Latent farmer groups in yield insurance markets and implications for policy measures

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Outline

- Introduction: Finland & CAP, idea of the paper
- Data and methods: survey, weather data, stated preferences, latent class
- Results: latent farmer groups based on deductible, scale and insurance type
- Conclusions: main results and implications for policy measures

Finland, CAP

- Guiding rules in EU are given in Rural Development Support articles 36-39. -> Common rules but lot of heterogeneity in implementation.

  -> Risk management is not implemented in Finnish Rural Development program.
- In Finland we used to have Crop Damage Compensation (CDC) scheme (no premiums, ad hoc, mix of farm and index insurance).
  - CDC was terminated at the end on 2015.
- Currently Finnish government doer not contribute to yield damages, but we have some new schemes provided by private insurance companies.

- In Finland we have a lacking culture on yield insurances, conformed with serious knowledge gaps in development and administration of such insurances and subsidies related.

Idea of the paper

- Decoupled income support is preferred in the EU Common Agricultural Policy CAP. Policies support all farms in the same way despite farmers' yield risks and preferences

→ Deductible, scale (and insurance type ?) are fixed in current EU legislation.

→ Finnish government's focus has shifted to the catastrophic assistance as "one size fits all" policy.

- However, there is spatial variation in the probabilities of unfavourable weather conditions.

→ We hypothesised that this variation also leads to spatial variation in farmers' preferences for yield insurance attributes.

Data

- Existing markets are thin → no data → we have to great hypothetical markets.
- The choice experiment survey was conducted.
- The survey was sent to a total of 5,000 farmers in Finland.
- Respondents were shown six crop insurance product cards. Each choice card presented two different crop insurance products with varying attributes + “no buy” option.
- The farmers were asked to select the most suitable crop insurance product for them.
- In the survey we tested price anchoring, and only small proportion of the data is usable for this analysis n= 306.

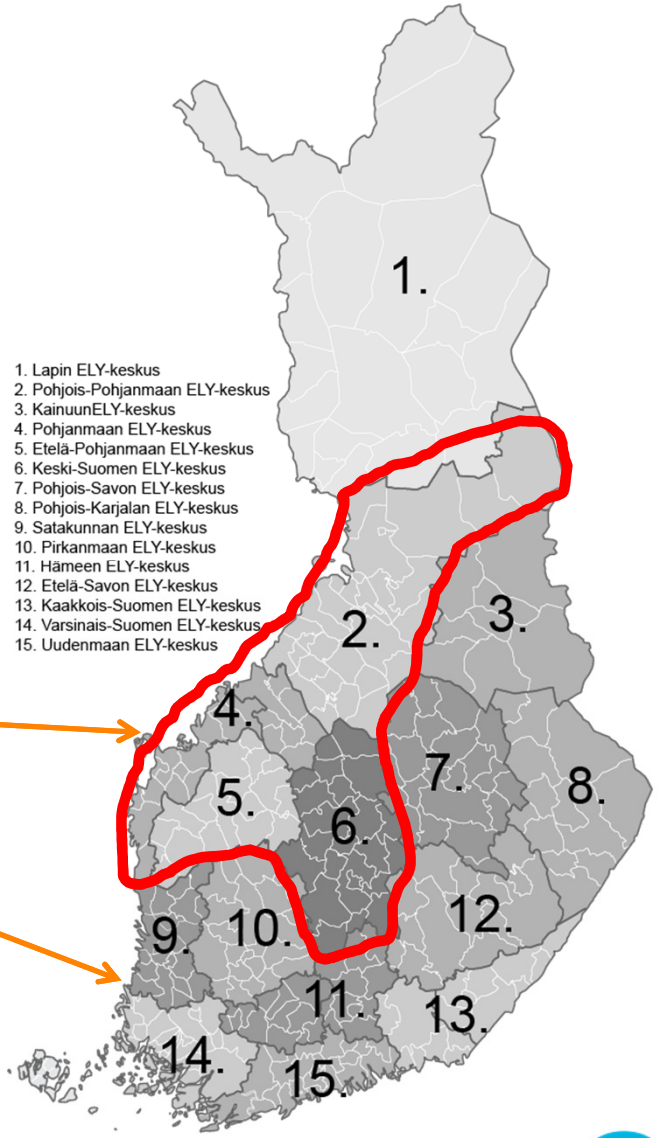
Choice card

INSURANCE CARD 1	**Insurance 1**	**Insurance 2**	**No buy**	**levels**
Insurance premium €/hectare	12	16	**I would not purchase insurance**	€4–32/ha
Deductible	20%	20%		10%, 20%, and 30%
Insurance type	Yield index insurance, farm inspection is not needed.	Farm yield insurance, inspection of loss at the farm is needed.		farm yield yield index
Expected compensation €/hectare	300	600		€100/ha €300/ha €600/ha
MY CHOICE	□	□	□	

Data on weather risks

- Weather-based yield risks have been mapped in Finland in several studies (Peltonen-Sainio 2016).

- Based on weather data, we grouped ELY regions in high weather risk zones into one subgroup “risky” and the rest of the regions into another subgroup “other”.



Methods

- Stated preferences, choice experiment
- Latent class model, maximum likelihood + iterations based on number of class
- Number of classes is based on AIC and BIC.
- The farmer classes were determined purely based on the choices made by the individuals in the choice experiment.
- Choice models measured utility, thus coefficients are not interpretable in economic terms, despite their signs.
- Class specific implicit prices for attributes are calculated as,

$$IP_k = -\left(\frac{\beta_k}{\beta_p}\right)$$

where β_k is the parameter of *k*th attribute, and β_p is the parameter of price coefficient.

Results

Model for Choices, subgroup "risky"	Farmer group 1	Farmer group 2	Farmer group 3	Overall	
R^2	0.3441	0.1781	0.2290	0.5394	
$R^2(0)$	0.4286	0.9089	0.3415	0.6052	
size	0.38	0.36	0.26		
Attributes				Wald p-value	Wald* p-value
Reference level	0	0	0		
1	-1.9677	-1.9703	0.2523	0.14	0.14
2	-1.7742	-3.0339	0.0195		
3	3.7419	5.0041	-0.2328		
Price	-0.0895	-0.5149	-0.0730	<0.001	0.44
Deductible	-4.6205	-6.6460	-2.3728	0.03	0.74
Scale	0.0045	0.0042	0.0041	<0.001	0.97
Insurance type (farm insurance =1)	1.0084	0.3402	-0.4860	0.03	<0.01

Model for Choices, subgroup "other"	Farmer group 1	Farmer group 2	Farmer group 3	Farmer group 4	Overall	
R^2	0.0032	0.4901	0.3932	0.4985	0.6241	
$R^2(0)$	0.8222	0.5504	0.4698	0.6252	0.6625	
size	0.36	0.33	0.24	0.08		
Attributes					Wald p-value	Wald* p-value
Reference level	0	0	0			
1	-2.4022	-1.7492	-1.5337	5.6138	<0.001	<0.001
2	-2.4006	-1.6350	-1.2076	5.6004		
3	4.8028	3.3842	2.7413	-11.2141		
Price	-0.0079	-0.241	-0.0508	-0.2665	<0.001	<0.001
Deductible	-4.660	-5.6306	-5.9889	7.0988	<0.001	<0.001
Scale	0.0005	0.0080	0.0061	0.0008	<0.001	<0.001
Insurance type (farm insurance =1)	-0.0719	-0.6816	-0.2903	0.6686	0.33	0.39

Wald p-values indicate that the attributes are jointly significant

Wald* p-values show that insurance attribute is farmer group dependent.

Results confirm that farmers do not have uniform preferences for yield insurance attributes.

Farmers' preferences vary between regions formed based on weather risks for arable farming.

Results, coefficients signs by farmer groups (FG)

Model for Choices, **subgroup "risky"**	FG 1 (38%)	FG 2 (36%)	FG 3 (26%)
Price	-	-	-
Deductible	-	-	-
Scale	+	+	+
Insurance type (farm insurance =1)	+	+	-

Model for Choices, **subgroup "other"**	FG 1 (36%)	FG 2 (33%)	FG 3 (24%)	FG 4 (8%)
Price	-	-	-	-
Deductible	-	-	-	+
Scale	+	+	+	+
Insurance type (farm insurance =1)	-	-	-	+

Implicit prices, farmer groups (FG), area “risky”

- Implicit prices (IP) are the marginal rates of substitution between price and product attributes.
- Implicit prices provide some guidelines for the labeling of latent farmer groups revealed by the estimation.

IP (€/ha)	FG 1 (38%)	FG 2 (36%)	FG 3 (26%)
Deductible (+10%)	-5.2	-1.3	-3.3
Scale (+ €100/ha)	5.0	3.8	5.6
Insurance type (farm insurance =1)	11.2	0.7	-6.6

Implicit prices, farmer groups (FG), area “other”

IP (€/ha)	FG 1 (36%)	FG 2 (34%)	FG 3 (24%)	FG 4 (8%)
Deductible (+10%)	-59.0	-2.3	-11.8	2.7
Scale (+ €100/ha)	6.3	3.3	12.0	0.3
Insurance type (farm insurance =1)	*-9.1*	*-2.8*	*-5.7*	2.5

Conclusions, main results

- The analysis revealed:
  - Several homogeneous groups that differ significantly from each other.
  - Weather risks seems to affect Farmers' preferences for yield insurances
    - If weather-induced risks are high, farmers could be clearly divided into those who prefer farm insurance and to those who prefer index insurance.
    - index insurance is largely preferred in other areas.

Conclusions, implications for policy measures

- Important policy issue in the EU is the implementation (rules related to insurance attributes) of risk management tools in Rural Development Programmes.

- EU is keeping insurance types (farm-based insurance and index insurance) open and both types eligible to premium subsidies?
  - Based on our results, this flexibility seems well justified.

- EU regulations are not sufficiently flexible to take into account the differing needs of farmers for agricultural risk management in terms of insurance deductible.
  - Only small proportion of farmer (1/3 ?) would be interested on insurances currently defined eligible for premium subsidies.

Thank you!

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WTP example

- WTP estimates are calculated by multiplying attribute levels with implicit prices and summing these intermediate scores up to the insurance product level.
- Insurances:
  - **(1) Index insurance, deductible 30% and scale €300/ha**
  - **(2) Index insurance, deductible 20% and scale €500/ha**

"Risky" WTP (€/ha)	Shallow farm loss protector	Catastrophe dodger	Average farmer
1	-0.6	-1.5	6.9
2	14.6	16.4	21.2

"Other" WTP (€/ha)	Full-cover seekers	Catastrophe dodger	Balance sensitive	Irrational
1	-158.1	3.0	0.6	8.7
2	-86.5	11.9	36.4	6.9