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SUBMITTED ARTICLE

Perspectives on stakeholder participation in the design of economic experiments for agricultural policymaking: Pros, cons, and twelve recommendations for researchers

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Abstract

Economic experiments have emerged as a powerful tool for agricultural policy evaluations. In this perspective, we argue that involving stakeholders in the design of economic experiments is critical to satisfy mandates for evidence-based policies and encourage policymakers' usage of experimental results. To identify advantages and disadvantages of involving stakeholders when designing experiments, we synthesize observations from six experiments in

Europe and North America. In these experiments, the primary advantage was the ability to learn within realistic decision environments and thus make relevant policy recommendations. Disadvantages include complicated implementation and constraints on treatment design. We compile 12 recommendations for researchers.

KEYWORDS

agricultural policy, agriculture, behavioral economics, experimental economics, participatory research

JEL CLASSIFICATION

C9, Q18, Q58

Randomized controlled economic experiments can reveal the causal drivers of behavior, and thus they are widely seen as a promising complement to existing tools for designing and evaluating agricultural policies ex ante (Colen et al., 2016; Dessart et al., 2019; Lefebvre et al., 2021; Palm-Forster et al., 2019). For experiments to be useful when developing evidence-based policies, the experiments must yield accurate generalizable results. That is, the experiments must be designed to achieve a high degree of parallelism between policy decisions of interest and decisions made by participants in the experiments, and they must achieve that parallelism without compromising methodological rigor (Harrison & List, 2004; Rosch et al., 2021; Weigel et al., 2021). We argue that a combination of parallelism and methodological rigor not only ensures that experiments offer the most accurate and useful evidence to policymakers and other stakeholders, but also makes these stakeholders more likely to accept and adopt experimental results.

To help achieve those objectives, researchers can involve stakeholders directly in the process of designing the experiment. Agricultural stakeholders typically include governmental policymakers and advisors, members of nongovernmental organizations (NGOs), and specific agents such as farmers, ranchers, and other resource managers working in the field of study. Collaboration between these stakeholders and experimental researchers is a powerful means by which one can create experiments that meet stakeholders' needs, increase their willingness to participate in the experiments, and improve policy outcomes.

In this perspective, we discuss recent economic experiments that were designed in collaboration with stakeholders to assess agricultural policies. These experiments serve as case studies from which we draw insights about the participatory design process. We first describe these experiments and the participatory design processes they used, and then we analyze their outcomes in terms of positive and negative effects of stakeholder participation. Lastly, we distill valuable lessons from the analysis to assist future researchers. Much research has been conducted on the role of stakeholders in research studies generally (e.g., Schmidt et al., 2020; Spangenberg et al., 2015), but few publications consider stakeholder involvement in the design of economic experiments (Palm-Forster & Messer, 2021) and none consider stakeholder involvement to design experiments to best reflect actual policy environments. Economic experiments that reflect actual policy environments introduce issues that are not encountered when using hypothetical surveys and other quantitative research methods. Such issues include framing of

the policy context using comprehensible rules, linking monetary incentives to behaviors in experiments, and identifying designs that are realistic but also are sufficiently simple for participants to understand and complete in a limited time period.

In this perspective, we chose to focus on economic experiments that assessed farmer behavior in response to agri-environmental policies and programs conducted in Europe and North America because of our research experience and the ever-increasing importance of agri-environmental policies. However, we believe that the lessons learned from these experiments can be generalized to agricultural policy evaluations in general and to other regions. Agri-environmental policies and programs affect many kinds of farms, entail large sums of taxpayer funds, and can potentially provide significant environmental improvements (Clark et al., 2020). For instance, the U.S. Department of Agriculture (USDA) requested a budget of $198.1 billion for 2022 and plans to devote 13% of its outlays to farm, conservation, and commodity programs (USDA, 2021). The total budget for the European Union's (EU's) common agricultural policy (CAP) amounts to €386.6 billion for 2021 through 2027 with tackling climate change and achieving environmentally sustainable farming as major objectives to which at least 40% of funds are expected to be allocated (European Commission, 2021a, 2021b).

FRAMEWORK FOR PRESENTATION OF CASES

Understanding economic experiments for Agri-environmental policymaking

Originally, economic experiments were primarily used to test economic theories under controlled conditions in laboratories with student participants. Under Smith's (1976) induced value theory, experimentalists ensured that participant behavior in economic experiments was guided by non-satiating, salient, dominant incentives. In other words, experimentalists sought to ensure that participant behavior was driven by changes in participants' utility in response to cash rewards or other substantial stakes associated with their choices in the experiments. Later, experimentalists started using economic experiments to also compare behavioral outcomes under treatments that manipulated relevant contextual factors in the decision environment. They also began to increasingly run experiments with nonstudent subjects, including subjects that are representative of the population targeted by policymakers, such as entrepreneurs or poor households.

Building on this foundation of prior experimental research, economic experiments designed to guide agricultural policymaking test policy-relevant questions both in the laboratory and in the field using context-rich designs and representative decision-makers, such as farmers and resource managers. In our experience, the results of these experiments are likely to be more compelling to policymakers than laboratory experiments with student participants because they have three attributes.

First, in our experience, they typically add specific local contexts to the decision scenarios. These contexts allow researchers to achieve greater parallelism with naturally occurring decision contexts while also allowing researchers to keep the decision environment simple enough to be understandable to participants. For example, in one experiment, a pro-environmental behavior by the subject can lead to a real charitable donation to a pro-environmental organization or, in another experiment, group rewards for cooperation can be paid to actual farmer groups (e.g., Müller, 2020). Second, economic experiments designed to guide agricultural policymaking are typically field experiments, which often have greater parallelism than laboratory

experiments. Field experiments include artefactual, framed, and natural field experiments as defined by Harrison and List (2004). Policymakers are more likely to endorse the results of field experiments over laboratory experiments because field experiments focus on testing the effects of specific interventions on the behavior of representative agents, like farmers, rather than on testing general economic theories with students in the laboratory (Cason & Wu, 2019; Grüner et al., 2022). Farmers, for example, have developed specific knowledge and preferences related to agricultural production—such as their views on human-nature relations (Howley, 2015)—and thus policymakers are concerned that farmers' behaviors and decisions differ substantially from behaviors and decisions of non-farmers like students. Third, economic field experiments are increasingly taking the form of randomized controlled trials (RCTs), a type of natural field experiment that has greater parallelism with the naturally occurring contexts that are the targets of policymaking. RCTs are increasingly being used to understand behavior of representative agents in their normal decision-making environments.

Stakeholder participation in experiment design

In the context of economic experiments, stakeholder participation refers to involvement of relevant stakeholders in exploring, developing, and choosing the instructions, treatments, and incentive structures, including tasks and rules established, the nature of the stakes, and the environment in which participant decisions will be made (Harrison & List, 2004). Stakeholder participation shares features of co-design in policy research, which has been established as an effective, democratic, and innovative approach to research that includes "the active involvement of a diverse range of participants in exploring, developing, and testing responses to shared challenges" (Blomkamp, 2018, p. 731). Research into ecosystem services and agricultural policy has generally shown that involving stakeholders in the research design can enhance the relevance of the research (Busse et al., 2023; Hölting et al., 2022; Spangenberg et al., 2015). Additional benefits include giving voice to those affected, improving the research quality, designing more efficient policy measures, stimulating social learning, and increasing acceptance and the legitimacy of process outcomes (Blomkamp, 2018; Schmidt et al., 2020).

To conduct a systematic assessment of key aspects of the participation process, we structure our research case studies using four dimensions of Neef and Neubert's (2011) widely accepted framework for participatory agricultural research as shown in Figure 1: (1) project type—context and objectives of the research project or the broader context in which an experiment is embedded; (2) research approach—the economic experiments on which the participatory process builds; (3) stakeholder characteristics—the experience and background of each of the actors involved in the design process; and (4) researcher–stakeholder interactions—the processes by which stakeholders are involved, related challenges, and the outcomes. Note that the main purpose of this framework is to structure the presentation of our cases.

Case studies

The case studies (CS) were selected based on the lead authors' networks and on inquiries made to European and North American networks for examples of economic experiments addressing agricultural topics (REECAP and CBEAR[1]). In that sense, they represent a subjective and self-selected group. Hence, this article should be viewed as a perspectives paper rather than a

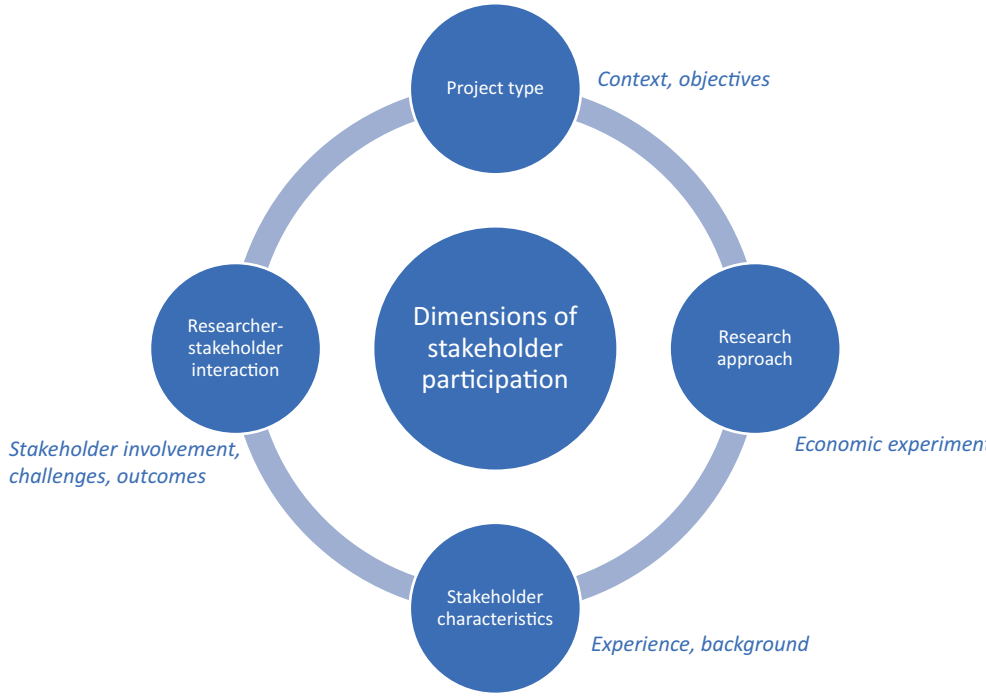

FIGURE 1 Key dimensions of participatory research when designing experiments to guide policymaking. *Source*: The authors, based on Neef and Neubert (2011).

rigorous empirical study. In a next step, we selected case studies from the pool and contacted the researchers responsible for those studies, inviting them to participate when they had relevant experience. Furthermore, we asked the contacted researchers to suggest additional participants. Of the researchers contacted, 12 individuals representing six research projects that involved a participatory process agreed to participate in the study.[2] Some of the selected projects were embedded in larger research projects; others were stand-alone projects. Some were either commissioned or developed in close collaboration with authorities. The studies were conducted in the United States, Canada, Hungary, Poland, Germany, Denmark, the Netherlands, and Spain.

1. *Project EFFECT—Generating environmental public goods from farming through effective contract targeting*. This experiment was embedded in an EU-funded research project in which the objective was to develop and test innovative agri-environmental contract mechanisms to increase the effectiveness of contracts through coordination between farmers (Hasler et al., 2022). The process of designing a common pool resource game included participation by farmers, consultants, extension service advisors and researchers.
2. *Behavioral experiment on EU farmers' willingness to contribute to environmental quality*. This experiment was part of a stand-alone study funded by the European Commission (see Dessart et al. (2021) for details). The objective was to gather evidence of farmers' adoption of environmentally friendly practices to inform implementation of the new green architecture of the EU CAP. The study assessed the effect of two features of the new policy architecture on farmers' environmental contributions: (1) additional requirements for adoption of environmentally friendly practices to qualify for support and (2) reduced CAP payments to EU

farmers. The participatory process involved designing the treatments and the framing of the experiment together with policymakers.

3. *Project Contracts 2.0—Understanding cooperation among European farmers*. Contracts 2.0 is an EU-funded Horizon 2020 research project designed to develop novel contract-based approaches to incentivize farmers to increase their provision of environmental public goods. One of the program's objectives is to identify conditions required to scale up the Dutch model of group-based agri-environmental contracts. A public good game was developed with key stakeholders to investigate farmers' decisions in a context that required cooperation to produce a common good (see Rommel et al. (2021) for details).
4. *Conservation Outreach to U.S. Farmers*. A large-scale RCT that tested impacts on farmer behavior from revised climate change language and options for farmer action. The project was a stand-alone, large-scale RCT involving nearly 10,000 U.S. agricultural producers. The experiment was embedded in USDA's outreach efforts designed to improve soil conservation practices to reduce greenhouse gas emissions (see Ferraro et al. (2021) for details), and those outreach efforts were part of a broader USDA program called Building Blocks for Climate Smart Agriculture and Forestry. This experiment was designed in coordination with USDA staff and funded through the USDA Office of the Chief Economist.
5. *Greening the Common Agricultural Policy*. The experiment was used primarily to investigate three behavioral economic aspects of agri-environmental policies (see Thomas et al. (2019) for details): The effects of the (1) framing of a policy, (2) degree of control perceived by farmers, and (3) framing of incentives as losses or gains on farmers' willingness to engage in pro-environmental farming practices. The experiment was developed with staff from the agricultural chamber of Lower Saxony (Germany).
6. *Reverse Auctions for Diversifying Agriculture in Ontario (RADAg-Ontario), Canada*. The RADAg-Ontario project was a field experiment developed in collaboration with the Ecological Farmers Association of Ontario (EFAO). The study investigated the efficiency of reverse auctions in incentivizing farmers to diversify their crop rotations with production of small grains and cover crops. This field experiment was the first of a series of studies funded by multiple agencies in Canada, including the Weston Family Foundation; the Ontario Ministry of Agriculture, Food and Rural Affairs; the Natural Sciences and Engineering Research Council of Canada; and the Agriculture and Agri-Food Canada. The participatory process involved designing the experiment and treatment randomization strategies jointly with employees of the EFAO.

LESSONS LEARNED: ADVANTAGES AND DISADVANTAGES OF PARTICIPATORY DESIGN OF ECONOMIC EXPERIMENTS

Table A1 in the appendix presents the six case studies and their associated design processes following the framework adapted from Neef and Neubert (2011). We next synthesize the results of our analysis of the pros and cons of participatory design based on these studies and provide recommendations for researchers.

Advantages

A major advantage of involving *stakeholders* in the design of experiments is the opportunity to access their knowledge and thus create realistic choice environments. The more realistic and

engaging an experiment's choices are, the more likely farmer participants are to understand the task, leading to greater internal validity (Meraner et al., 2018). Stakeholder involvement also can improve translation of experiment results into actual programs, improving their relevance and impacts, since the studies are better adapted to the needs and constraints of the stakeholders and participants. In case study CS5 (Thomas et al., 2019), the experiment instructions were adapted in response to feedback from several Chamber of Agriculture employees, and the payoff function was modified slightly to follow the actual farm income structures more closely. In CS6 (RADAg-Ontario), the stakeholders and researchers jointly refined the research questions and treatments to address program needs effectively and thus directly inform EFAO initiatives. Agricultural policies and experiments that inform them require thorough knowledge of the specifics of the producers, commodities, markets, and governance structures. Though such knowledge is also needed for other types of policies, such as consumer policies, researchers typically have less direct experience with agricultural production. Therefore, stakeholder engagement is particularly important.

Involving *policymakers* promotes their interest and engagement. First, it creates a feeling of co-ownership that can lead to greater acceptance of the results, their usage to inform policymaking, and dissemination of key results to appropriate audiences. Second, policymakers' involvement can help identify the policy interventions that are actually being considered for future implementation. This knowledge can guide the design of the experiment and increase the relevance of the results for policymakers. Third, policymakers also can provide "gut checks" regarding whether researchers' proposed policy interventions are likely to be accepted by farmers and stakeholders. For instance, the randomizing application of treatments can raise concerns about fairness and general feasibility (Morawetz & Tribl, 2020), a challenge that input from stakeholders can minimize since they will know whether particular treatments are agreeable and feasible. These kinds of reality checks are particularly important in the context of agricultural policy because agricultural communities often are relatively small and tight-knit. Acceptance is critical for ensuring adequate participation in studies and positive discussions about programs and studies. This helps researchers avoid creating rifts in the farming community which could make it harder for the stakeholders and also damage future research activities, especially since the pool of agricultural producer participants tends to be quite limited.

Researchers wanting to conduct field experiments involving agricultural producers often find it difficult or expensive to recruit farmers and response rates are often low (Rosch et al., 2021; Weigel et al., 2021). Our analysis shows that collaboration between researchers and public and private agricultural organizations can facilitate recruitment. These organizations can sometimes provide access to contact information for producers. Their involvement can also be viewed as a positive signal to farmers that can increase their trust in researchers and willingness to participate. Participation by a trusted institution signals to farmers that their interests will be considered and protected. For example, in CS5 (Thomas et al., 2019), participation of an agricultural organization allowed the researchers to send invitation letters to a random sampling of all farmers in the state and achieve an unusually high response rate of 8% after only 3 days of runtime. In CS6 (RADAg-Ontario), the reverse auction experiment was embedded directly into EFAO's small grain program; when farmers received the invitation to participate from EFAO, they knew that a trusted organization was implementing the study.

Trusted stakeholder partners that have established longstanding relationships with agricultural producers also can generate support for new studies and initiatives and be a resource for experiment participants long after the studies are complete. Research funding is typically provided only for the short term, and researchers (especially graduate students and postdocs) are

relatively transient, but farmers generally stay put. Therefore, working with individuals from groups and agencies that are established in the community and can continue to provide support farmers after the research ends is important. Farmers do not want to invest time in relationships that are likely to be short-lived and one-sided. As pointed about by Palm-Forster and Messer (2021), there are key ethical considerations about conducting economic experiments with farmers under these conditions.

In conclusion, our analysis shows that developing designs with trusted stakeholders has benefits for everyone involved: researchers, policymakers, stakeholders, and study participants. Participatory design offers unique opportunities for researchers to understand stakeholders' perspectives, identify emerging policy questions, and incorporate new ideas. Potential benefits include serving as a platform from which to promote economic experiments in support of agricultural policies, enable future collaborations, and secure future funding. And stakeholder involvement can provide access to previously untapped pools of experiment participants, thus addressing the recruitment challenges noted by Weigel et al. (2021) and Lefebvre et al. (2021). Ideally, new pools of participants will allow experiments to test similar conditions across multiple countries and address issues emerging from self-selection into samples (e.g., interest in research, digitalization).

Disadvantages

There are several drawbacks of participatory design of economic experiments: it requires time to recruit stakeholders, a lengthier design process, development of a common language between researchers and non-academics, and lower levels of control for the researcher over the design and implementation of the experiment. The process is particularly time-consuming when multiple stakeholders participate, as was the case in the Contracts 2.0 study (CS3, Rommel et al., 2021), which involved ministry staff members, scientists, farmers, and representatives from NGOs, farmers' associations, rural advisory centers, and CAP operating agencies. Bureaucratic processes and restrictions can impose additional requirements and delay the process. It can even lead to a project being canceled after there had been a significant time investment.

Another common source of delay is the difficulty to prioritize which policy option to choose for the experiment, in light of the limited number of options that an experiment can reasonably test (something policymakers are not always aware of). On top of that, staff members from partner institutions often have full agendas that can delay the rollout of an experiment. Slower processes and delays often also create problems for researchers, whose employment and budgetary cycles can require rather tight schedules during the design process relative to the months and potentially years associated with collecting and analyzing data and providing feedback. In many cases, these conflicts can be resolved only by greater investments of time and funds by the researchers. Even then, coordinating multiple stakeholder timelines can be extremely challenging. A related challenge is that partner staff can often turn over in the life of the research project, which can make it difficult for the experiment to continue.

Though delays can be caused by stakeholders' participation, stakeholder partners sometimes want to move things along more quickly than researchers can manage while remaining confident about a study's design and integrity. For instance, pending reforms sometimes require submission of scientific data, placing pressure on researchers to deliver results quickly. Academic research tends to be a methodical, and therefore relatively slow, process that involves prerequisites such as training student researchers and clear communication regarding the context and

objectives of the study. Academics often feel uncomfortable releasing their results until the related papers have undergone peer review and been accepted in a final form by journals. This process can take years to complete.

Another major challenge of stakeholder engagement is reconciling a study's policy relevance with its research relevance. Potentially interesting treatments in terms of academic research are not necessarily perceived by stakeholders as important. Conversely, the treatments that researchers find most interesting might be viewed as threatening to the farming community and regulators (e.g., greater monitoring, imposition of new sanctions and taxes). This can lead to treatments proposed by the researchers to be vetoed by the stakeholders, as occurred multiple times in CS4 (Ferraro et al., 2021). Policymakers and stakeholders also can conflict with academic researchers in terms of the magnitude of treatment effects in experiments. Levels of a treatment viewed as unrealistic by stakeholders can be useful for researchers to obtain robust results and greater external validity (and the study could determine that the treatment levels were not unrealistic after all). Researchers prefer sharp contrasts in treatments to maximize statistical power, but policymakers typically are interested in the effects of small gradual shifts. Another area of potential conflict is outcome variables and covariates that are relevant for scientific publications but not so much for policymaking. For instance, including a measurement of emotions or of psychological traits can be valuable for research to help understand the mechanism at stake, but such variables may be less informative for policy. Another challenge can be the desire of policymakers to conduct additional analysis of subgroups, such as small farmers or historically disadvantaged farmers, after the data has been collected, even though the samples of these populations can be quite small unless intentionally recruited as part of the recruitment process. Ultimately, compromises are often required and can dilute the academic originality and quality of the research.

When partner institutions are large and/or field settings are complex, experiments can require involvement of multiple members of a stakeholder's staff, each with unique views of the subject and some potentially unhappy about being involved (e.g., required by supervisors to participate). These dynamics will tend to exacerbate the other challenges associated with participatory design. And in a similar vein, problems can arise when stakeholders (e.g., officers of farmers' associations) also end up being included in the pool of potential experiment participants. For example, in CS5 (Thomas et al., 2019), many Chamber of Agriculture staff members were also part-time farmers. Even when such overlaps are intentional, they can lead to attempts to manipulate the research process strategically when, for example, the policy being investigated directly affects an experiment participant's farm.

TWELVE RECOMMENDATIONS FOR RESEARCHERS

Based on this synthesis of the various case studies and our professional experience, we offer the following 12 recommendations. In addition to these recommendations, we also suggest a check list for practical steps in Table A2.

1. *Prepare carefully*. We find, in general, that participatory design of economic experiments requires *careful preparation*. To avoid wasting time and missed opportunities, researchers must have or first acquire strong facilitation skills to coordinate multiple interests and conduct successful workshops, interviews, and focus groups. Most experimental researchers lack experience with such participatory processes—therefore, getting properly trained or working with professional facilitators seems essential.

Try to foster stakeholders' interest in getting involved in the co-design of your experiment. Researchers should first identify the key stakeholders they want to involve and, if possible, contact a trusted sponsor stakeholder that will be the relay with the rest of stakeholders. There are various ways to foster stakeholders' interest. Our experience shows that organizing a knowledge dissemination seminar can pay off. This can consist in presenting the results of published experiments and highlighting their relevance for stakeholders, including policy. Such initial trust-building can also help secure seed funding from academic or non-academic organizations to apply for larger grants.

Timing the event can be crucial to adjust timelines. In one of the presented cases, an international agricultural and food fair was used to gather stakeholders, as many were present for the event anyways. For others, participation in the workshop became an option only when it was combined with tickets for the fair. Offering a payment for farmers in particular can sometimes increase the willingness to engage, but such payments should be substantial enough not to backfire and discourage farmers from participating.

2. *Build trust through good communication and keeping the schedule on-track*. In our experience, multiple interactions with stakeholders and potential subjects to obtain feedback and pilot testing of experiments and treatments increase engagement. However, clear timelines and responsibilities must be established at the outset to complete those preparatory activities. Researchers must invest considerable effort in communicating and building trust. Keeping the project moving according to the agreed upon time schedule can be value in this process.
3. *Be clear on the goals*. Being critically aware of the goals of stakeholder participation processes is crucial (see for instance Busse et al., 2023 for a typology of participatory research design processes). Once the collaboration is established, at the very beginning, the researchers should be clear about the goal and scope of the collaboration: How much power do stakeholders get in the development of the study (are only small inputs wanted or is there an opportunity to substantially co-design the research)? Which inputs do you seek? How are these inputs used? Whose inputs are relevant? For example in Dessart et al. (2021), the stakeholders had a substantial role in the design, as the experiment was intended to obtain an initial understanding of the effects of ambitious changes in agricultural policy design.
4. *Understand the decision-making structure of partner institutions*. Another large part of preparation is understanding partner institutions: (1) analyzing their structures and identifying which staff members and organizational levels are likely to open doors and should be approached first; (2) anticipating stakeholders' values, constraints, and likely responses; and (3) understanding what interests stakeholders about the research questions and whether the stakeholder organizations have a stake in a particular outcome. Every stakeholder institution brings its own sets of rules and values, which can have important implications for what is possible in the experiment and in the participatory design process.
5. *Get a foot in the door with a small experiment*. Researchers can benefit significantly from developing trust, networks, and processes early on in smaller experiments that lay the groundwork for large-scale experiments in the future. For instance, a small online study could help establish trust and generate relevant insights, increasing the willingness to scale up studies or to move to more demanding formats such as RCTs.
6. *Manage stakeholder expectations*. Another critical aspect of preparation is to manage stakeholder and researchers' expectations. The parties involved should agree (ideally formally)

on (1) the scope of the experiment, (2) the limits of the experiment—for instance, clearly stating early on that experiments cannot test infinite or even a large number of policy options, and (3) researchers' need to publish and, in the case of policymakers, the need to obtain meaningful results that can inform future policies. In some instances, pre-registration of study designs can provide some protection for researchers against rejection of unwanted results and help formalize such processes.

We find that stakeholder engagement does not necessarily translate into their support of results that contradict their goals or expectations. It is common for stakeholders to be disappointed when particular treatments "do not work" or have only small or even negative effects. While academic researchers know that most interventions are likely to have small impacts on targeted behavior, stakeholders can view processes that produce null results and even statistically significant but modest results as fruitless wastes of their time. Consequently, the studies must be carefully designed and have sufficient statistical power to determine whether specific interventions are worthy of further exploration, and researchers must adequately explain those factors to stakeholders. In particular, researchers need to make stakeholders aware that a well-powered experiment can rule out the need to pursue some approaches, something that can help save valuable time and resources in the future.

7. *Onboard everyone*. Another potential source of stakeholder disappointment is when they see the results and simply declare that results are 'obvious' and do not bring forth new insights. To address this, asking stakeholders to forecast outcomes of the study before fieldwork can increase their engagement (DellaVigna et al., 2019; Rommel et al., 2022; Schaak et al., 2023; Vivalt & Coville, 2021) and help avoid such disappointments, especially when being combined with individual feedback on the accuracy of forecasts and a debriefing workshop.
8. *Be willing to compromise*. Based on our experience, we recommend that research *should search for trade-offs between scientific quality and stakeholders' interest in significant policy impacts* imposed by participatory design of experiments. As mentioned in the disadvantages section, we find that stakeholders often want to assess numerous treatments and impacts on different socio-demographic groups or use treatments that cannot be conducted in experiments or RCTs. Researchers should seek to modify stakeholders' expectations by explaining unavoidable restrictions on treatment options and sub-group analysis, and by pre-defining feasible choices up front. However, lengthy sessions devoted to these topics can lead to stakeholder fatigue and rejection of experiment designs.
9. *Include stakeholder priorities, while also looking for contributions to the academic literature*. It is important to include at least some options that stakeholders are keenly interested in during the pilot tests before or between stakeholder meetings, as this can mitigate conflict. Many stakeholders appreciate identifying the likely impacts of various policy options before conducting the study. At the same time, you should make sure to design a study that also provides important insights to the academic community.

   For framed field experiments, reminding stakeholders that the goal is to understand behavioral mechanisms rather than to quantify impacts precisely can be beneficial. Indeed, policymakers often expect scientific evidence to feed into ex-ante policy impact assessment, which typically build on a quantification of the effect of policy options, something experiments cannot always provide.
10. *Be clear about parallelism*. We find that stakeholders' expectations regarding the parallelism of decisions in experiments and actual decisions made by farmers tend to be high. Such expectations can be reasonable when studies employ RCTs, but not when other types of

experiments are used. Therefore, we recommend researchers to convey realistic expectations and to combine different experimental methods. We have also found that presenting meta-analyses that point out conflicting results and discussing why the results conflict have been helpful, in some cases, to identify a mutually agreeable experiment approach.

11. *Maximize statistical power with limited resources*. Researchers and stakeholders are nearly always constricted by a lack of resources. The tendency observed among policymakers to want to test numerous interventions and subgroup analysis must be countered with the need for statistical power and costs associated with large sample sizes needed to achieve that power. Adaptive experimental designs use multiple stages of testing treatments. They start with a large number of treatments that are evaluated based on their effectiveness to be narrowed down in later stages (Jobjörnsson et al., 2022; Kasy & Sautmann, 2021). Such design can be especially useful when numerous treatments are on the table, as an iterative participatory processes can provide multiple rounds of feedback. For example, an initial workshop can generate a long list of potential treatments that can be distilled into a few feasible options in subsequent rounds of interaction.
12. *Get enough money*. RCTs but also framed field experiments tend to be costly, and while they can ultimately provide key insights that can save stakeholders millions of dollars, that does not mean that the research itself is inexpensive. Researchers should manage the expectations of their stakeholders on how much the research will likely cost, including time costs.

CONCLUSION

Our experience makes clear that involving stakeholders in the design of economic experiments can increase the acceptance and policy relevance of the experiment results by refining the choice environments and tested treatments to make them as useful as possible. At times, stakeholder participation can also enable researchers to tap into new funding pools, especially if the funds come from the administration of schemes and programs or if seed-funding or larger grants demand stakeholder participation (many European funding schemes demand a multi-actor approach, i.e., stakeholders must be part at all stages of the research process). However, researchers must take the greater complexity of such processes into account and remain aware of trade-offs required between scientific quality and policy impacts. The tension between strong experimental designs and context-specific framing can lead to suboptimal compromises where neither the research team nor the involved stakeholders obtain results that are up to their expectations. This can lead to subsequent publications being challenged because of confounding effects and policymakers believing results are not useful for their needs. Educating stakeholders on the scientific enterprise and familiarizing them with available results can help avoiding problems. A comprehensive understanding of participating institutions, a carefully structured and facilitated approach, and application of tools such as forecasting will allow future experimenters to make the most of participatory processes for designing economic experiments.

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ENDNOTES

[1] REECAP: Research Network on Economic Experiments for the Common Agricultural Policy; http://www.reecap.org. CBEAR: Center for Behavioral and Experimental Agri-Environmental Research; https://centerbear.org.

[2] Potential researchers opted not to participate primarily because they felt they did not meet the criteria of having recent experience with design of policy-relevant experiments in collaboration with stakeholders.

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APPENDIX A

See Tables A1 and A2.

TABLE A1 Participatory processes in the case studies.

		Researcher–stakeholder interaction		
Case study (citation)	**Stakeholder characteristics**	**Stakeholder involvement**	**Challenges**	**Outcomes**
Project EFFECT—Generating **E**nvironmental public goods **F**rom **F**arming through **E**ffective **C**ontract targeting. (CS1)	**Farmers**: different farming systems, able to voice concerns of the farming community. **Consultants**: advising farmers on contracts. **Extension service advisors:** developing monitoring systems for the sector. **Researchers:** advising ministry on compensation schemes, payment amounts, and cost-effective measures.	**Workshop with farmers:** in person mix of presentations and discussions of challenges related to current programs. Farmers directly informed of the experiments through ranking of potential treatments. **Workshop with farm extension services and researchers:** involved sharing perspective of possible policy mechanisms from the participants. **Workshop with consultants:** pilot test of the experiment.	• Challenging to take complexities of real-world farming into account. • Difference in objectives between agencies and farmers of what contracts should offer and what characterizes a "good" contract.	Five contextualized treatments. Treatments were changed to make them more relevant in the eyes of the participants.
Behavioral experiment on EU farmers' willingness to contribute to environmental quality. (CS2, Dessart et al., 2021)	**Policymakers**: European Commission policymakers in charge of CAP design and evaluation. **Researchers:** providing science for policy advice in	**Regular meetings and written exchanges** *First step*: discuss potential research questions, with researchers presenting related findings with a view	• Choosing level of contextualization: *finding the right balance in terms of contextualization to assure both ecological validity and internal validity*.	In the first stage, stakeholders clarified the policy question to be tackled in the experiments. In the second stage,

TABLE A1 (Continued)

Case study (citation)	Stakeholder characteristics	Researcher–stakeholder interaction		
		Stakeholder involvement	Challenges	Outcomes
	the field of behavioral insights.	to inspiring policymakers and creating reasonable expectations about project output. *Second step*: researchers proposed several draft experimental designs, which policymakers commented on in writing. *Third step*: a core team of researchers and policymakers discussed the details of the experiment, including the degree of contextualization, levels of the treatments, some parts of the follow-up questionnaire, and the token allocation task.	• Choosing number and prioritizing of treatments: *identify the key policy issue that is relevant for stakeholders and can be tested by experiment*. Researchers aimed for statistical power in the context of a limited budget. • Choosing the levels in the treatments: Contrast between levels is needed to detect effects with limited sample sizes. However, this contrast may be larger than the policy options on the table.	stakeholders agreed on the type of experiment, i.e., a semi-contextualized dictator game. Last, they agreed on two between-subject treatments.
Project Contracts 2.0—Understanding cooperation among European farmers. (CS3, Rommel et al., 2021)	**Policymakers**: Ministry of Climate and Environment, Department of Climate and Environment of the Ministry of Agriculture and Rural Development. **Scientists**: specialized in agriculture. **Farmers' associations** **Environmental NGOs** **Rural advisory centers**	**Online workshop and survey:** introduction to the project, warm-up exercise with experiment, discussion of the results, presentation of a list of eight potential treatments. Participants filled out a survey on the instructions and importance of the eight variants. This was followed	• Abstract project language and goals: Unfolding the concept of 'economic experiment' and explain advantages challenging. • Game perceived as too abstract, challenging to connect to real-world decision-making. • Concerns over the inference from	Three contextualized treatments, feedback on wording used in the experiment, and suggestions of other interested stakeholders.

(Continues)

TABLE A1 (Continued)

Case study (citation)	Stakeholder characteristics	Researcher–stakeholder interaction		
		Stakeholder involvement	Challenges	Outcomes
	CAP operating agencies **Farmers**: Ecological farms that introduce agri-ecological practices.	by an open discussion about potential advantages and disadvantages of introducing collective contracts.	experimental evidence to the policy context. • Limited agricultural and social context made experiment worrisome to stakeholders.	
Conservation Outreach to U.S. Farmers. (CS4, Ferraro et al., 2021)	**Staff from several branches of the USDA**: (1) Office of the Chief Economist, (2) Natural Resource Conservation Service, (3) Farm Service Agency, and (4) Economic Research Service.	**Meetings:** During meetings, potential treatments were proposed by both researchers and stakeholders. Stakeholders rejected treatments that involved varying economic payments and gifts and that involved peer comparisons and other applications of behavioral insights. Researchers rejected treatments that could not be easily randomized.	• Researcher proposals to test more promising outreach treatments were vetoed by the stakeholders. Researchers acquiesced because they hoped that stakeholders could be convinced to explore more ambitious treatments in future experiments. • Stakeholders did not allow researchers to follow-up with experiment participants to determine if they had made changes in conservation practices. Researchers could only collect data on participant actions to seek out more information about conservation practices.	Two different treatments related to the language related to climate change. Three different treatments related to outreach. Measured behavior was engagement with project website and attendance in a webinar.

TABLE A1 (Continued)

		Researcher–stakeholder interaction		
Case study (citation)	**Stakeholder characteristics**	**Stakeholder involvement**	**Challenges**	**Outcomes**
Greening the Common Agricultural Policy (CS5, Thomas et al., 2019)	**Staff from the agricultural chamber of Lower Saxony (Germany).** (1) with knowledge on the topic of environment and agriculture, (2) with access to data. Chamber employees had diverse backgrounds, e.g., agricultural economics, agricultural sciences, farm advisors, vocational training as farmers.	**Personal meetings and document exchange:** Researchers received detailed comments on the experimental design and the invitation letter. **Pre-test and focus group discussion:** Chamber organized pre-test with farmers and employees, which involved running the experiment first and a focus group discussion afterwards. **Promotion of the survey:** Chamber helped to promote the study, sent invitation letters, and helped to administer the payment to farmers.	• Chamber staff had limited time available, which increased fieldwork preparation time. • Diverse interpretations and framings of the subject motivating the experiment were present among chamber staff and researchers. This led to controversial discussions and the need for alternative framings/ wordings.	Instructions benefitted from feedback in terms of clarity and understandability for farmers (e.g., the payoff function was slightly modified to make it more realistic). High response rate to the experiment.
Reverse Auctions for Diversifying Agriculture in Ontario (RADAg-Ontario). (CS6)	**Employees of the Ecological Farmers Association of Ontario:** Research and Small Grains Program Director; Executive Director; and two other participants hired by EFAO for this project. The dedicated stakeholder team had extensive experience in	**Frequent online meetings and feedback via email**: The team met at least monthly and more frequently when approaching program launch. Meetings focused on communicating logic models, developing experiment administration	• Researchers were most interested in testing theory-inspired economic treatments with representative farmers. • Stakeholders were most interested in improving program efficiency while maintaining good relationships with farmers.	Three research questions and a strategy for treatment randomization and recruitment that aligned with an ex ante statistical power analysis. Researchers gained a better understanding of what was feasible in the field and stakeholders

(Continues)

TABLE A1 (Continued)

Case study (citation)	Stakeholder characteristics	Researcher–stakeholder interaction		
		Stakeholder involvement	**Challenges**	**Outcomes**
	working with the farming community and led experiment implementation and logistics.	plans, and offering feedback regarding the hypotheses, power analysis, and treatment randomization strategies.	• Goals of each team were mutually respected, and compromises were made accordingly to overcome this challenge.	gained insights into how reverse auctions could be used to achieve program goals. The team continues to work together.

TABLE A2 Suggestion for concrete steps that can help implement our 12 recommendations.

Phase	Steps
Foster stakeholders' interest and seek funding	• Draw a list of key stakeholders that you want to engage in the participatory process. • Look for a sponsor among your stakeholders, who will be your main contact person. • Organize a dedicated workshop on a topic of interest for stakeholders, during which you present in plain language the results of one or several published experiments on the topic. • Write up a succinct research proposal and request funding.
Preparation of stakeholder engagement	• Clarify the objectives, involvement type, and desired outcomes of your participatory process. Identify and understand relevant stakeholders, including their likely expectations. • Organize or attend workshops and symposia with stakeholders (in some instance this can be a first step, in others a clarification of goals should come first). • Present available evidence and examples of previous projects. • Contact identified staff members and/or organizational levels. • Decide on a format (e.g., workshop, interviews, email exchange, questionnaire). • Plan the meeting(s), create a timeline, send invitations. • Consider gifts or payments for participation (if appropriate). • Identify potential gains that stakeholders can obtain from getting involved in the process.
Stakeholder meeting	Agenda • Start meeting with clear objectives and obtain informed consent if this is a legal requirement, as for instance in EU projects (in particular, if the data of the process are stored and processed). • Explain relevance of the process, both for research and participants. • Explain economic experiments and perform test run if there is a pre-defined game for the research (for instance if the goal is to develop treatments for a public goods game, you should start by playing the game for a few rounds). • Showcase sample findings that can be obtained from the experiment and ask for what other findings are of interest to the participants. • Collaboratively explore, develop and choose relevant parts of your economic experiment, such as treatments. • Take notes, record the meeting, save results (if applicable). • End workshop with thank you and outlook on next steps. Facilitation • Be open for discussion, but clear about the purpose and constraints.
After stakeholder meeting, before the experiment	• Design experiment. • Share design for pre-testing and additional comments, clearly highlighting the involved trade-offs and decisions you have made as researcher. • Showcase how stakeholder needs and expectations are incorporated into the design and why some have not been included. • Consider using forecasting (i.e., asking stakeholders' expectations of the findings) to increase engagement and reduce potential disappointments with "obvious" findings.

(Continues)

TABLE A2 (Continued)

Phase	Steps
After the results are in	• Inform participants about relevant results and their interpretation, and discuss them. • Summarize and popularize results in adequate forms, such as policy briefs, infographics, short videos, or meetings.
Throughout	• Be available for questions/clarification in pre-defined hours. • Engage in early, clear, appropriate, and transparent communication.