Re-calibrating Second-Order Beliefs: Results From a Randomized Experiment on French Farmers

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Motivations

- We focus on the role played by individual beliefs with a particular emphasis on second-order beliefs (SOB) i.e. beliefs on beliefs of others.
- The role played by SOB for shaping individual behaviors and opinions has been largely documented in political sciences and in economics.
- Ex : SOB are better predictors for energy saving behaviors than first-order personal beliefs (Jachimowicz and Galinsky, 2018).
- But research in cognitive psychology suggests that individuals tend to hold biased SOB (ex : over-representation of similar beliefs to their own and underestimation of contrasting beliefs).
- Is-it the case ? Can we correct biased SOB and modify individual decisions ?

Context of the work

New policy instruments called eco-schemes (ES) under discussion for the 2023 reform of the Common Agricultural Policy

ES can viewed some particular form of payments for ecosystem services with voluntary adoption by farmers

In general low uptake rates by farmers of this type of policy instrument

Our hypotheses :

- Farmers hold wrong beliefs regarding opinions of their peers regarding ES.
- Wrong beliefs about peers may explain low adoption by farmers of ES
- It is possible to correct wrong beliefs of farmers and to modify their individual decisions.

What we do

We implement a large-scale web survey to assess the view of French farmers on ES :

1. We elicit farmer's SOB about ES
2. We show that French farmers hold biased SOB regarding ES
   - Farmers systematically underestimate the share of other farmers in their region who are ready to adopt the proposed ES
   - Farmers who misperceive the adoption of ES by their peers are less likely to adopt the ES themselves
3. We show that it is possible to re-calibrate inaccurate SOB of farmers using informational treatments
4. We explore the causal impact of this re-calibration on different dimensions of farmer's behavior.

Rest of the talk

1. Material & Method
2. Results
3. Conclusion

1. Material & Method

The survey 1/2

An online survey on French farmers

- 59,000 invitations sent by email from Feb-March 2021 ;
- 3 676 farmers followed the link sent in the invitations (6.2%)
- 1 856 completed the entire questionnaire (3.14%)
- Roughly representative sample in terms of geographical locations, organic farming, quality labels.
- Over-representation of large farmers and young farmers

The survey 2/2

The survey consists of five blocks

- *Block 1 : General information* on farmers (age, gender, educational level, etc.).
- *Block 2 : Eco-schemes (ES).* Elicitation of farmer's beliefs regarding ES.
- *Block 3 : Farm characteristics* (agricultural activity, size, etc.).
- *Block 4 : Agri-environmental measures.* Adoption of existing agri-environment-climate measures by farmers (2015-2020).
- *Block 5 : Psychological traits.* Assessment of individual personality traits of farmers (risk preference, openness, etc.).

The two ES proposed to farmers

ES Ecological Focus Areas (EFA) : Payment to farmers for voluntary setting aside part of land to constitute an area to preserve biodiversity

ES Treatment Frequency Index (TFI) : Payment for voluntary reducing TFI i.e. intensity of use of plant protection products (number of reference doses per ha per year).

We elicit beliefs of farmers regarding :

- Benefits from ES ;
- Adoption rate ;
- Willingness to accept (WTA).

Elicitation of farmer's beliefs

There are various approaches to elicit individual beliefs

Here we ask respondents to report their beliefs regarding others without financial incentives (introspection approach)

No reliable evidence that complex incentivized elicitation outperforms introspection approach.

- Beliefs regarding benefits from ES
  - SOB : *% of farmers believing that the ES provides benefits ?*
  - FOB : *Do you think that the ES provides benefits ?*
- Beliefs regarding adoption of ES
  - SOB : *What % of farmers would implement this ES ?*
  - FOB : *Could you consider adopting this ES on your farm ?*
- Beliefs regarding willingness to accept of ES
  - SOB : *Subsidies such that 50% of farmers implement this ES ?*
  - FOB : *Subsidies such that you implement this ES ?*

Re-calibrating beliefs with informational treatments

Since elicited SOB often present large biases, we use informational treatments to re-calibrate individual beliefs.

Farmers have been randomly allocated into treatments where they have been shown :

- the true proportion of farmers in their region who have declared that the ES may provide benefits (Treatment 1) ;
- the true proportion of farmers in their region who wish to adopt a particular ES (Treatment 2) ;
- the true minimum subsidies required by peer farmers in their region to implement ES (Treatment 3).

The true information is based on the results of an internet survey conducted on a sample of 1 559 French farmers a few weeks before the current survey using the same questions (*prior-survey*).

Study pre-registered on the AEA RCT Registry

Re-calibrating beliefs with informational treatments

Table – True information from the *prior-survey* conducted a few weeks before the current one on a different sample of farmers.

Region	**EFA**			**TFI**		
	Benefits	Adopt	WTA	Benefits	Adopt	WTA
	(%)	(%)	€	(%)	(%)	€
Auvergne-Rhône-Alpes	55	58	402	69	63	342
Bourgogne-Franche-Comté	46	59	379	55	58	304
Bretagne	44	56	471	68	61	310
Centre-Val de Loire	39	61	380	52	50	365
Grand Est	57	63	428	62	57	339
Hauts-de-France	49	55	541	52	55	386
Ile-de-France	37	44	428	52	42	343
Normandie	47	56	409	55	57	350
Nouvelle-Aquitaine	44	64	386	53	57	354
Occitanie	48	62	330	60	61	314
Pays de la Loire	49	66	341	63	68	287
Provence-Alpes-Côte d'Azur	61	72	420	72	76	454
Observation	1,266	1,195	864	1,260	1,179	873

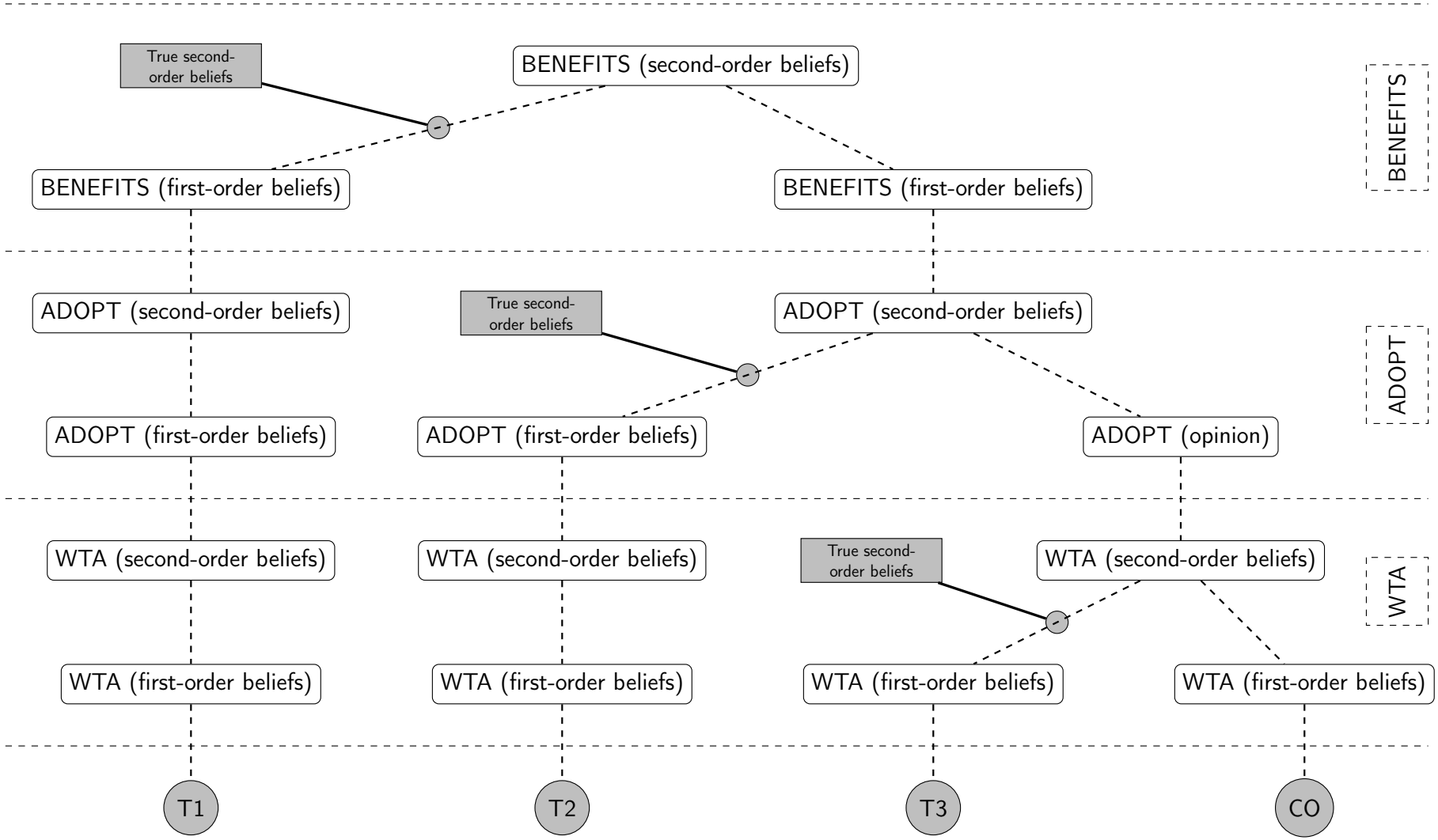
Re-calibrating beliefs with informational treatments

- Script used for re-calibrating SOB on benefits
  - In your opinion, what percentage of farmers in your area think that such a measure is beneficial for the environment ? [X%]
  - (T1) You have just indicated that, for you, X% of farmers in your region (*Name Region*) think that the measure is beneficial for the environment. In fact, a recent INRAE study showed that Y% of farmers in your region (*Name Region*) believe that this measure is beneficial for the environment.
- Script used for re-calibrating SOB on adoption
  - Subject to receiving adequate financial aid, in your opinion what percentage of farmers in your region would be willing to implement this measure ? [X%]
  - (T2) You have just indicated that, for you, X% of farmers in your region (*Name Region*) would be willing to adopt this measure. In fact, a recent INRAE study showed that Y% of farmers in your region (*Name Region*) would be willing to adopt this measure.

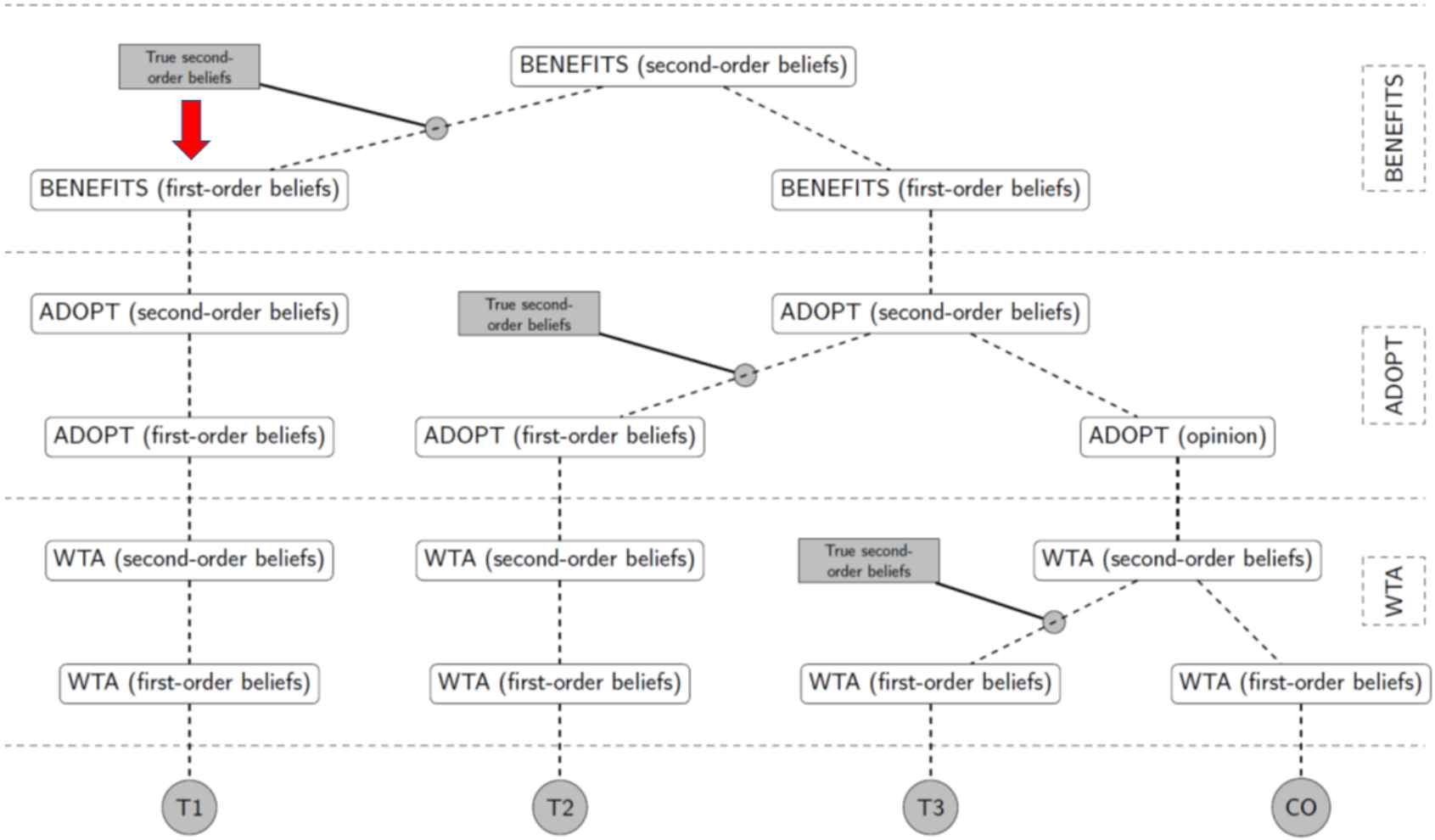
Re-calibrating beliefs with informational treatments

- Script used for re-calibrating SOB on WTA
  - Thinking of all the costs induced by this measure but also of the possible benefits, what minimum amount of aid (€/ha) would lead that at least 50% of the farmers in your region implement this measure on their farm ? [X€/ha]
  - (T3) You have just indicated that, for you, the minimum aid that would lead at least 50% of farmers in your region (*Name Region*) to implement this measure should be X€/ha. In fact, a recent study by INRAE showed that at least 50% of the farmers in your region (*Name Region*) would implement this measure if the aid was Y€/ha.

Re-calibrating beliefs with informational treatments



Re-calibrating SOB on benefits to be expected from ES



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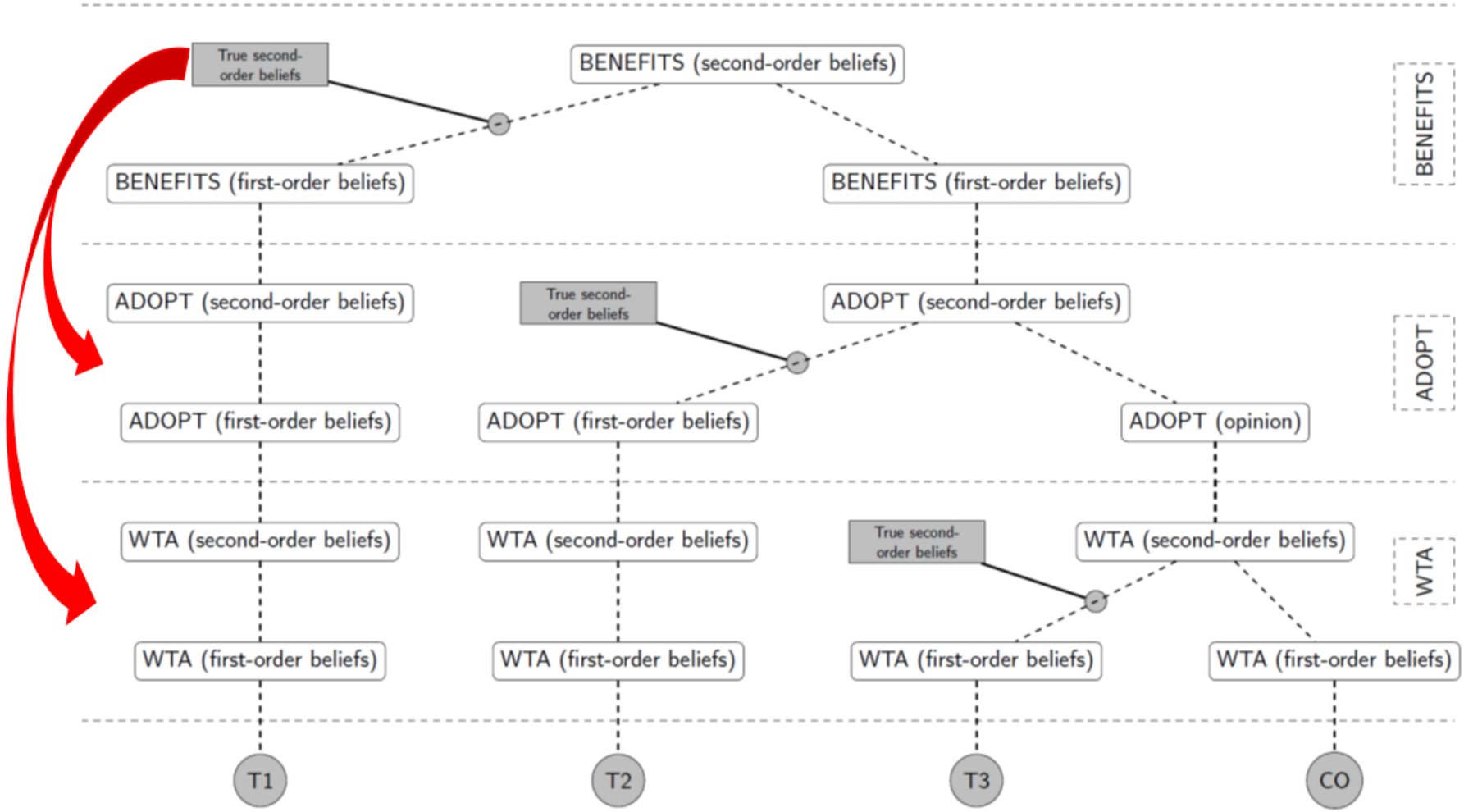
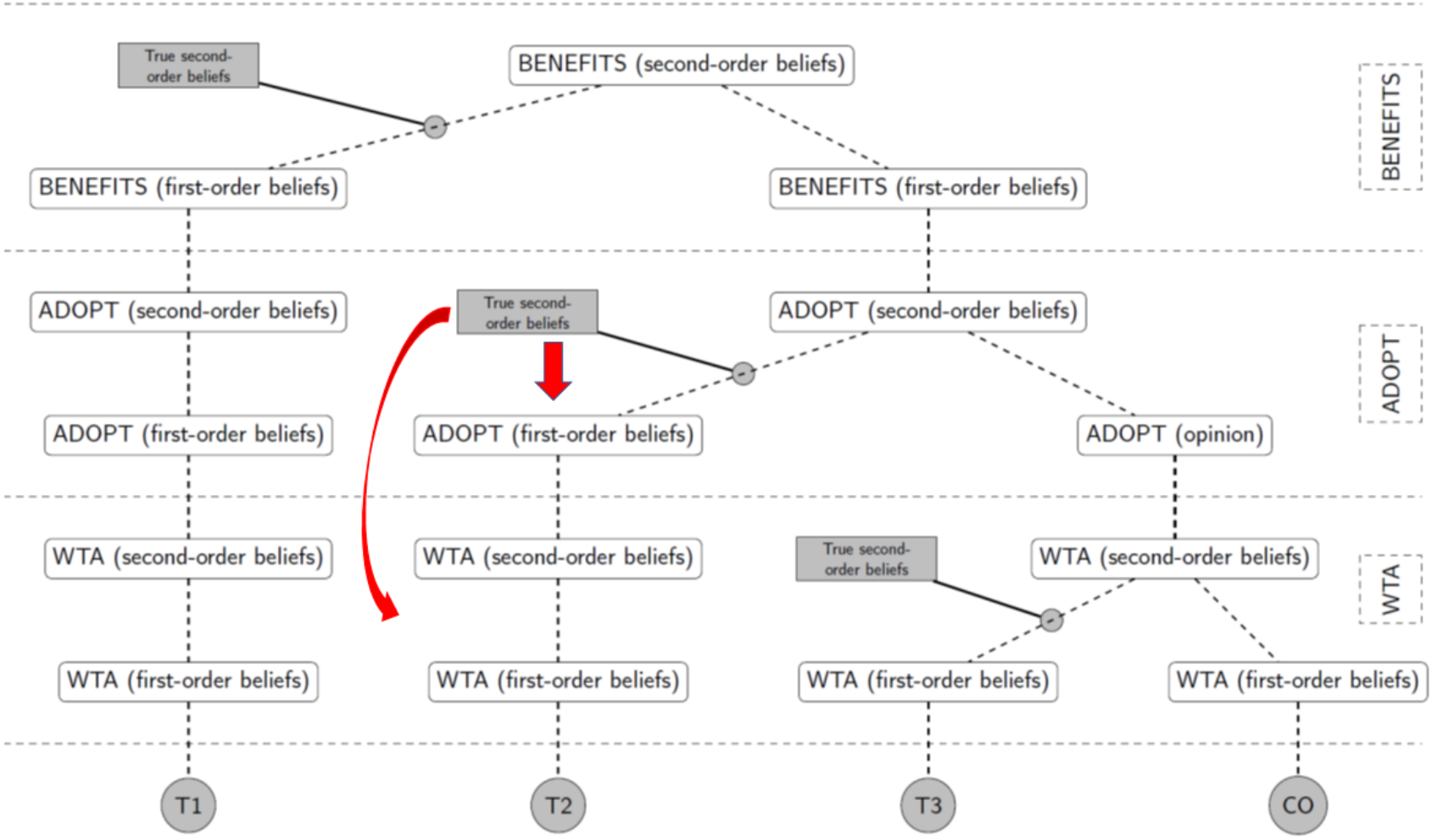
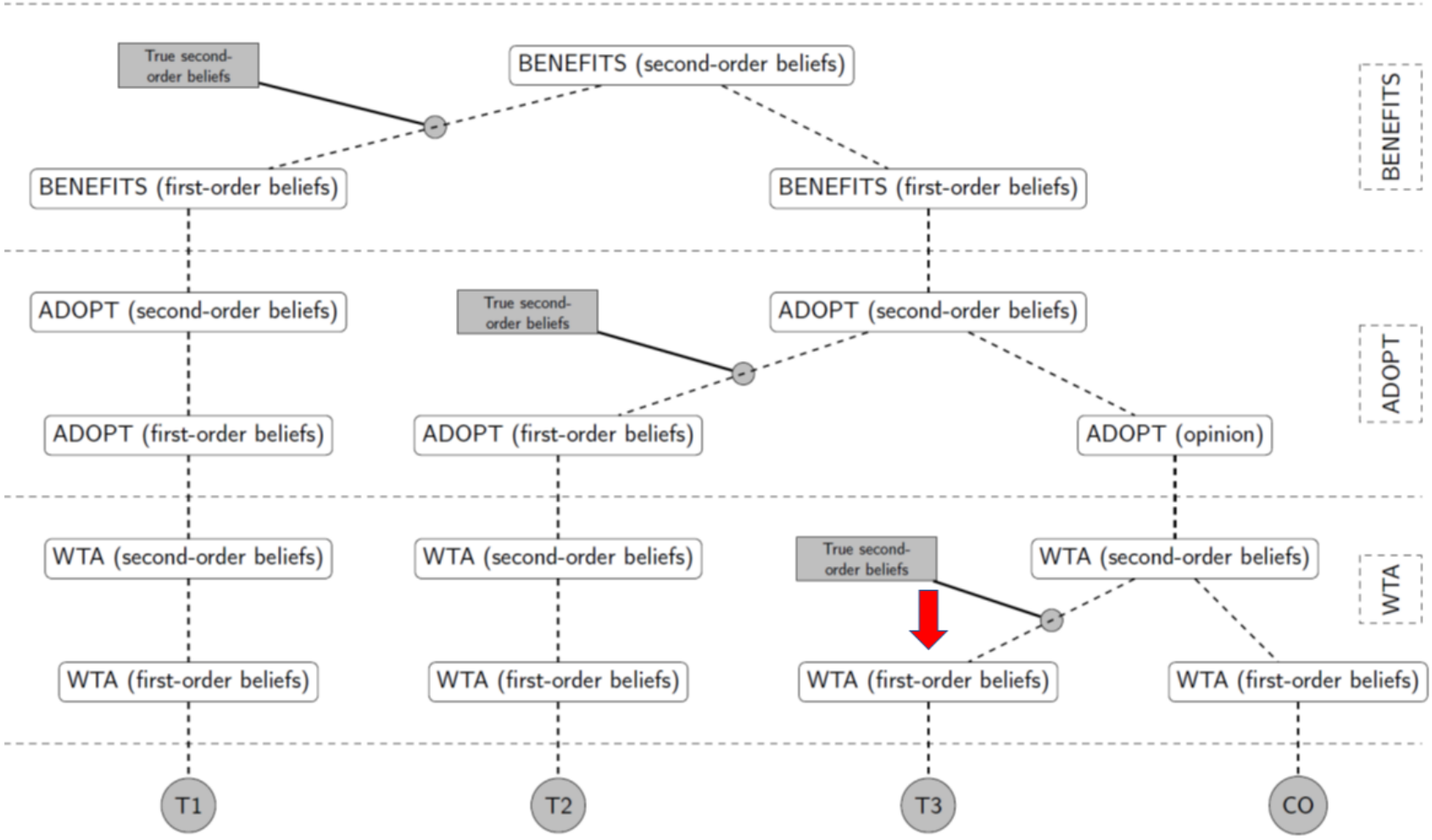


Re-calibrating SOB on ES adoption by peers



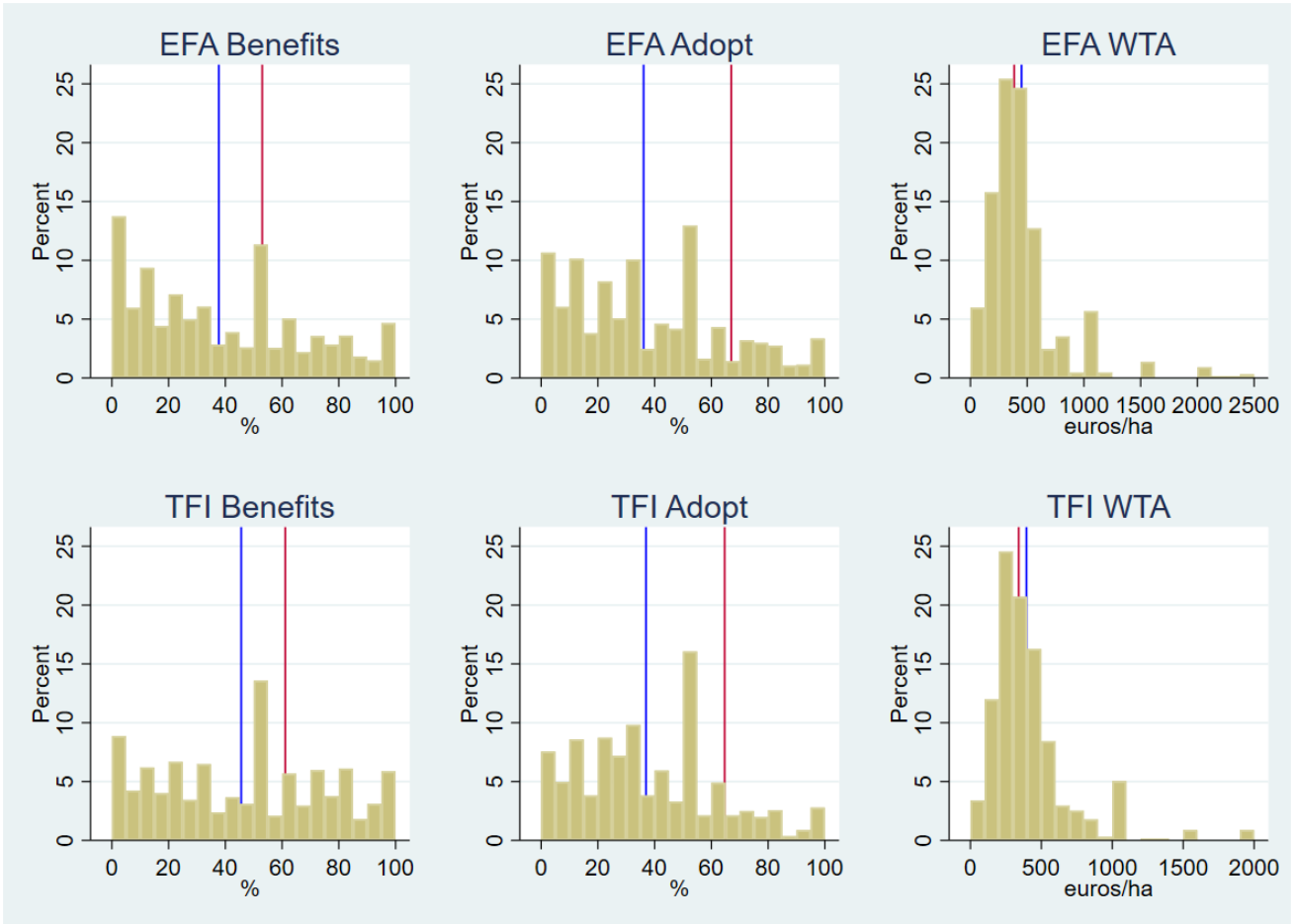
Re-calibrating SOB on WTA by peers



2. Results

Evidence of biased SOB

Figure – SOB on *Benefits*, *Adopt* and *WTA* for ES EFA & TFI



Blue line : regional means for the SOB.

Red line : true regional mean .

Evidence of biased SOB

For ES EFA farmers misperceive

- SOB *Benefits* by 15.30 percentage points
- SOB *Adopt* by 30.93 percentage points
- SOB *WTA* by 64.38 €/ha

For ES TFO farmers misperceive

- SOB *Benefits* by 15.48 percentage points
- SOB *Adopt* by 27.75 percentage points
- SOB *WTA* by 55.56 €/ha

Result : Misperceptions of SOB are large among farmers. Farmers underestimate SOB regarding benefits and adoption rate of ES and overestimate WTA for implementing ES.

Possible explanations of biased SOB

- Biased SOB regarding ES is not due to measurement errors
  - Strong asymmetry of the distribution for SOB
  - Association between biased SOB and some characteristics of farmers (age, gender, knowledge of peers, etc.).
- Biased SOB regarding ES are unlikely due to strategic behaviors of respondents when responding to the survey.
- The patterns of biased SOB regarding ES are consistent with some well-known psychological biases.
  - Ex : Farmers who underestimate the share of peers who believe that ES may provide benefits are less involved into eco-friendly activities (projection bias).

T1 : Re-calibration of SOB regarding benefits of ES

Table – T1 : Treated farmers are shown the true proportion of peers believing that ES provides benefits

	Treated	Control	T-test
ES EFA			
FOB Benefits	58.46%	51.31%	-3.23***
SOB Adopt	41.35%	36.23%	-4.37***
SOB WTA	421.69 €/ha	446.38 €/ha	1.52*
ES FTI			
FOB Benefits	66.96%	59.30%	-3.53***
SOB Adopt	42.48%	38.28%	-3.84***
SOB WTA	380.44 €/ha	401.85 €/ha	1.50*

Whatever the ES considered, re-calibrating SOB for "benefits" has a significant impact on FOB for "benefits" and on SOB for "adopt" or "WTA".

T2 : Re-calibration of SOB regarding adoption of ES

Table – T2 : Treated farmers are shown the true proportion of peers wishing to adopt an ES

	Treated	Control	T-test
ES EFA			
FOB Adopt	64.62%	66.41%	0.78
SOB WTA	438.99 €/ha	446.39 €/ha	0.46
ES FTI			
FOB Adopt	63.88%	62.46%	-0.61
SOB WTA	389.31 €/ha	401.85 €/ha	0.89

Whatever the ES considered, re-calibrating SOB for "adoption" has no significant impact on FOB for "adopt" and on SOB for "WTA".

T3 : Re-calibration of SOB regarding WTA ES

Table – T3 : Treated farmers are shown the true WTA ES of peers

	Treated	Control	T-test
ES EFA			
FOB WTA	449.14 €/ha	449.9 €/ha	0.04
ES FTI			
FOB WTA	387.86 €/ha	390.78 €/ha	0.19

Whatever the ES considered, re-calibrating SOB for "WTA" has no significant impact on FOB for "WTA"

Re-calibration of SOB : Summary of findings

- Re-calibrating SOB with informational treatments may work but the impact depends upon the type of information about peers provided to farmers
- Farmers update their decisions and priors when they are shown the true proportion of peers believing that ES provides benefits (preferences of peers) but not when they are shown the share of peers wishing to adopt ES or their WTA ES (what other farmers do or wish to do)
- This result could be related to the high level of individualism usually found in the population of farmers (developed countries).

Heterogeneous impacts of SOB re-calibration

We document heterogeneous responses to our treatments depending upon the fact that farmers have SOB under or above the true regional means.

Table – Impacts of re-calibrating SOB regarding **benefits** for ES EFA

	Treated	Control	T-test
Farmers with SOB under the true regional mean			
FOB Benefits	42.79%	32.01%	-3.99***
SOB Adopt	35.83%	26.71%	-6.54***
SOB WTA	440.97 €/ha	485.19 €/ha	1.91**
Farmers with SOB above the true regional mean			
FOB Benefits	83.59%	82.60%	-0.36
SOB Adopt	50.20%	51.57%	0.84
SOB WTA	391.19 €/ha	382.74 €/ha	-0.44

3. Conclusion

Main findings

- French farmers hold biased SOB regarding ES
- Using informational treatments, it is possible to re-calibrate inaccurate SOB of farmers.
- The type of information provided to farmers matters a lot (ex : no impact of displaying adoption rates by peers)

Public policy perspective

- Biased SOB regarding CAP policy instruments offers a new explanation for the low uptake of voluntary measures proposed to farmers in the CAP to protect biodiversity.
- Policy-makers should be more aware of the role played by beliefs about others in the process of endorsement of new policy instruments by stakeholders.
- Scholars should also invest more in understanding SOB, as a way to modify individual attitudes and behaviors.

Jachimowicz, J.M., H. O. O. J. S. E. and A. D. Galinsky (2018). The critical role of second-order normative beliefs in predicting energy conservation. *Nature Human Behaviour 2*, 757–764.