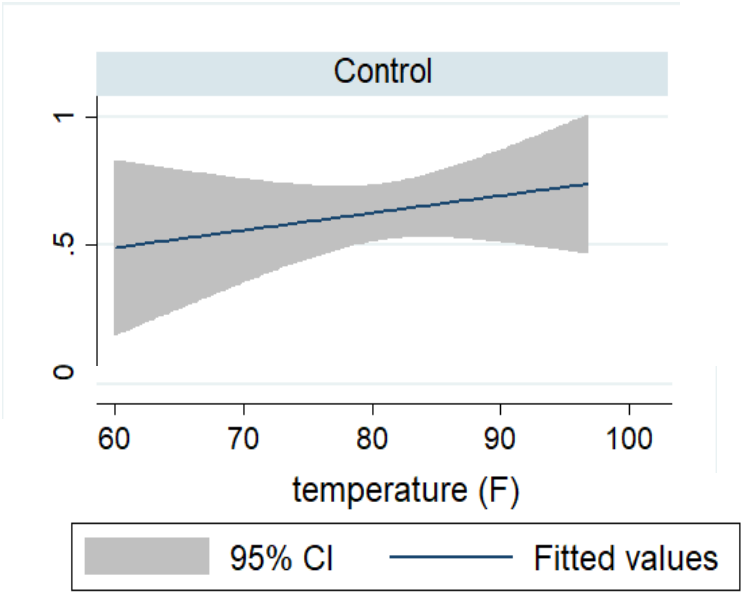


Showing lifetime energy costs lowers purchases of most efficient (A+++) products

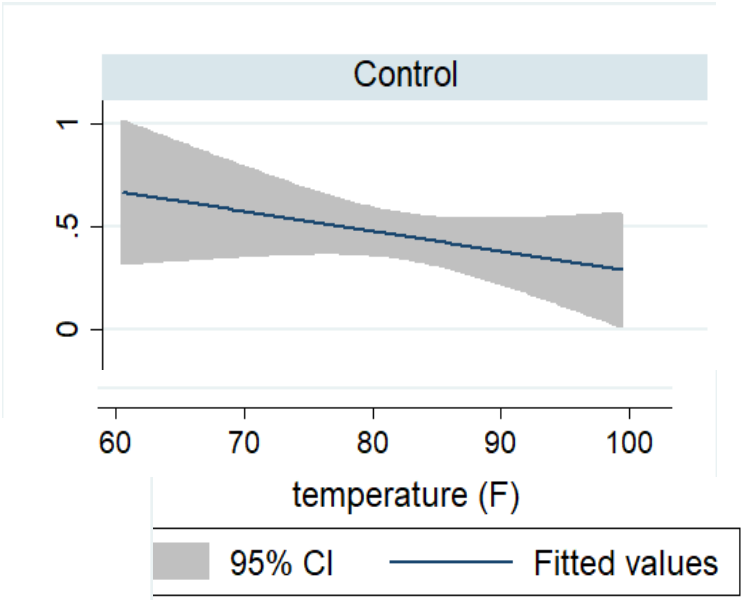
d'Adda, Gao, Goette and Tavoni, 2019

Information avoidance and air conditioning (USA)

Avoid information on environmental impact



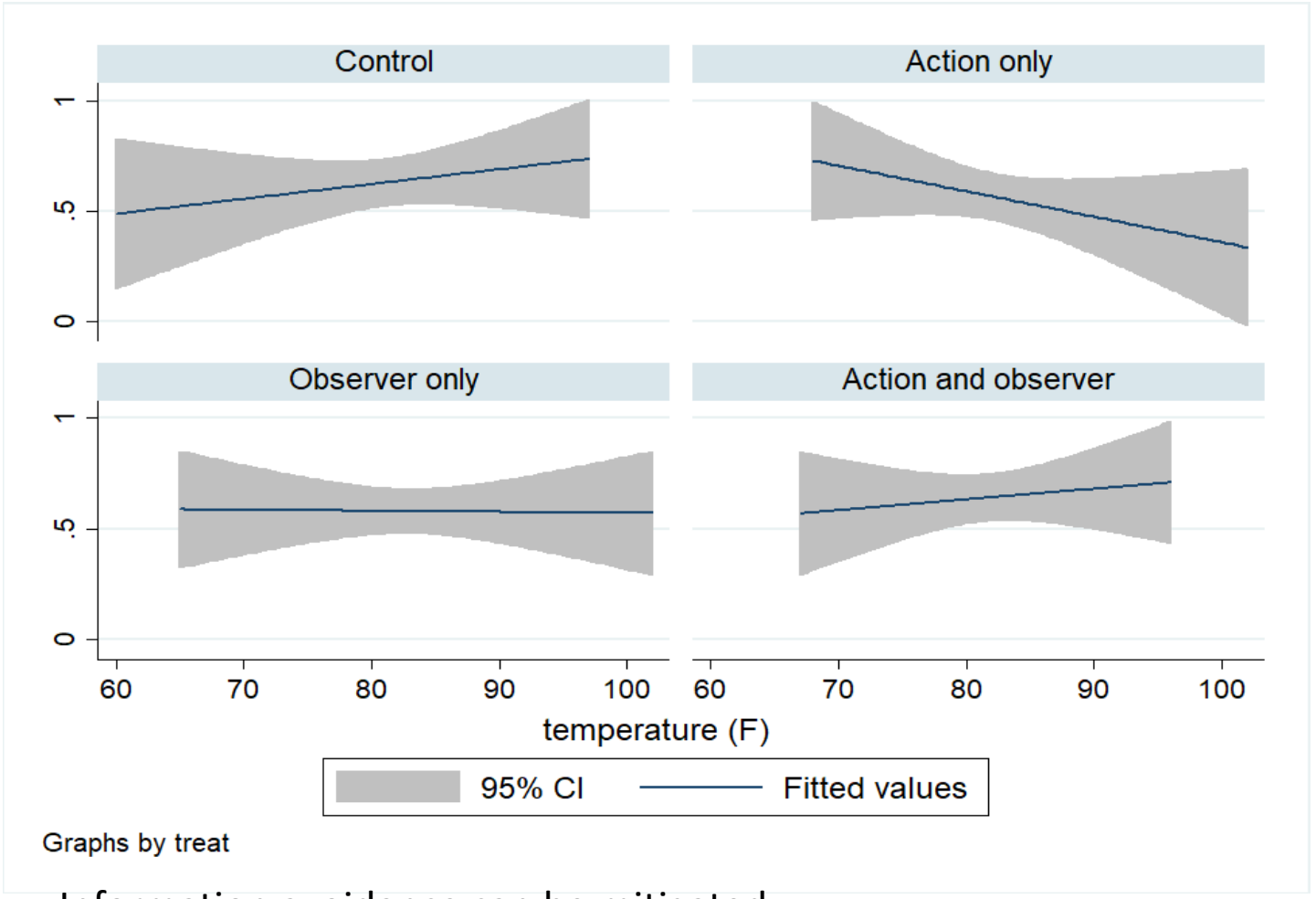
Avoid information on economic savings



People don't want to know the environmental impact of AC when it is hot outside

d'Adda, Gao, Golman and Tavoni, 2019

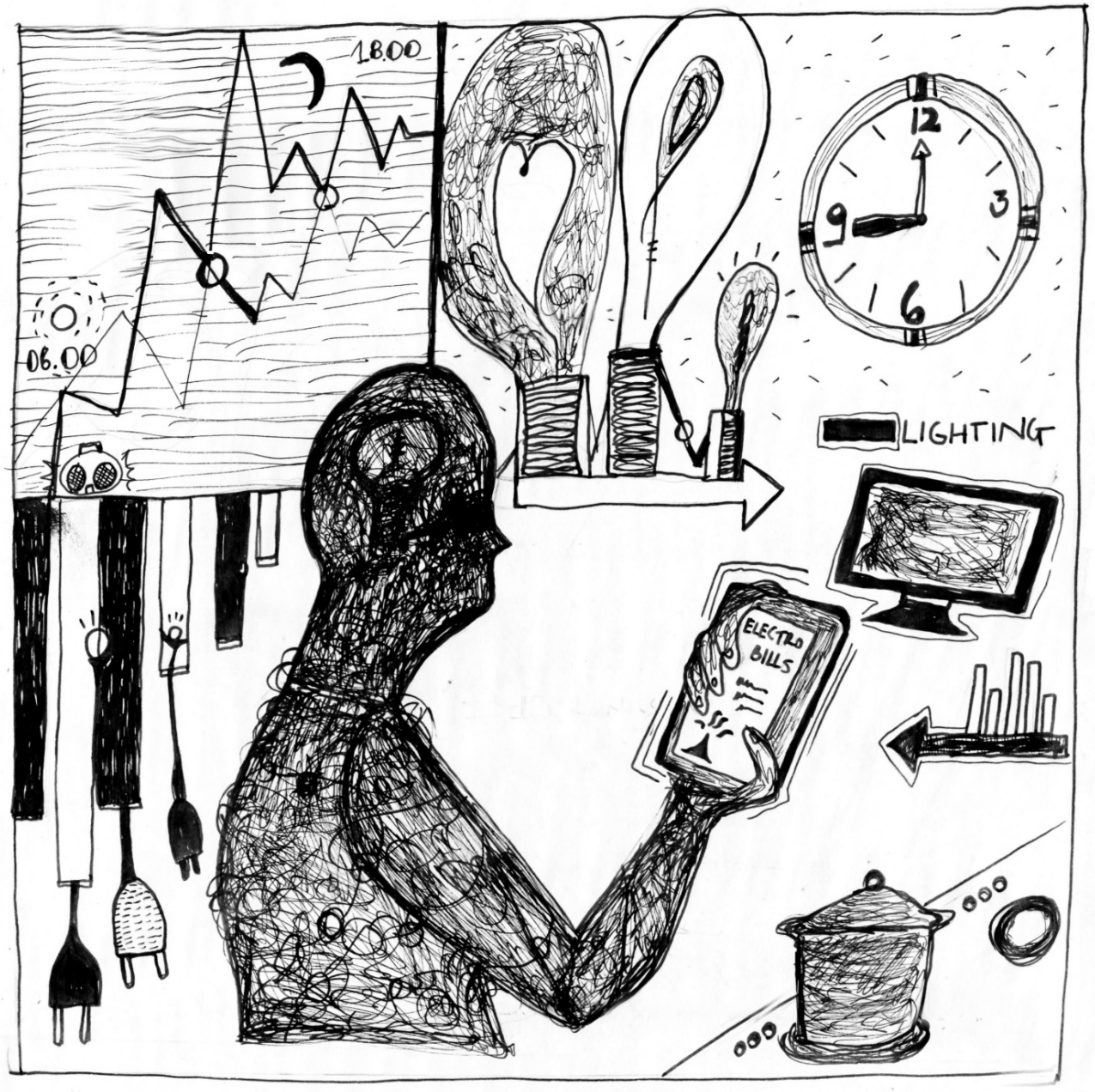
Information avoidance and air conditioning (USA)



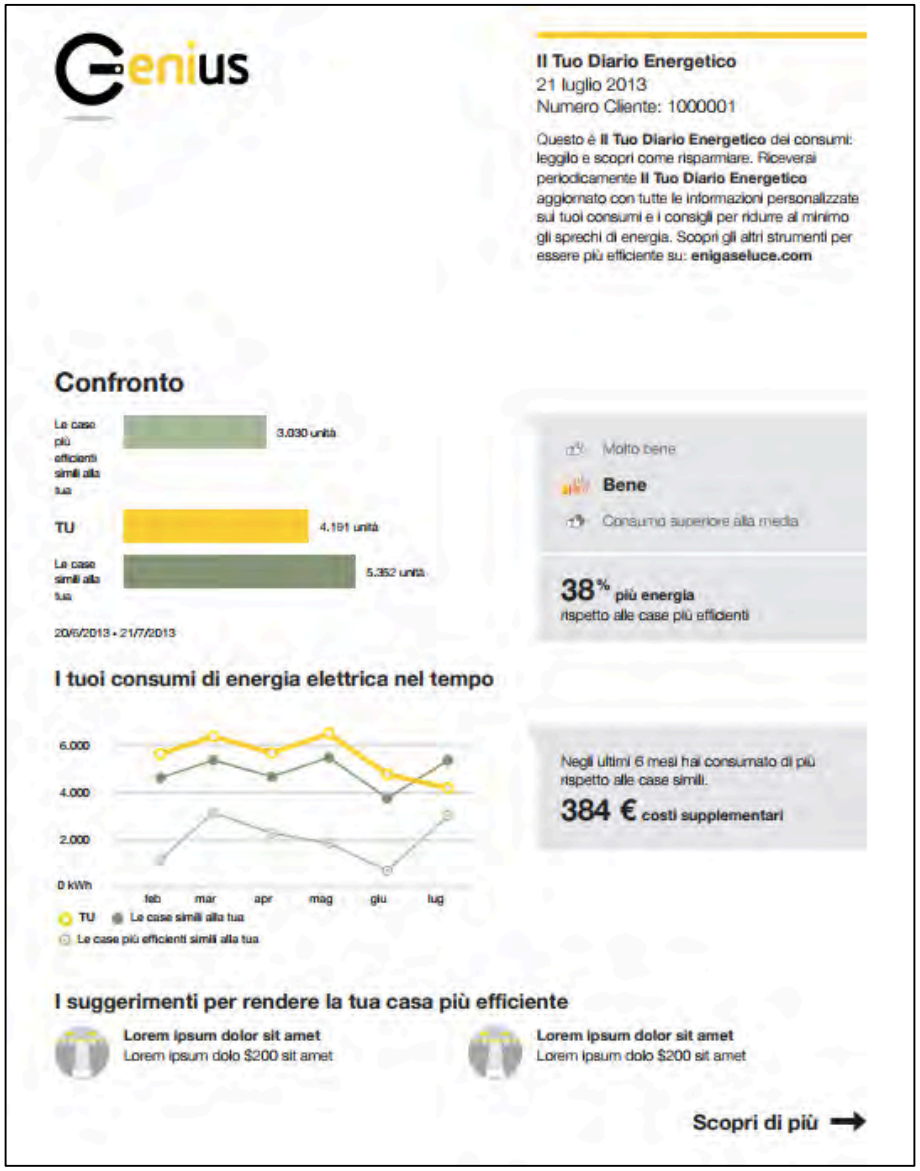
Information avoidance can be mitigated

d'Adda, Gao, Golman and Tavoni, 2019

Nudging



Social comparison



Genius

Il Tuo Diario Energetico
21 luglio 2013
Numero Cliente: 1000001

Questo è **Il Tuo Diario Energetico** dei consumi: leggilo e scopri come risparmiare. Riceverai periodicamente **Il Tuo Diario Energetico** aggiornato con tutte le informazioni personalizzate sui tuoi consumi e i consigli per ridurre al minimo gli sprechi di energia. Scopri gli altri strumenti per essere più efficiente su: **enigaseluce.com**

Confronto

Le case più efficienti simili alla tua — 3.030 unità
TU — 4.191 unità
Le case simili alla tua — 5.352 unità

20/6/2013 - 21/7/2013

Molto bene
Bene
Consumo superiore alla media

38% più energia
rispetto alle case più efficienti

I tuoi consumi di energia elettrica nel tempo

6.000
4.000
2.000
0 kWh
feb mar apr mag giu lug

TU · Le case simili alla tua · Le case più efficienti simili alla tua

Negli ultimi 6 mesi hai consumato di più rispetto alle case simili.
384 € costi supplementari

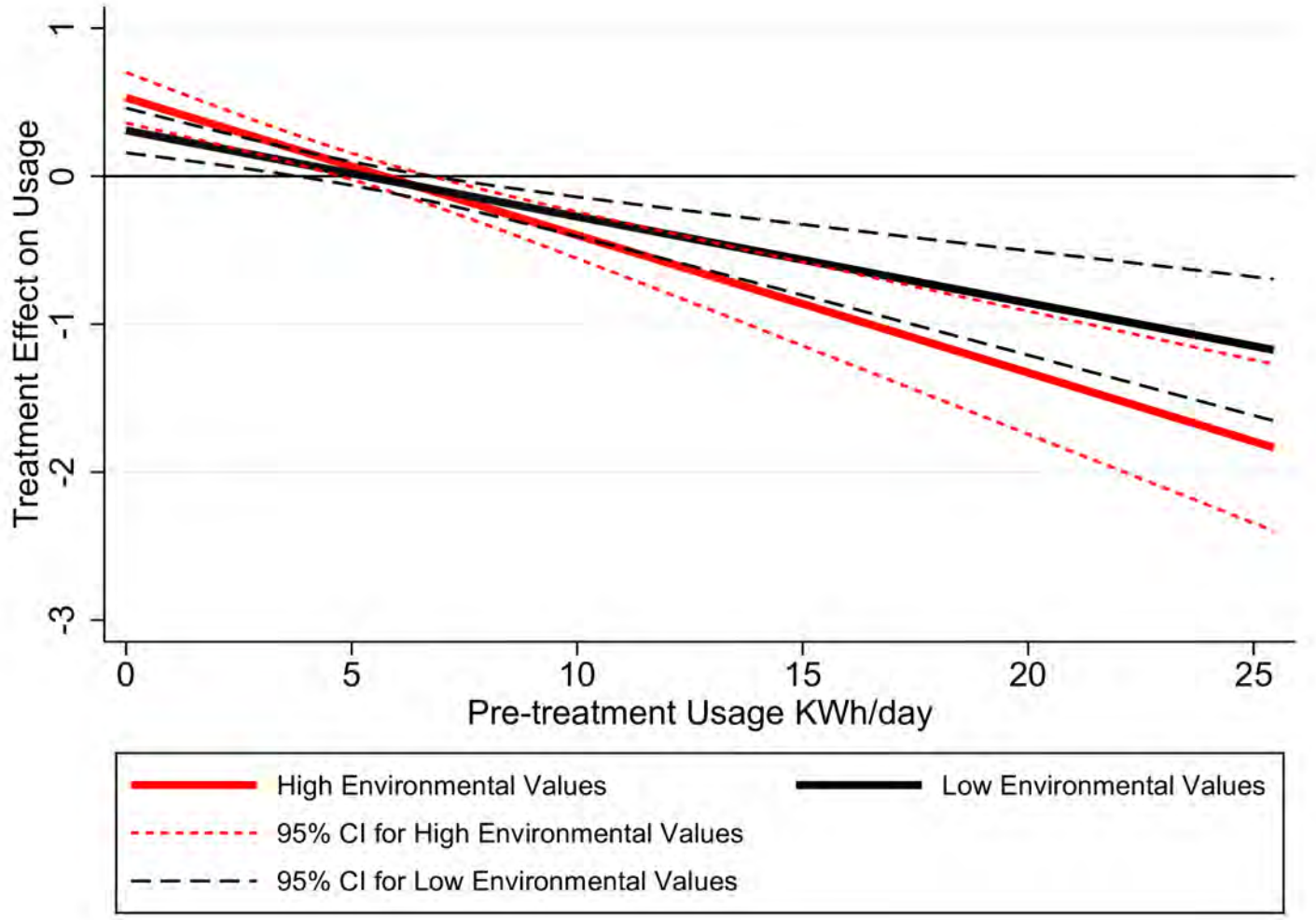
I suggerimenti per rendere la tua casa più efficiente

Lorem ipsum dolor sit amet
Lorem ipsum dolo $200 sit amet

Lorem ipsum dolor sit amet
Lorem ipsum dolo $200 sit amet

Scopri di più →

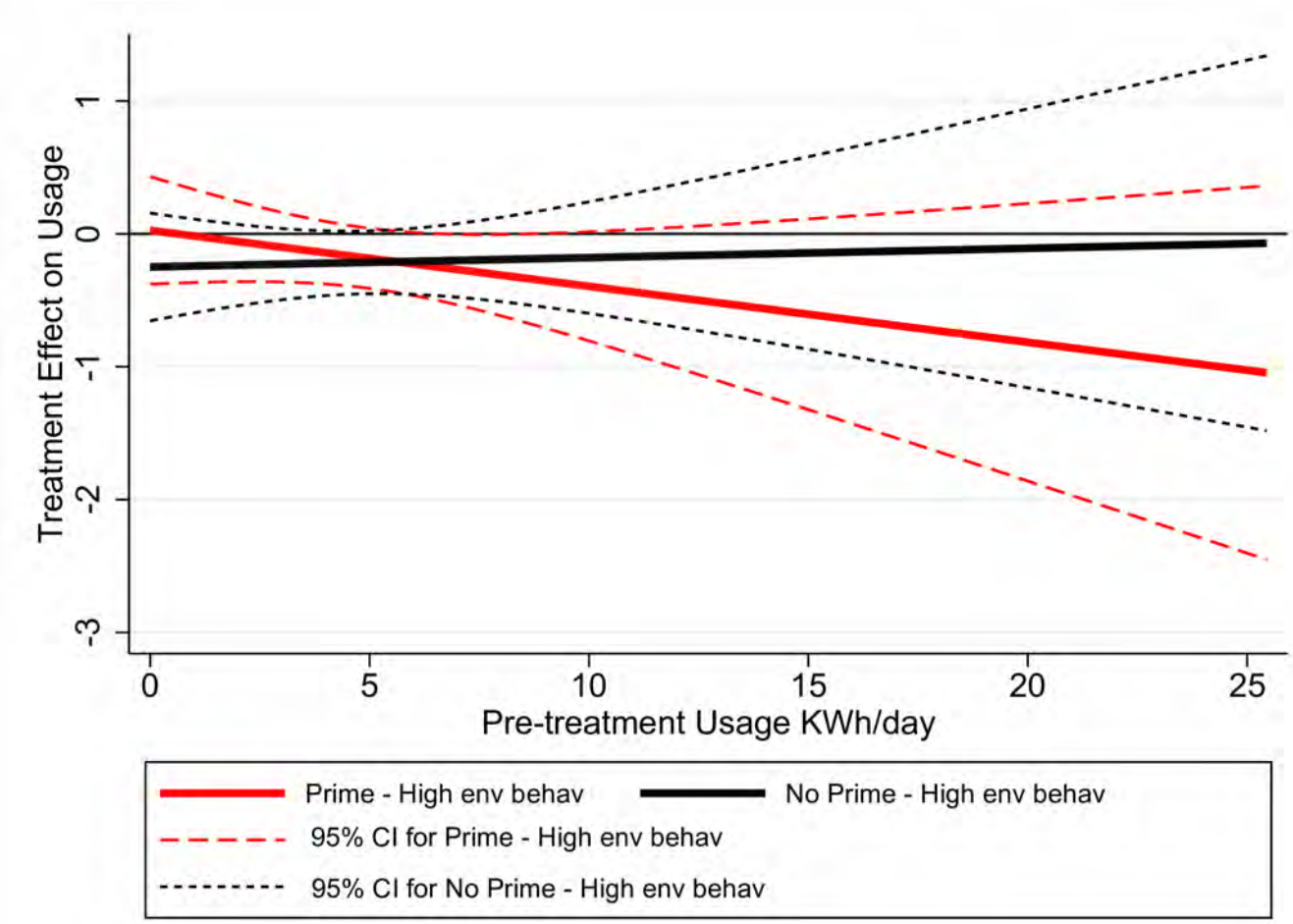
Heterogeneity of social comparison on use and values (EU)



Social comparison works only for high users and environmentally aware ones

Bonan, Cattaneo, d'Adda and Tavoni, 2019

Priming environmental values (EU)



Priming environmental behavior works but only for pro-environmental individuals

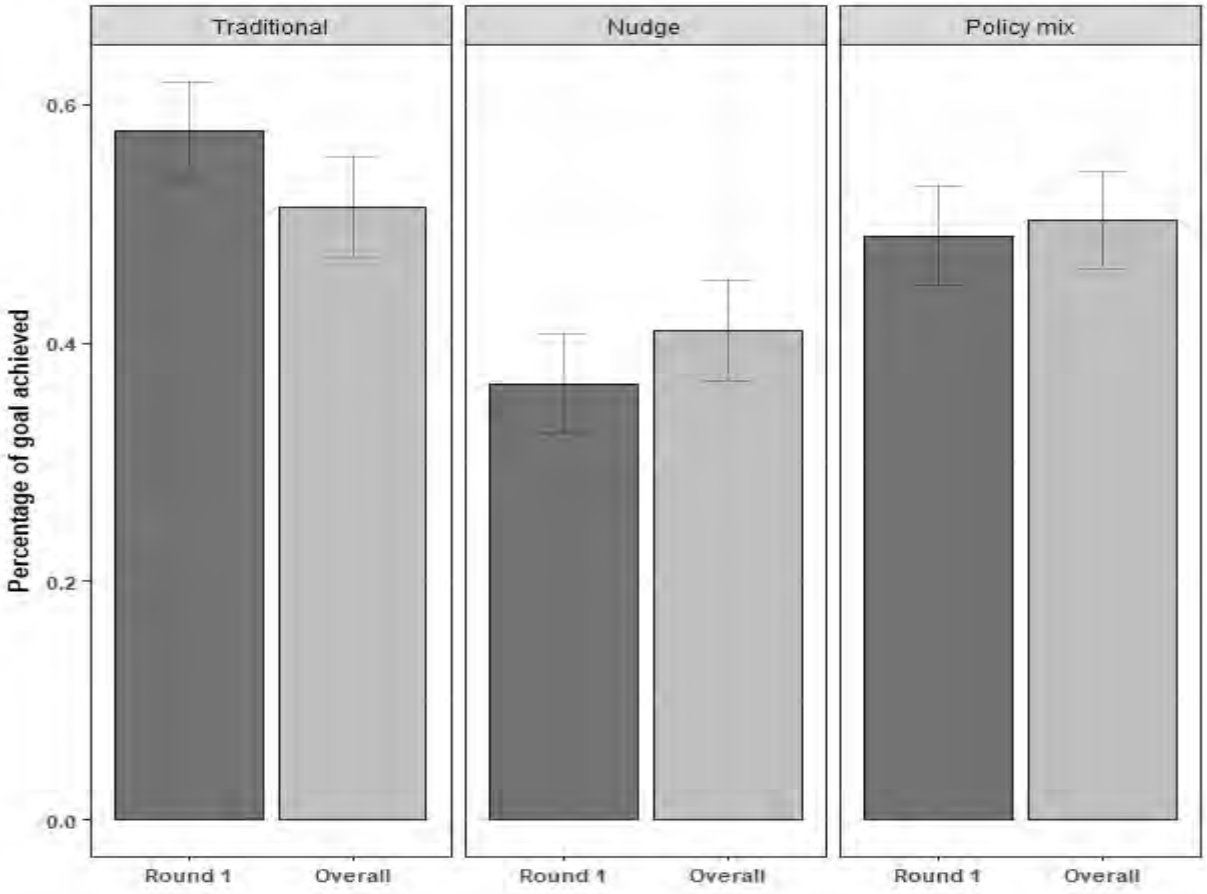
Bonan, Cattaneo, d'Adda and Tavoni, 2019

Priming environmental values (EU)

- Priming pro-environmental actions strengthen environmental self-identity
- But, it doesn't promote following pro-environmental decisions. It generate negative spillovers among subjects who engage less in pro-environmental behaviors.

Fanghella, d'Adda and Tavoni, 2019, Frontiers in Psychology

Interaction between traditional policies and nudges (EU)



Combining the traditional and the behavioral tools results in negative interactions

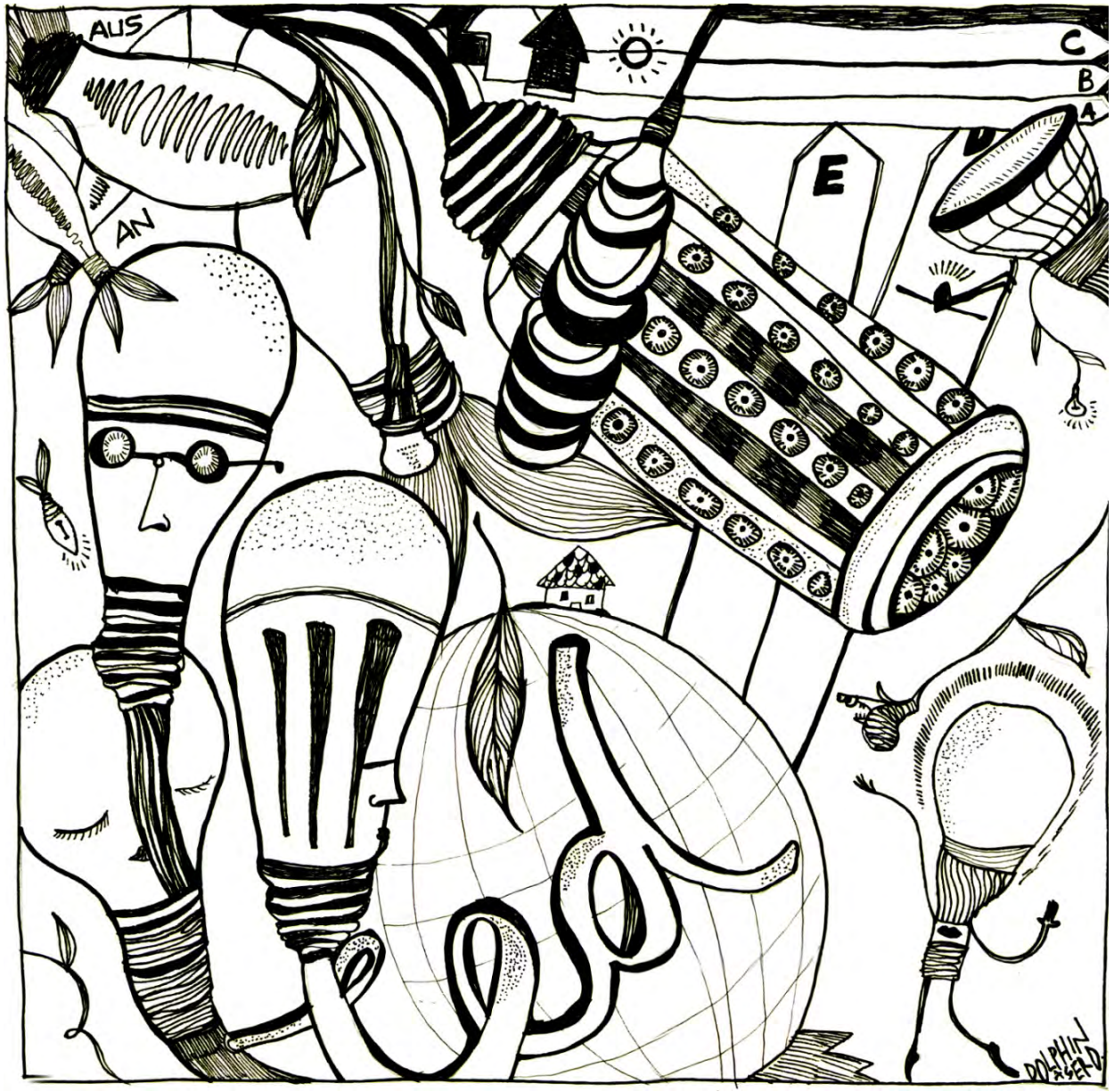
Fanghella, Ploner and Tavoni, 2019

Persistency of traditional policies and nudges (EU)

- Policy interventions are generally evaluated only for their direct effectiveness.
- Little is known about their ability to persist over time and spill across contexts.
- We experimentally compare two instances of nudges and two of push measures.
- Push measures result more effective than nudges in promoting fairness directly.
- Their effect also persists over time. However, it does not spill across contexts.

d'Adda, Capraro and Tavoni, 2017, Economic Letters

Technology



LED lightbulbs adoption and climate change beliefs (China)

Beliefs

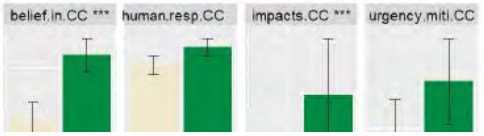
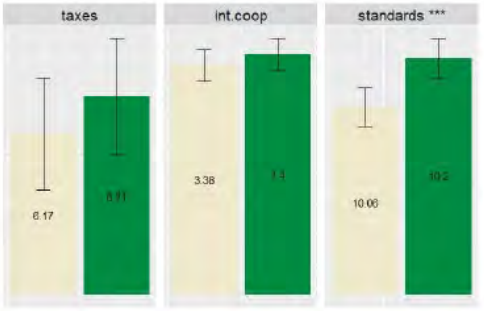


Table 1: Climate attitudes impacts of receiving a LED

	Change in 'Belief in CC'	Change in 'Purchase EE'
Received LED	0.1805**	0.3122***
	[0.0847]	[0.1186]

The table reports average treatment effects of receiving a LED. Standard errors are in parentheses. Significance of Wilcoxon signed rank test: < 0.01 ***; < 0.05 **; < 0.1 *.

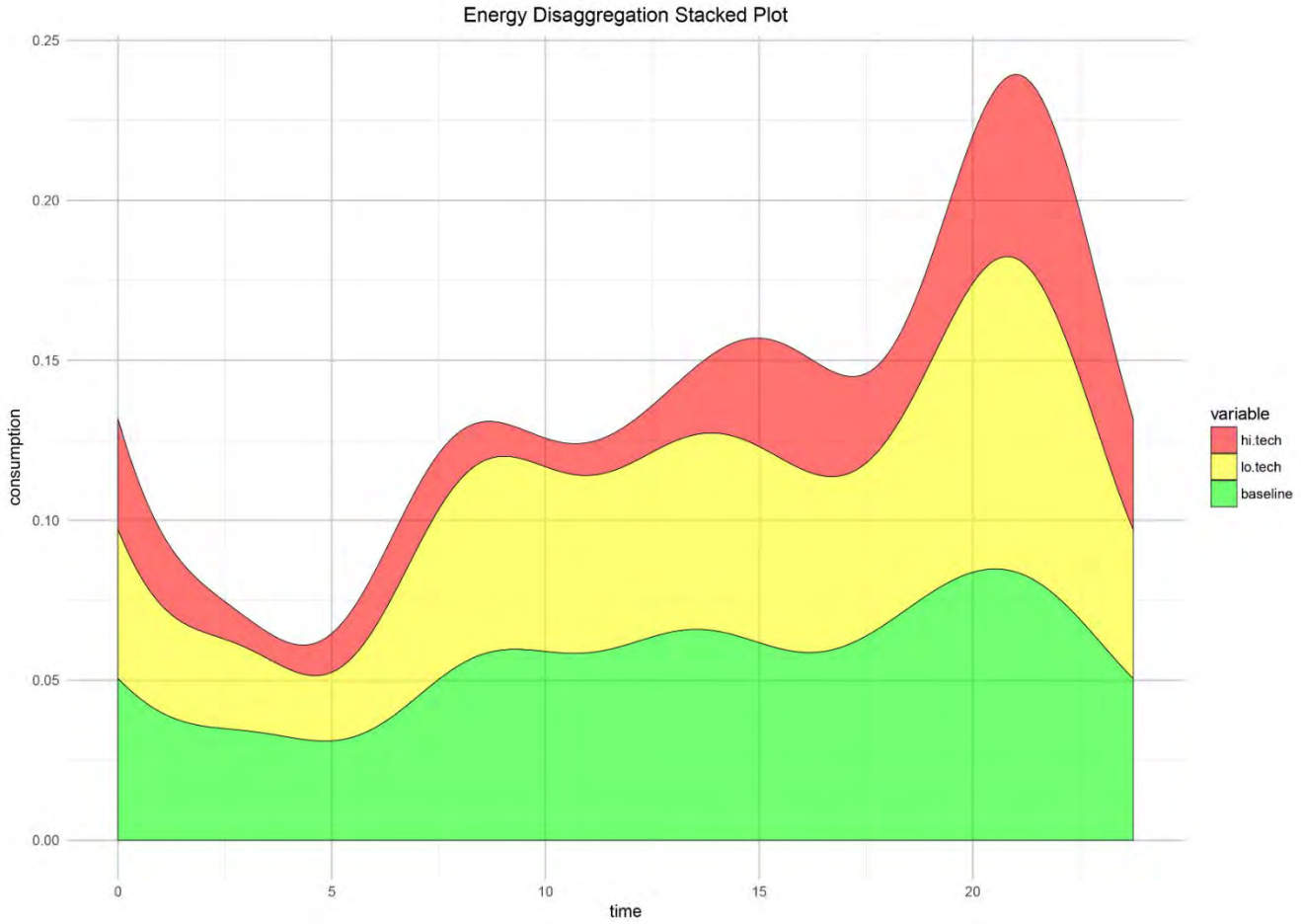
Policy Support



Adopting efficient technology modifies climate perceptions

Gao, d'Adda and Tavoni, 2019, ERL

Real time electricity feedback (EU)



Fontana, Vantini and Tavoni, 2019

Energy access

Training and efficient cookstove adoption (Mali)

Training sessions improve uptake and use of efficiency cokstoves

ICS ownership

Invited	0.311***	
	(0.0449)	
Participated		0.670***
		(0.0888)
Constant	-0.0541	-0.00167
	(0.0899)	(0.0882)
Observations	989	989
R-squared	0.150	0.264

Panel B: Predicted actual usage	All	
Invited	0.116***	
	(0.0187)	
Paricipated		0.248***
		(0.0344)
Constant	-0.0117	0.00984
	(0.0461)	(0.0438)
Observations	953	953
R-squared	0.190	0.296

Bonan et. al, 2019

Energy and bill payment (Pakistan)

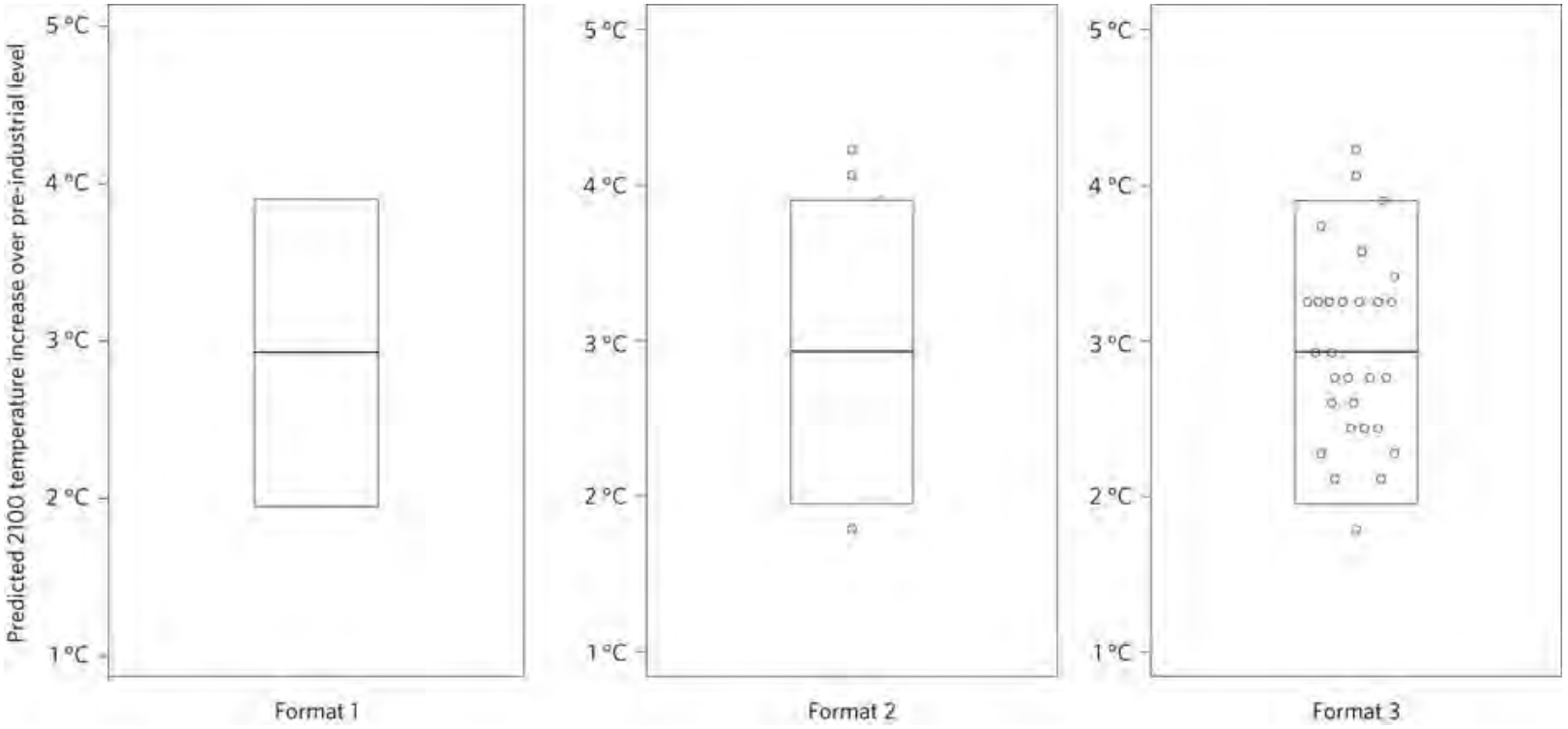
- Fixed payment schedule and use of planning tools helps paying electricity on time

- Payment for electricity e enrollment in debt repayment plans depends on honesty and moral disengagement. These are influenced by the relation with the energy utility, especially on the quality and reliability of energy supply.

Bonan et. al, 2019

Climate policy

Scientific information display and climate policymakers views (UNFCC COP Paris 2015)



Policymakers' views are influenced by the way uncertainty of climate projections are presented

Bosetti, Weber, Berger, Budescu, Liu and Tavoni, 2017, Nature Climate Change

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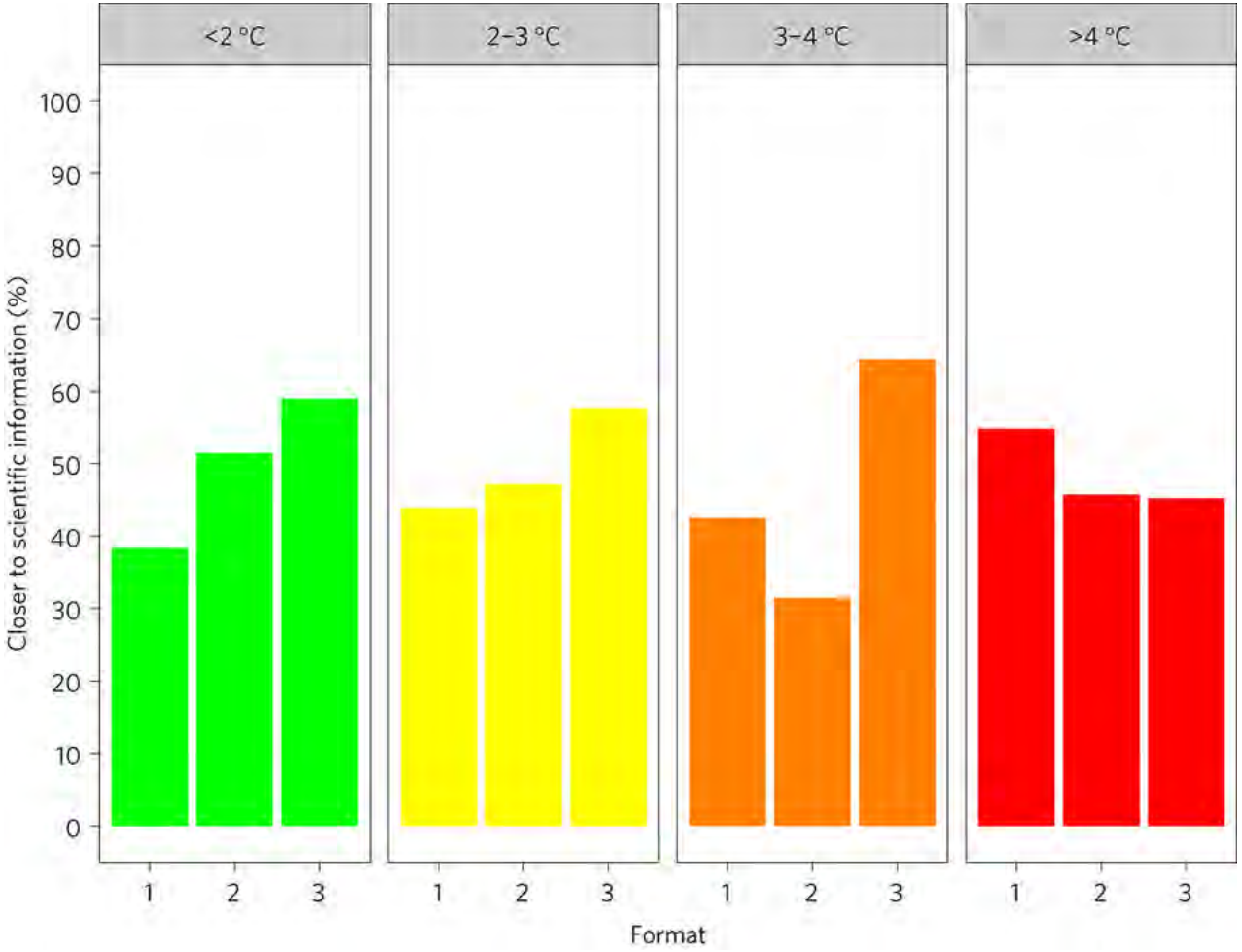

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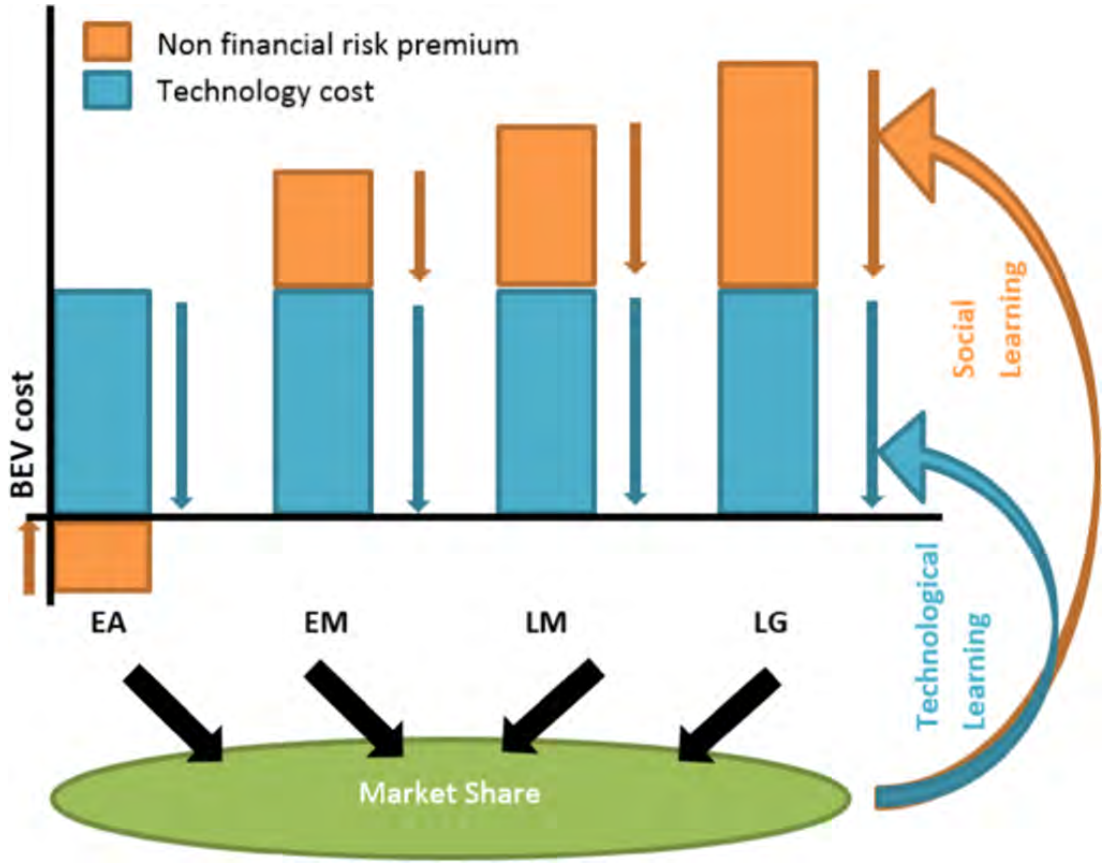
Modeling climate compatible behaviour

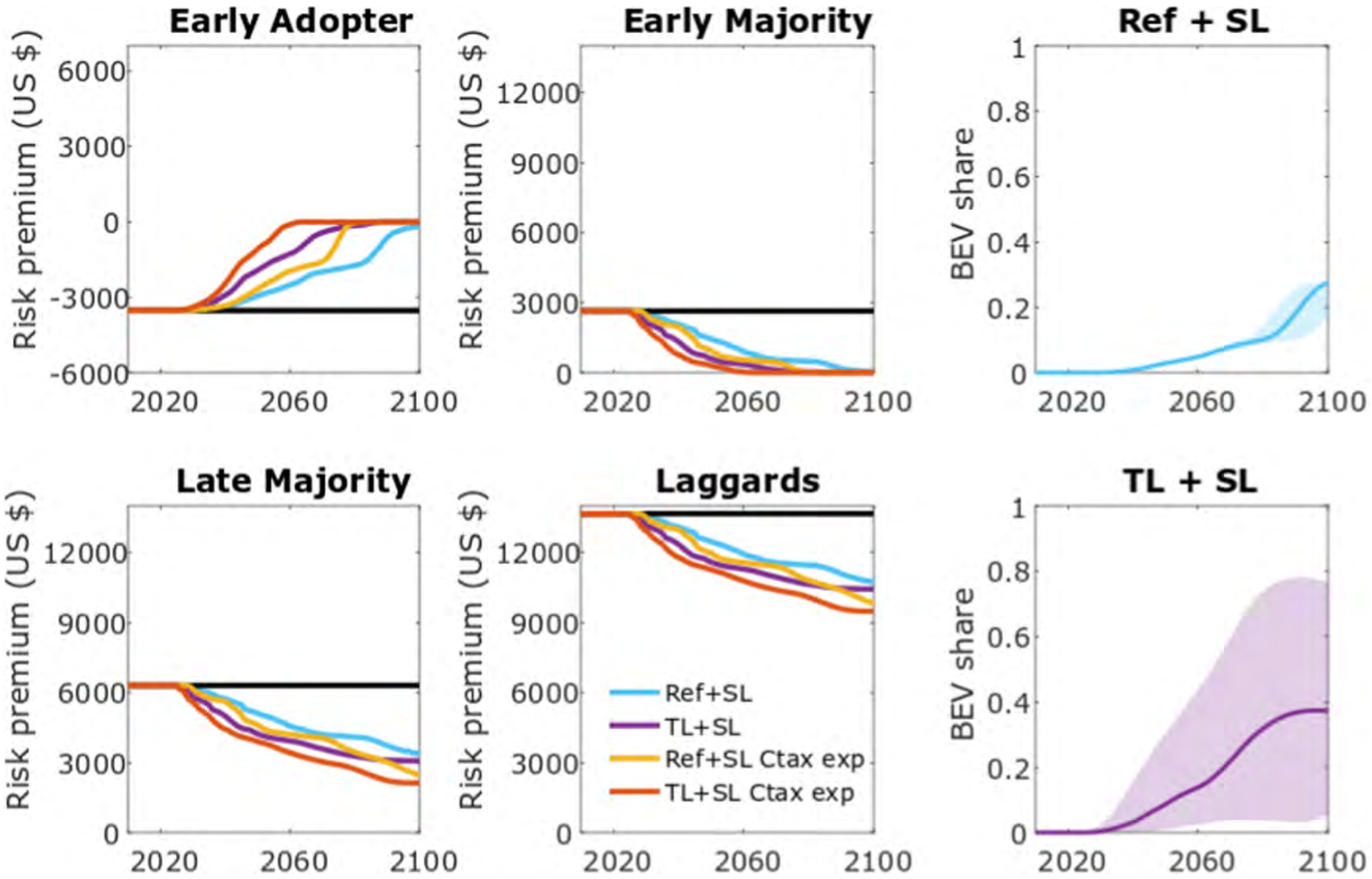
Technological and social learning interaction



Social and technological learning positively reinfornce each other

Edelnbosch et. al, 2018, Environmental Research Letters

Technological and social learning interaction



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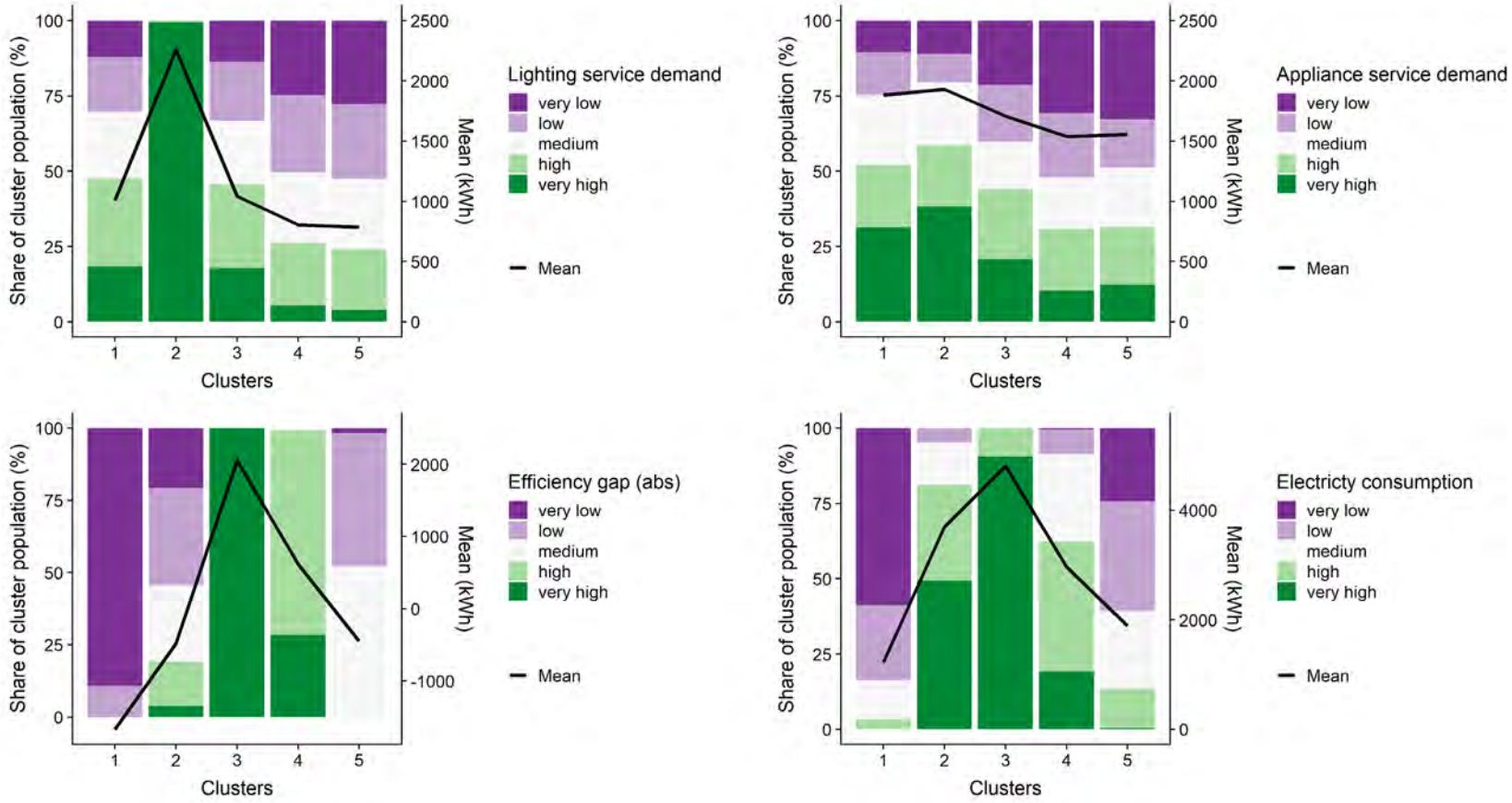
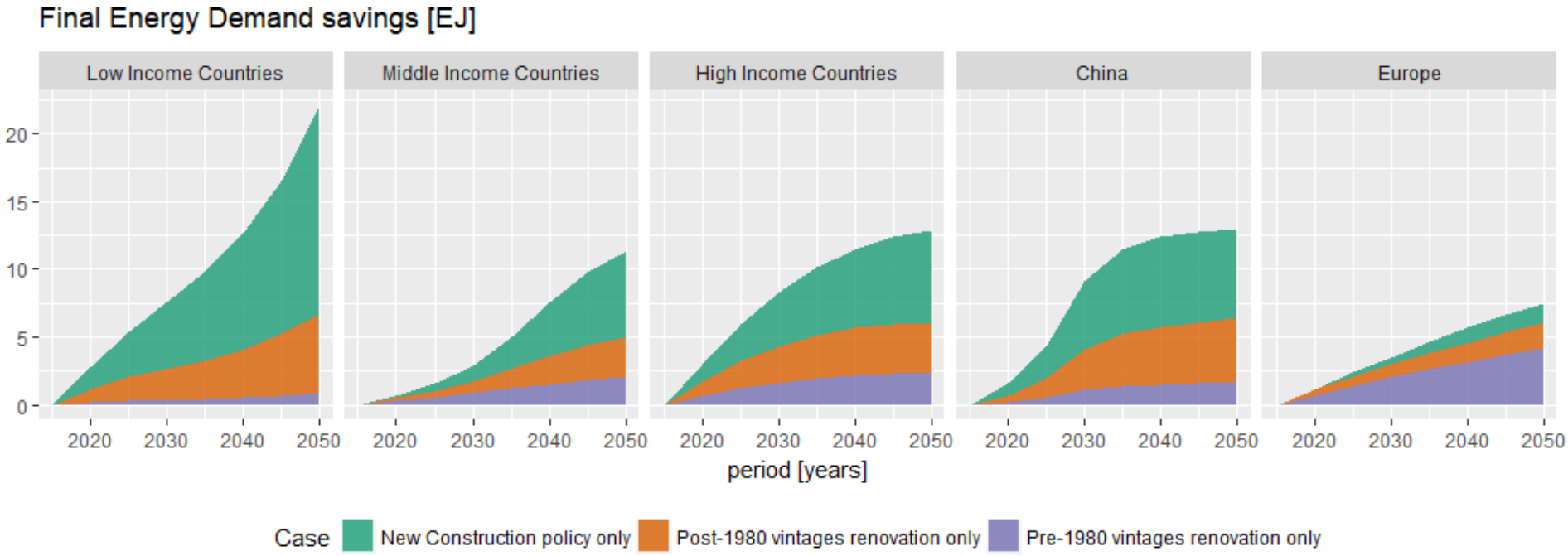
Clusters heterogeneity for Agent Based Models calibration



Definition of clusters in models is important

Edelnbosch et. al, 2019

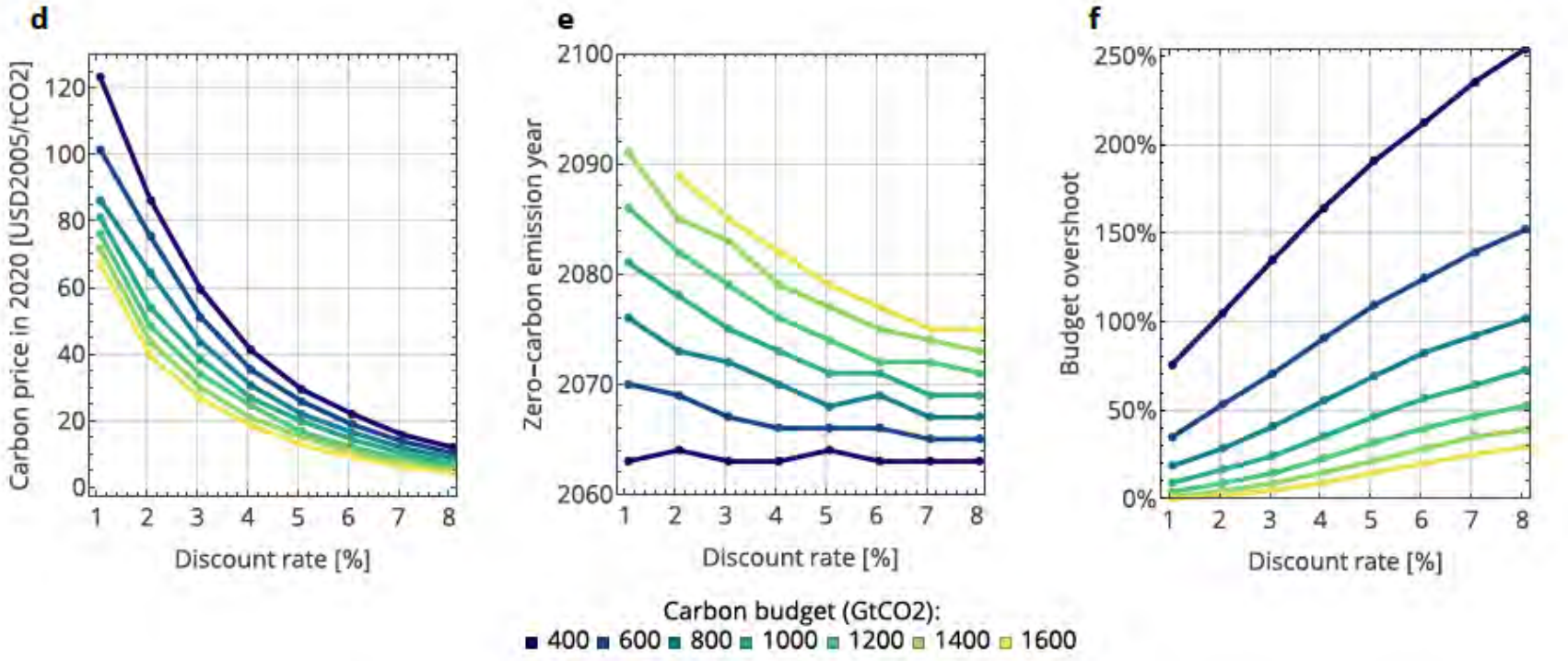
Building age heterogeneity and energy savings



Buildings' age shapes future energy demand projections

Rovelli et. al, 2019

Discounting in IAMs



Lowering discount rates reduces the need for negative emissions and increases the importance of energy efficiency measures

Emmerling et. al, 2019