Heterogeneity in farmers' preferences for risk and contract's attributes:

Behavioral evidence from a discrete choice experiment and a risk preferences elicitation task

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H2020-SFS-2014-2

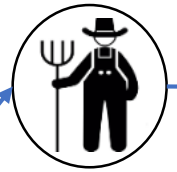
SUFISA

Grant agreement 635577

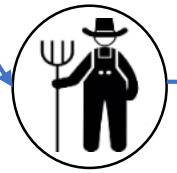
Introduction

CONDITIONS → STRATEGIES → PERFORMANCES

Market Imperfections
Policy and Regulations



S_1



S_2

Why?

Preferences → Choices

How do we observe choices?

"What did you do?"
➔ **Revealed preference**

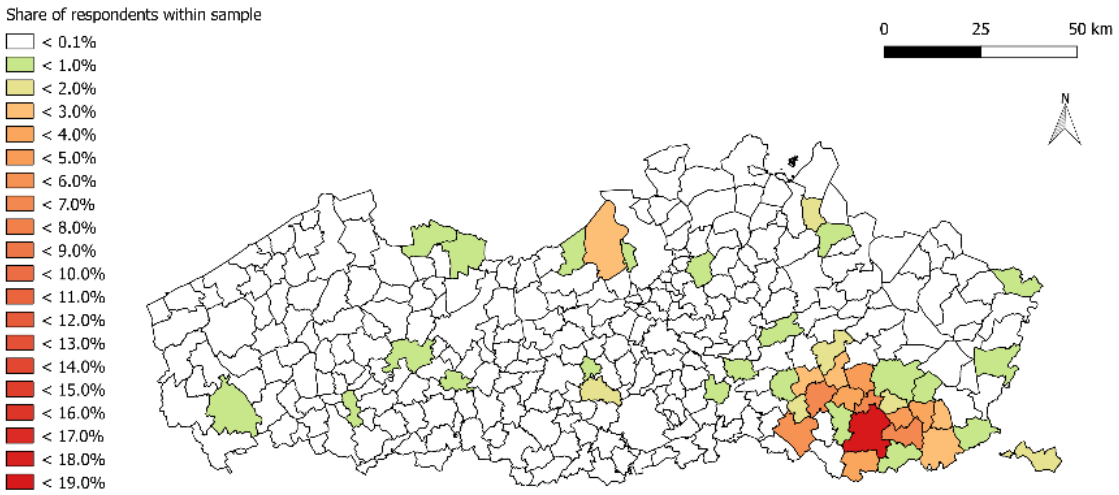
"What would you do?"
➔ **Stated preferences:**
➔ **EXPERIMENTS**

Introduction

- Experiments are a ***controlled data generating process*** (Croson Gächter, 2010)
  - controlled : most factors which influence behavior are held constant and only one factor of interest (the treatment) is varied at a time
  - enable to draw **causal inferences**
  - ➢ Powerful tool for **evidence-based policy**

- Experiments can be:
  - naturally occuring : the process occurs naturally (rare cases)
  - laboratory/field experiments : the researcher controls the data generating process

Context



The Survey:

- from January-March 2018
- Sector: apple and pear in Flanders
- Participation rate: about 20%
- First contact by phone or face-to-face then online questionnaire
- Common questionnaire of SUFISA + 2 experiments

Context

The Sector:

- Highly educated producers
- Rather entrepreneurial and business-oriented
- Light-subsidy sector
- The sector is in crisis:
  - Russian Boycott
  - Oversupply

Motivation for investigation “Risk” and “Contracts”

- Risk is **inherent to agricultural production** => plays a key role in the decisions farmers make every day
- Growing concern because of **climatic dysfonctioning**: more frequent, unpredictable and deep negative shocks
- **Market liberalization**: increased exposure of farmers to price volatility
- Yet, farmers are the actors in **supply chains** who are most at risk

- In the case-study:
  - Frost of April 2016…
  - Strong criticism of cooperatives…

Experiment 1

Risk Preferences

Experiment 2

Preferences for Contracts

Experiment 1

Risk Preferences

Motivation

Experiment 1

Two issues regarding the understanding of **Risk Preferences**

1. Confronting theories:
   - Expected Utility Theory : risk aversion
   - Cumulative Prospect Theory : risk aversion + loss aversion + probability distortion

     (Kahneman and Tversky – Nobel Prize 2002)

Motivation

Experiment 1

Two issues regarding the understanding of **Risk Preferences**

1. Confronting theories:
   - Expected Utility Theory : risk aversion
   - Cumulative Prospect Theory : risk aversion + loss aversion + probability distortion

     (Kahneman and Tversky – Nobel Prize 2002)

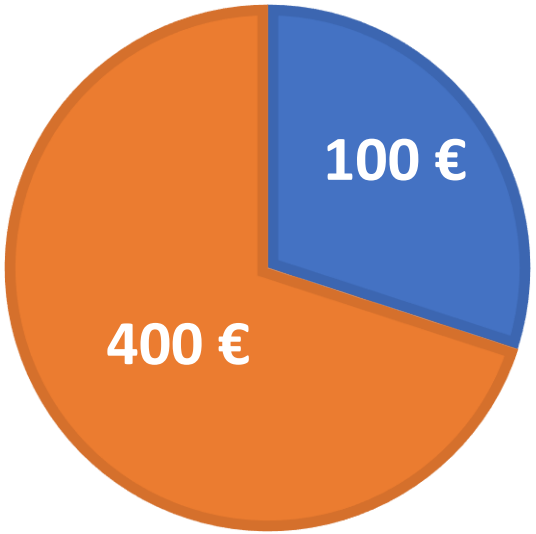
2. Still performing poorly at explaining farmer's decision-making

Methods

Experiment 1

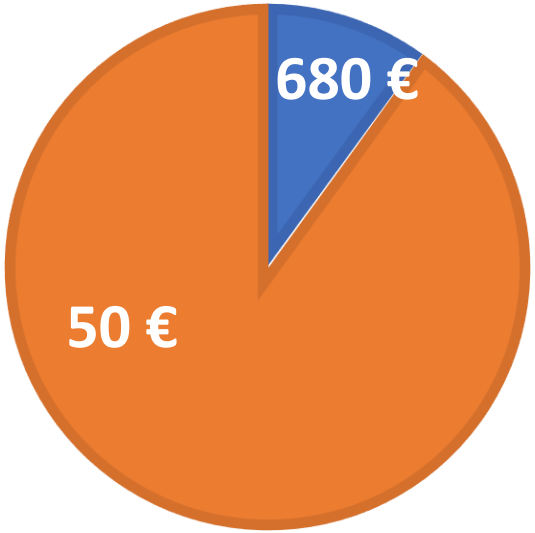
- Laboratory experiments: ***Risk Preference Elicitation Task***

Lottery A (safer)



[E(A) = 190]

Lottery B (riskier)



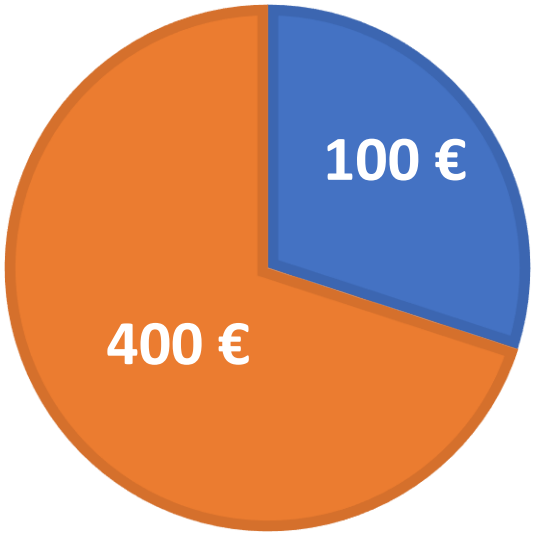
[E(A) = 77]

Methods

Experiment 1

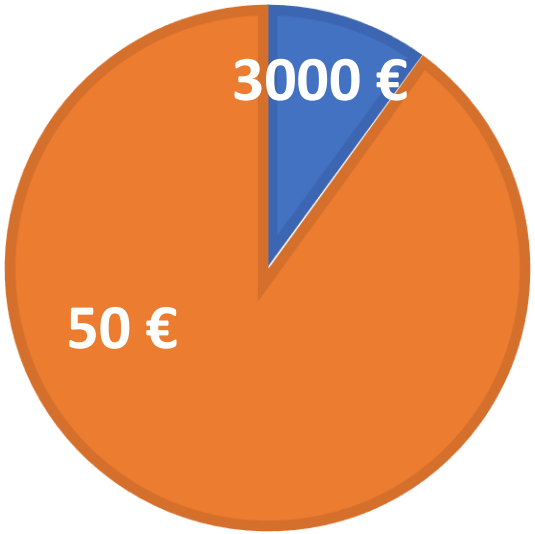
- Laboratory experiments: ***Risk Preference Elicitation Task***

Lottery A (safer)



[E(A) = 190]

Lottery B (riskier)



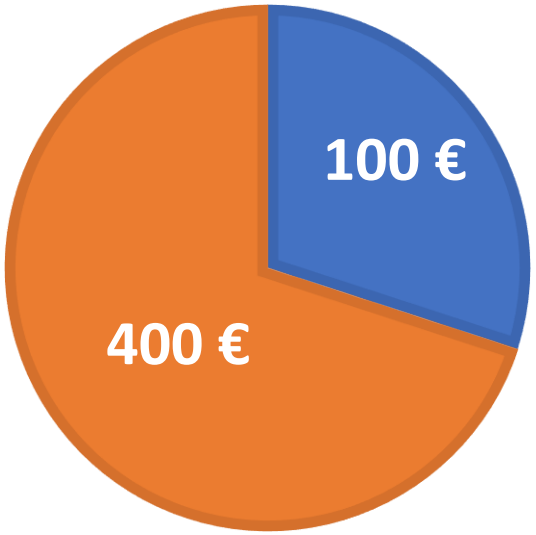
[E(A) = 345]

Methods

Experiment 1

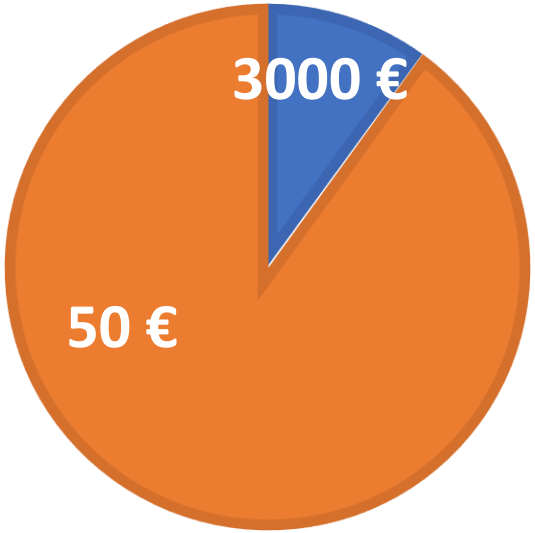
- Laboratory experiments: ***Risk Preference Elicitation Task***

Lottery A (safer)



[E(A) = 190]

Lottery B (riskier)



[E(A) = 345]

INCENTIVIZED !

Played for real money

Risk Preferences: Results

Experiment 1

1. Empirical input for hypothesis testing in behavioural economics: Cumulative Prospect Theory

In average, producers are:

- Very risk-averse
- Not loss-averse
- Do distort probabilities

		Model 1: EUT	Model 2: CPT	Model 3: CPT
		(1)	(2)	(3)
r	constant	0.1384*** (0.0352)		
σ	*constant*		0.2617*** (0.0118)	
λ	*constant*		1.2922*** (0.1594)	
γ	*constant*		0.6839*** (0.0328)	0.6840*** (0.0328)
α	*constant*			0.2618*** (0.0118)
β	*constant*			0.2934*** (0.0200)
	H^0: $r=1$	*p-value: 0.000*		
	H^0: $\lambda=1$		*p-value: 0.067*	
	H^0: $\alpha=\beta$			*p-value: 0.041*
	N	4247/137	4247/137	4247/137

Standard errors in parentheses

Maximum Likelihood Estimations with standard errors clustered at the respondent level
Stochastic error=0; tech(bfgs 5 dfp 5 nr 5 bhhh 5)

** p<0.10, **p<0.05, *** p<0.01*

Risk Preferences: Results

Experiment 1

1. Empirical input for hypothesis testing in behavioural economics: Cumulative Prospect Theory
2. Flemish apple-pear producers are less loss-averse than French arable crops farmers

		Model 1: EUT	Model 2: CPT	Model 3: CPT	Model 2: CPT Consistent only
		(1)	(2)	(3)	(4)
r	constant	0.1384*** 0.212*** (0.0352)			
σ	*constant*		0.2617*** 0.280*** (0.0118)		0.2696*** (0.0124)
λ	*constant*		1.2922*** 2.275*** (0.1594)		1.1625*** (0.1564)
γ	*constant*		0.6839*** 0.655***	0.6840*** (0.0328)	0.7002*** (0.0342)
α	*constant*			0.2618*** (0.0118)	
β	*constant*			0.2934*** (0.0200)	
	H^0: r=1	*p-value: 0.000* 0.000			
	H^0: λ=1		*p-value: 0.067* 0.000		*p-value: 0.299*
	H^0: α=β			*p-value: 0.041* 0.000	
	N	4247/137	4247/137	4247/137	3813/123

Standard errors in parentheses

Maximum Likelihood Estimations with standard errors clustered at the respondent level
Stochastic error=0; tech(bfgs 5 dfp 5 nr 5 bhhh 5)

** p<0.10, ** p<0.05, *** p<0.01*

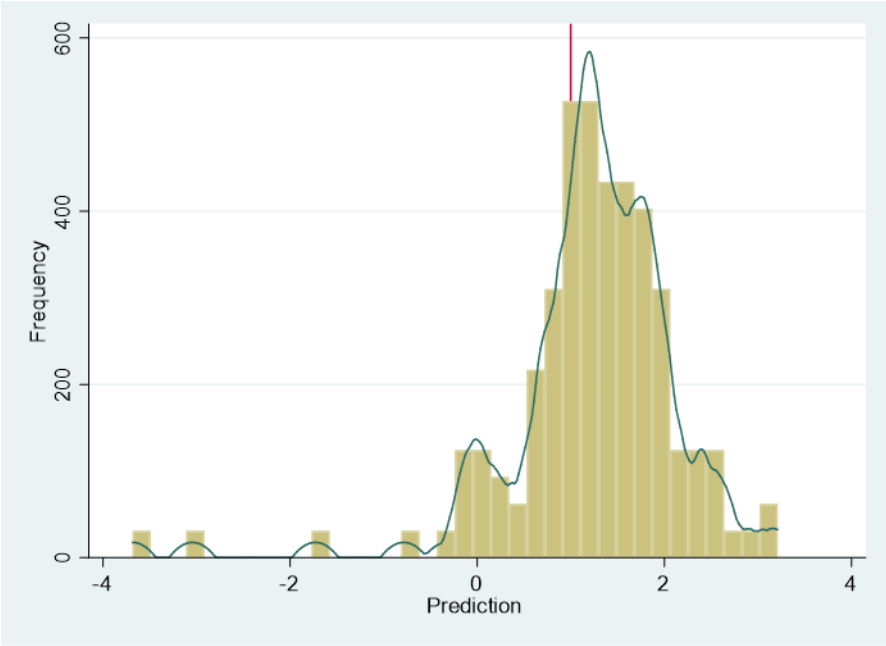
Bocquého et al, 2014, ERAE

Risk Preferences: Results

Experiment 1

1. Empirical input for hypothesis testing in behavioural economics: Cumulative Prospect Theory
2. Flemish apple-pear producers are less loss-averse than French arable crops farmers
3. High level of heterogeneity in risk preferences

Distribution of loss-aversion



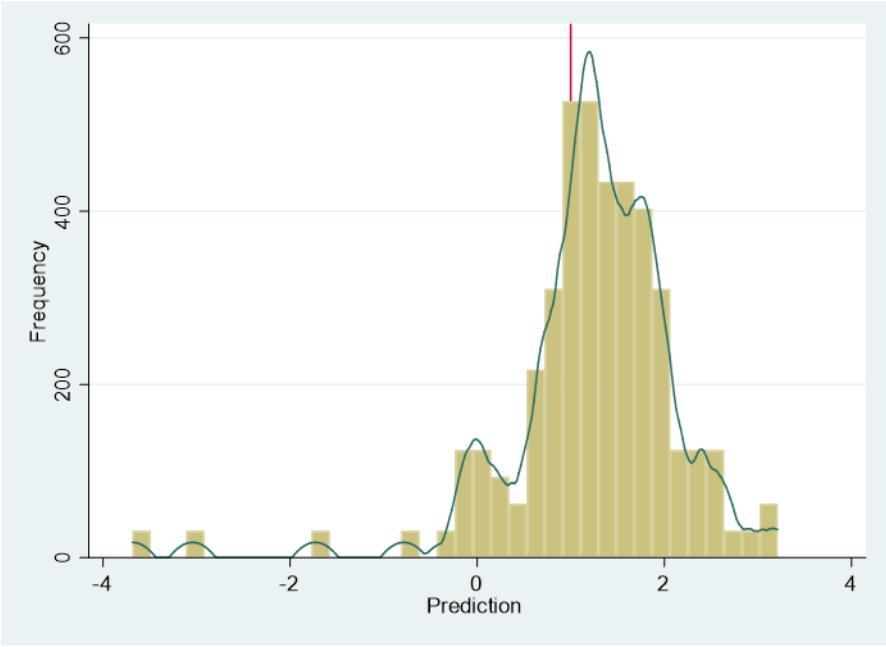
Risk Preferences: Results

Experiment 1

1. Empirical input for hypothesis testing in behavioural economics: Cumulative Prospect Theory
2. Flemish apple-pear producers are less loss-averse than French arable crops farmers
3. High level of heterogeneity in risk preferences

Very loss-averse producers are (20%):
"Relatively young and low-educated farmers, having inherited a relatively small farm that they manage alone"

Distribution of loss-aversion



Risk Preferences: Results

Experiment 1

SUFISA

1. Empirical input for hypothesis testing in behavioural economics: Cumulative Prospect Theory
2. Flemish apple-pear producers are less loss-averse than French arable crops farmers
3. High level of heterogeneity in risk preferences
4. We explain farmers' strategies and performances

Risk Preferences: Results

Experiment 1

1. Empirical input for hypothesis testing in behavioural economics: Cumulative Prospect Theory
2. Flemish apple-pear producers are less loss-averse than French arable crops farmers
3. High level of heterogeneity in risk preferences
4. We explain farmers' strategies and performances

- More risk-averse farmers ➔ Hail insurance
- More loss-averse famers ➔ Pre-harvest contract
- Farmers who distort probabilities ➔ Online sales
- Investment in preventive measures is mainly explained by wealth, on top of risk-aversion

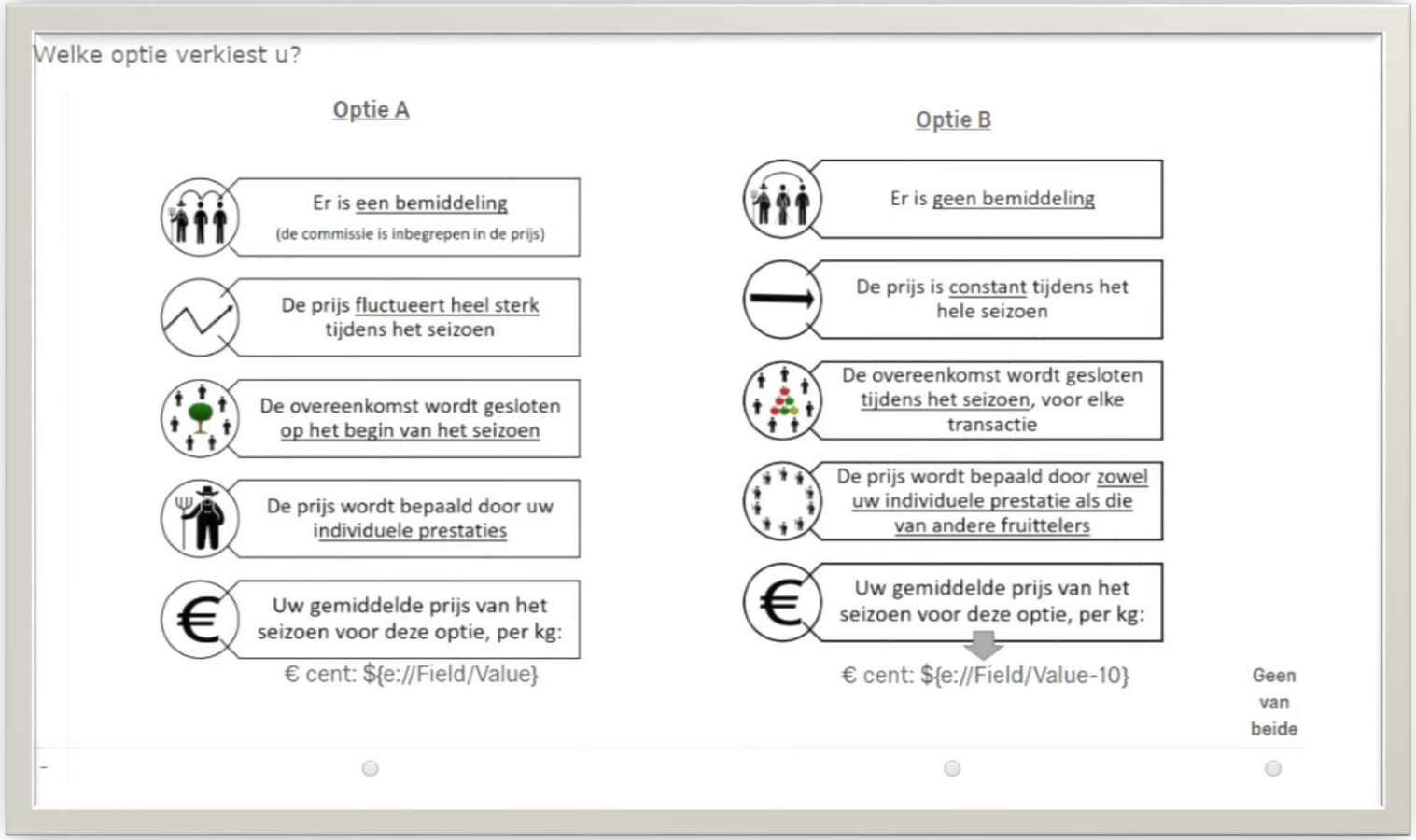
Experiment 2

Preferences for Contracts

Motivation

Experiment 2

- Preferences for contracts' attributes: ***Discrete Choice Experiment***



Motivation

Experiment 2

- Preferences for contracts' attributes: ***Discrete Choice Experiment***

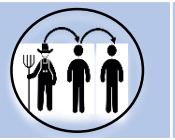
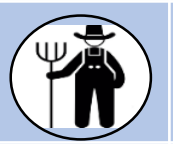
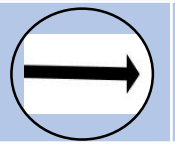
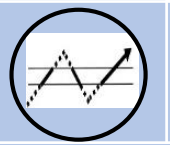
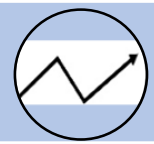
- Provides policy relevant information:
  - What is important to people?
  - How might people trade-off between attributes?
  - Simulation of possible scenarios and cost-effectiveness of different measures?

- Difficulty: complex to design and analyse

Motivation

Experiment 2

- Preferences for contracts' attributes: ***Discrete Choice Experiment***

ATTRIBUTES	LEVELS		
INTERMEDIARY	YES 	NO 	
TIMING	BEFORE THE HARVEST 	AFTER THE HARVEST 	
PRICE POOLING	NO 	YES 	
PRICE VOLATILITY	CONSTANT PRICE 	REDUCED VOLATILITY 	HIGH VOLATILITY 
AVERAGE PRICE/KG		-30% ; -20% ; -10% ; 0 ; +10% ; +20% ; +30% of [average price of the most important cultivar]	

Preferences for Contracts: Results

Experiment 2

SUFISA

- Heterogeneous Preferences: (latent class model)

ATTRIBUTES	Group 1: 42%	Group 2: 28%	Group 3: 16%	Group 4: 14%
INTERMEDIARY	INTERMEDIARY		NO INTERMEDIARY	
TIMING				AFTER HARVEST
PRICE POOLING		NO PRICE POOLING		
PRICE VOLATILITY	MEDIUM			
AVERAGE PRICE/KG	+++	+		+

Preferences for Contracts: Results

Experiment 2

SUFISA

- Heterogeneous Preferences: (latent class model)

ATTRIBUTES	Group 1: 42%	Group 2: 28%	Group 3: 16%	Group 4: 14%
INTERI				
TIMIN				ARVEST
PRICE				
PRICE				
AVERA				

➢ **All producers dislike high price volatility**

Preferences for Contracts : Results

Experiment 2

SUFISA

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INTERI				
TIMIN				ARVEST
PRICE				
PRICE				
AVERA				

- **All producers dislike high price volatility**
- **Some like medium price volatility**
- **but some dislike it = the price poolers (30%), who are also more loss-averse**

Preferences for Contracts : Results

Experiment 2

SUFISA

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ATTRIBUTES	Group 1: 42%	Group 2: 28%	Group 3: 16%	Group 4: 14%
INTERI				
TIMIN				ARVEST
PRICE				
PRICE				
AVERA				

- **All producers dislike high price volatility**
- **Some like medium price volatility**
- **but some dislike it = the price poolers (30%), who are also more loss-averse**
- **Farmers producing high quality and/or new cultivars want to stay free in their marketing options**

Lessons Learned and Recommendations

Policy Implications:

1. Heterogeneity exists in an important way: Preferences vary within and between population
2. Evidence-based policy: ex-ante and ex-post analysis of what works and why?

Lessons learned and recommendations

Research Recommendations:

1. Data collection:
   1. a lot of data is currently not used
   2. First-hand data should target questions that can not be studied with secondary-hand data, with innovative analysis, beyond description
2. Representativeness of the sample, at all levels, is key
3. Combination of Theory – Observational Data – Experiments: well-documented descriptive work + model + impact assesment + mechanisms thinking
4. Systematic replication of experiments for evidence-based policy (www.reecap.org)

Thank You

Questions?

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Eewoud Lievens – Erik Mathijs