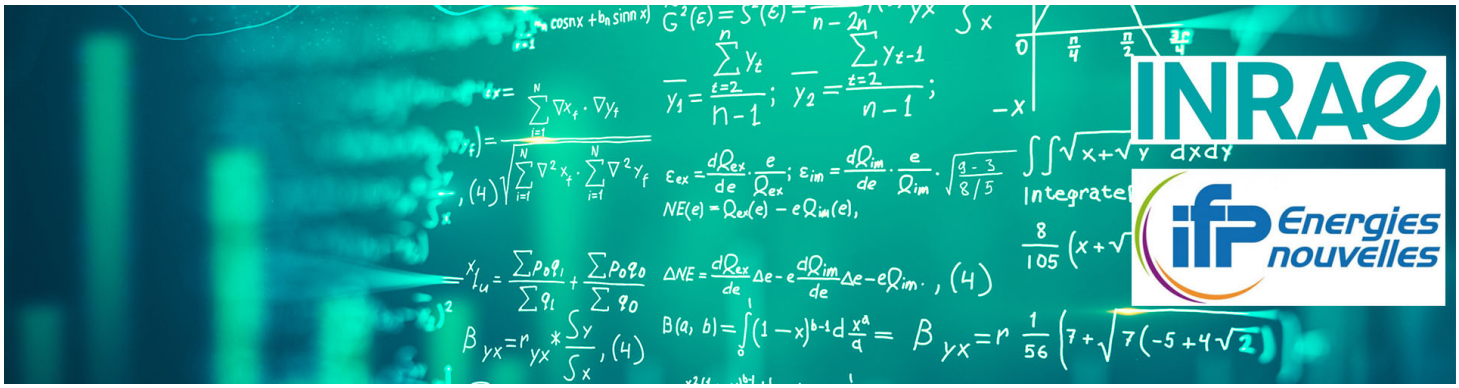
EXPERIMENTAL ECONOMICS SUPPORTING THE ENERGY TRANSITION: PESTICIDE REDUCTION



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News

Fundamental Research

Economics | Microeconomics and econometrics | Economic modeling | Technical and economic evaluation

In order to understand why French farmers still prefer to use pesticides rather than alternative agronomic solutions, despite the effectiveness of the latter when it comes to crop protection, IFPEN and INRAE conducted a survey of around one hundred farmers using a discrete choice experiment method. The results obtained revealed their reticence and their motivations. They will be useful in informing public decision-making and the design of incentive instruments.

A question: why do farmers prefer to use pesticides?

Reducing pesticide use in agriculture is seen as a major challenge in developed countries and has been **one of the stated objectives** of public policies for nearly two decades. However, the associated agro-environmental policies **have yet to prove effective** [1].

Results remain disappointing and the use of plant health products continues to increase (growth of **around 25% over the decade from 2008 to 2018**). The cause? A lack of enthusiasm among farmers for these alternative agronomic solutions despite their proven advantages [2]. Many still prefer to use

pesticides to protect their crops and maintain yields and profits.

Within the framework of their scientific partnership, IFPEN and INRAE thus conducted a study aimed **at gaining a better understanding of farmers' reluctance to reduce their pesticide use**. The results are based on the use of data gathered via a **discrete choice experiment**, a specific method for revealing individual preferences, useful for guiding public support policies.

Study methodology: a discrete choice experiment

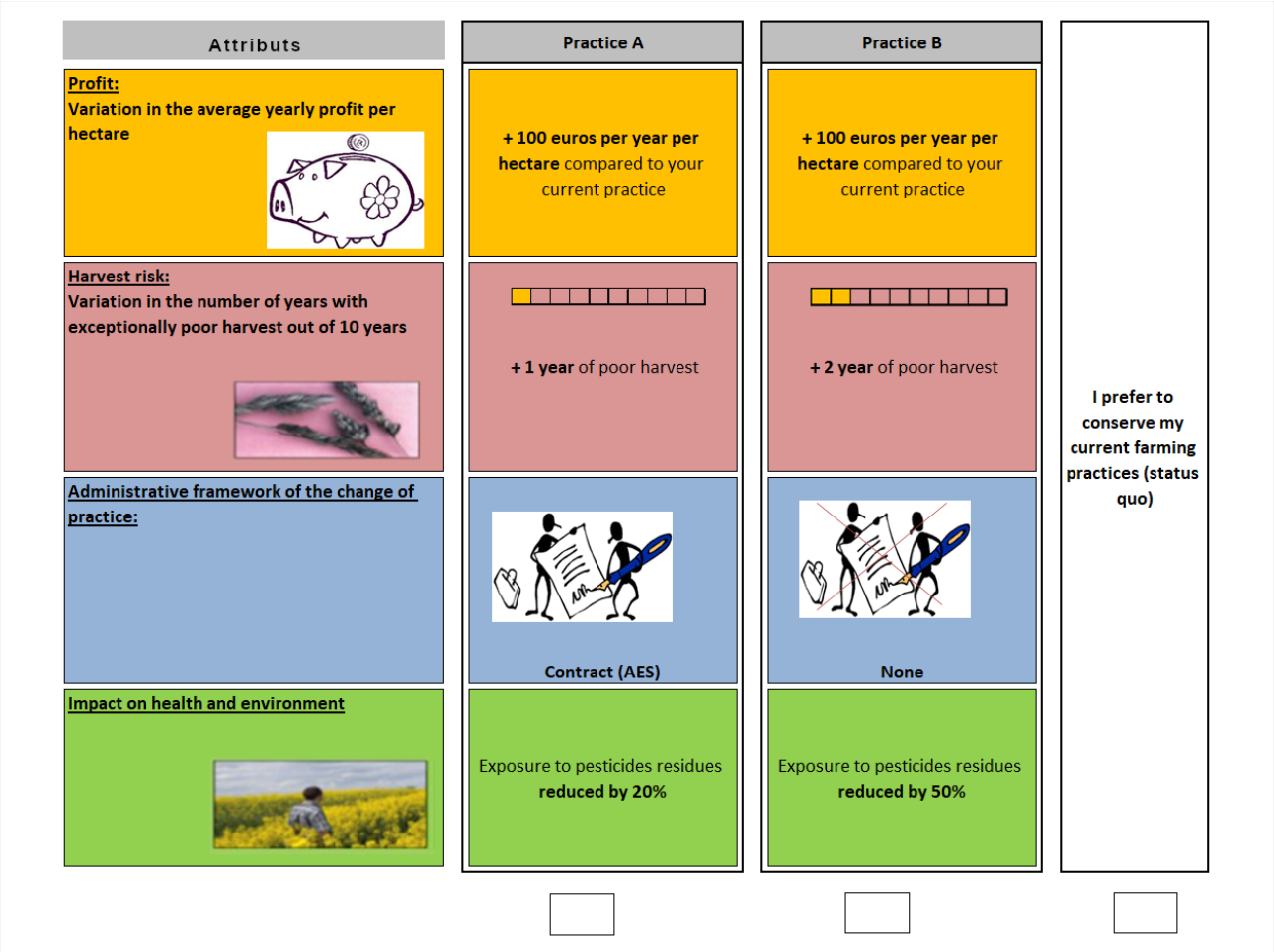
The Discrete Choice Experiment – DCE was conducted in around one hundred farmers in France, using a methodology involving several steps:

1. **Introduction of the question studied**, providing the essential information;
2. **Comparison of choice cards for a given problem** (often a succession of between five and ten), with the possibility of choosing a status quo option if neither of the two scenarios proposed is preferable.

Each scenario, or option, is defined by a unique combination of proposed levels relating to various previously defined decision factors (referred to as attributes in the literature).

The illustration below is an example of the type of choice those surveyed were asked to make on the basis of the proposed options.

3. **Survey conclusion with a series of socio-demographic, economic and/or psychological question**s enabling the researchers to analyze the impact of the characteristics of the population studied on the structure of preferences and their heterogeneity. This quantitative analysis was carried out using econometric estimators specific to Discrete Choice Modelling – DCM [3].



Example of choice card

Illuminating results

The study conducted [4] made it possible to measure **the relative weight of several decision factors** (attributes, cf. left-hand column in the figure) farmers might take into account when choosing whether or not to adopt agricultural practices conducive to reducing their pesticide use.

The attributes considered concern:

i) the impact of the change in practice on their profits;

ii) the increase in the frequency of major crop loss as a result of pests;

iii) the administrative context of the change in practice (none, charter, agri-environmental measure, label);

iv) the reduction in exposure to pesticides resulting from the change in practice considered.

The results underline **the dominant role of the harvest risk**, even when the change in practice would tend to lead to economic gains over the long term. The other major factor behind the reluctance to change practice: **the fact that the economic gain is dependent on an administrative commitment**. Finally, the reduction in pesticide exposure only plays a role in decision-making **for farmers who already believe that these products** are harmful for the environment and health (i.e., around 65% of the sample considered).

They also **help guide public decision-making and the design of incentive instruments** and underline the importance of informing farmers about the effects of pesticides on the environment, as

well as insurance mechanisms. The latter make it possible to offset large-scale crop losses.

The analysis also provides an assessment of willingness to pay or accept for non-monetary attributes associated with the choices of proposed agricultural practices, i.e. attributes ii), iii) and iv) set out above. Accordingly, it makes it possible to calibrate the amount of aids to be put in place to offset the effects of attributes not conducive to pesticide reduction.

Useful perspectives for the deployment of an ambitious ecological transition

More generally, the methodology and the results obtained illustrate how behavioral approaches can be used as decision-making tools to support public authorities and their policies.

More widely deployed in the fields of both environmental and energy economics, these methods will help provide a better understanding of some of the obstacles to the adoption of New Energy Technologies (NETs) by consumers and citizens.

These questions relate to the acceptability of change. Strictly speaking, they are not economic in nature (although they incorporate this aspect), but they do impact the definition and effectiveness of public support policies. As such, they are fundamental in order to set in motion the ambitious energy and ecological transition sought by public decision-makers.

DCE-type surveys form part of a wider theoretical and empirical corpus: behavioral economics and experimental economics, fields in which experts have already won three Nobel prizes in economics.

The objective of experimental economics is to generate and obtain data through controlled experiments, in a similar way to experimental sciences, in order to demonstrate – via statistical tools – the diversity of behaviors and perceptions of economic agents as theorized by behavioral economics.

The latter – at the crossroads of economics and other disciplines such as social psychology, sociology and neurosciences – challenges, or at least complements, the hypothesis of “perfect” economic rationality of agents (homo œconomicus) as the only explanation of their economic decisions.

We should also point out that approaches developed in the field of experimental economics make it possible to simulate public policy scenarios or situations that do not yet exist and to analyze resulting behavior and reactions. That being the case, the advantage of these methods over other ones designed to reveal preferences developed in economics is that public policies can be tested before they are even implemented, thus enabling ex ante evaluation of their effectiveness.

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[4] B. Chèze, M. David, V. Martinet. 2020. Understanding farmers' reluctance to reduce pesticide use: A choice experiment, Ecological Economics, Volume 167, 106349, ISSN 0921-8009, https://doi.org/10.1016/j.ecolecon.2019.06.004

Link to the web page : Experimental economics supporting the energy transition: pesticide reduction