

Jiaying Song, Aurelie Harou, Mary Doidge  
 McGill University, Department of Agricultural Economics

## BACKGROUND

- Although soil organic matter in Canadian agricultural land has been increasing, changes to farming and cropping practices have caused soil carbon to decline in some areas, including Quebec
- Quebec's goal is to have 85% of agricultural soils will be have a percentage organic matter of 4% or more. 75% if cultivated area will be covered in winter by crop or by residue of crops [1]
- Current subsidy levels are not sufficient incentive to achieved the target level of adoption [2]
- Most scholars utilize choice experiment without distinguish risk and ambiguity for uncertainty [3]. While study have found risk and ambiguity are playing different roles in technology adoption[4]

## OBJECTIVES

- Measure the differential impact of risk and ambiguity on grain producers' cover crop adoption decisions
- Investigate the effectiveness of incentives aimed at increasing conservation practice adoption

## METHOD

**Experiment:** To understand how risk and ambiguity influence conservation practice adoption, we will conduct an economic experiment among grain farmers in Québec.

Participants will be asked to make yearly decisions about planting cover crops, with each decision influencing their future returns. By analyzing farmers' response on follows games, we aim to investigate how factors such as uncertainty, ambiguity, and subsidy strategies (payment allocation) influence the willingness of Quebec farmers to adopt conservation practices.

Year		Net annual return with cover crop	Net annual return without cover crops	Plant cover crops?	Actual net revenue
1	Bad year	290	295	Yes	320\$/acre
	Good year	320	305		
2	Bad year	310	315		
	Good year	340	325		

Table 1. Example of the information shown to farmers when they make their cover crop decision

	Version A	Version B	Version C	Ambiguity $\alpha$
Scenario 1	Unknown	Unknown	Unknown	1
Scenario 2	30%~70%	10%~50%	50%~90%	0.4
Scenario 3	40%~60%	20%~40%	60%~80%	0.2
Scenario 4	50%	30%	70%	0
Mean prob (risk)	50%	30%	70%	

Table 2. Experimental version and scenario details on probability revealed to participates

**Sample:** This study will be conducted in Quebec. We will contact to farmers with the assistance of Producteur de Grains du Quebec, who will distribute the survey via a link emailed to its members in Winter 2024.



Figure 1 . Factors being investigated as the determinants of conservation practice adoption

- Cover crop adoption game, Table 1
  - 3 versions, 4 scenarios with different risk and ambiguity level, as shown in Table 2
- Decreasing subsidy structure
  - Same budget, different allocation.
  - Participants face zero potential loss if adopting cover crop in the first year, greater potential loss compares to constant subsidy game after year 3

## POLICY IMPLICATIONS

- Explore participants' awareness of Québec's existing programs, as well as key determinants and barriers shaping their adoption decisions
- We incorporate parameters from real-world programs, striving to create simulations with enhanced external validity specific to Quebec
- Explore whether it's a clear cut that with more information revealed by the government an incentive to all farmers. Suggest more effective education programs to reduce uncertainty barrier
- With same payment amount, investigate different subsidy structure and allocation impacts on farmers' participation and commitment adopting conservation practice. Acquire insight into more efficient expenditures on subsidies.

## REFERENCES

[1] Ministère de l'Agriculture, des Pêcheries et de l'Alimentation. 2020. Agir, pour une Agriculture Durable Plan 2020-2030. Bibliotheque et Archives du Quebec.

[2] David Rourke. 2022. *Policy Brief: Investing in Cover Crop Technology*. Senate Canada

[3] Canales, Elizabeth, Jason S. Bergtold, and Jeffery R. Williams. 2024. "Conservation Intensification under Risk: An Assessment of Adoption, Additionality, and Farmer Preferences." *American Journal of Agricultural Economics* 106(1): 45–75. <https://doi.org/10.1111/ajae.12414>

[4] Barham, Bradford & Chavas, Jean-Paul & Fitz, Dylan & Salas, Vanessa & Schechter, Laura. (2012). The Roles of Risk and Ambiguity in Technology Adoption. *Journal of Economic Behavior & Organization*. 97. 10.2139/ssrn.1937849.