

SUSTAINABLE RESILIENT EU FARMING SYSTEMS

# Risk, risk management and resilience in European agriculture

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SUSTAINABLE RESILIENT EU FARMING SYSTEMS

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### Resilience

SURE-Farm defines resilience as:

Maintenance of the essential functions of farming systems in the face of increasingly complex and volatile economic, environmental, social and institutional challenges through capacities of robustness, adaptability and transformability (Bullock et al., 2017).

- Focusses on dynamics of a system
- Is an elusive concept that needs context
- Resilience is (unfortunately) the new sustainability





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Bullock, J. M., Dhanjal-Adams, K. L., Milne, A., Oliver, T. H., Todman, L. C., Whitmore, A. P., & Pywell, R. F., (2017) Resilience and food security: rethinking an ecological concept. Journal of Ecology, 105(4), 880-884.



#### **Resilience framework**



# Main adaptive cycles and interwoven processes



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Meuwissen, M. ... **de Mey, Y.** ... Finger, R., ... et al., (2018) Report on resilience framework for EU agriculture. Deliverable 1.1, SURE-Farm.



#### **Resilience of what?**



#### **Selection criteria:**

Actors that influence farms and are influenced by farms

Actors that influence the farming system but are marginally influenced by the system

Actors that neither directly influence the farming system, nor are directly influenced by the system



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#### **Resilience to what?**

	Short-term shocks	Long-term challenges
Environmental	<ul> <li>Extreme weather events</li> <li>Epidemic disease outbreak</li> <li>Hail, frost</li> </ul>	<ul> <li>Climate change</li> </ul>
Social		<ul> <li>Changing societal concerns</li> <li>Increasing urbanisation</li> </ul>
Economic	<ul> <li>Price drops</li> <li>Food or feed safety crisis</li> <li>Personal hazards (illness, death)</li> </ul>	<ul> <li>Upstream and downstream market power along the value chain</li> <li>Increasing dependence on non-farm land owners</li> </ul>

Both @ micro scale (idiosyncratic risks) and @ macro scale (systemic risks)



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### **Resilience to which purpose?**





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### **Resilience analysis in four steps**





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#### **Understanding robustness**

How well can shocks be absorbed and how fast is recovery?





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### **Understanding adaptability**

How easy is it to adjust or change, while still maintaining essential functions?



#### – – Continuing important system functions



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### **Understand transformability**

How easy is a radical transformation or reorganisation?





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#### **Resilience framework**



interwoven processes



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### Analyse risk

Digitization of agriculture has tremendous opportunity to characterize risk

- Various sources of risk and their interdependency
- Regional level > Farm level > Plot (herd) level > m<sup>2</sup> (animal) level
- Historical data to real-time data





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Pciture credit: <u>http://english.gov.cn/news/photos</u>; EIP-Agri Brochure and ag-analytics.org







This Project has received funds form the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520 Wauters, E., Van Winsen, F., **de Mey, Y**., & Lauwers, L. (2014). Risk perception, attitudes towards risk and risk management: evidence and implications. *Agricultural Economics–Czech*, *60*(9), 389-405.



#### Farmers' subjective impact when shocks occur

	Type of shock								
	weather	pests	prices	costs	margin	policy	land	personal	subsidy
All farms	3.56	3.63	4.15	4.05	4.08	3.83	3.77	3.69	3.59
Typology									
Arable farms	3.79	3.51	4.02	4.05	4.00	3.86	4.07	3.74	3.95
Greenhouse growers	3.58	3.75	4.29	3.88	4.04	3.67	3.18	3.47	3.04
Horticulture	3.78	3.47	4.13	3.84	3.94	3.55	3.41	3.69	2.78
Fruit and orchards	4.31	3.25	4.27	3.88	3.96	3.58	3.37	3.54	2.73
Dairy farms	3.60	3.67	4.08	4.00	4.01	3.76	4.06	3.68	4.00
Beef farms	3.47	3.90	4.13	4.10	4.23	3.92	4.06	3.92	4.22
Mixed cattle	3.43	3.75	4.03	4.17	4.19	3.97	4.06	3.64	4.42
Pig farms	3.04	3.74	4.36	4.39	4.22	3.89	3.88	3.80	3.30
Mixed crop-livestock farms	3.66	3.59	4.11	3.98	4.11	4.03	3.89	3.78	4.05
Size class									
Small	3.52	3.56	4.07	3.95	4.01	3.84	3.71	3.78	3.72
Medium	3.71	3.68	4.19	4.13	4.12	3.84	3.82	3.70	3.68
Large	3.44	3.62	4.18	4.06	4.09	3.84	3.75	3.63	3.41



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#### Farmers typically select a portfolio of risk management techniques



*Likert scale items, black lines indicate standard errors* 



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#### Farmers typically select a portfolio of correlated risk management techniques

	Buffer	Avoid	Cutting	Hard work	Prod. Div.	Contract	Insur.	Optim.	Enlarge	Income Div.	Off-farm
Buffer	1.00										
Avoid loans	0.13	1.00									
Saving on private	0.10	0.21	1.00								
Hard work	0.04	0.08	0.38	1.00							
Prod. Div.	0.06	0.10	0.07	0.07	1.00						
Contracts	-0.02	0.02	0.02	0.07	0.11	1.00					
Insurances	-0.09	-0.01	0.17	0.12	0.06	0.16	1.00				
Invest. Techn.	0.09	-0.05	0.11	0.18	0.23	0.10	0.12	1.00			
Enlarge	0.04	-0.17	0.04	0.20	0.19	0.10	0.16	0.46	1.00		
Income Div.	-0.07	0.02	0.00	0.01	0.38	0.12	0.16	0.04	0.03	1.00	
Off-farm	-0.07	0.20	0.10	0.06	0.02	0.11	0.13	-0.07	-0.05	0.22	1.00



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But, understanding how these insights shape risk perceptions and lead to farm decision making under risk is crucial as well





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#### btai ทอนระกอเน การก



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de Mey, Y., Wauters, E., Schmid, D., Lips, M., Vancauteren, M., & Van Passel, S. (2016). Farm household risk balancing: empirical evidence from Switzerland. *European Review of Agricultural Economics*, 43(4), 637-662.



isk



### **Designing/promoting optimal risk management tools**

- The European Commission relies on four groups of instrument to increase the resilience of European agriculture:
  - 1. Direct payments
  - 2. Rural development programs
  - 3. Risk transfer instruments (e.g. crop insurance, mutual funds, IST)
  - 4. Market management measures
- Difficult task for farmers/policy-makers to strike the right balance between risk management instruments that enable robustness, adaptability and transformability
- Devoting too much attention/resources to robustness may reduce possibilities for adaptation and change, while exclusive attention to longterm transformation may neglect functionalities of well-performing systems



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SURE-Farm consortium (2018) Policy brief on resilience framework, scenarios and farm typology.



### **Designing/promoting optimal risk management tools**

#### Robustness

- It can build on individual or collective resources, capacities and flexibility
- Access to information, novel insurance schemes, savings schemes, IST

#### Adaptability

- While adaptation can occur very quickly, building up adaptive capacities requires a medium-term strategy
- Well-functioning innovation system (training, research and technology)
- Precision agriculture, (climate)smart farming

#### Transformability

- Transformations imply new business models and a fundamental change in the way goods and services are produced, financed or marketed.
- Requires long-term strategies and substantial structural changes
- Vertical farming, highly diverse and pluriactive farm



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### **Designing/promoting optimal risk management tools**





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### **Conclusion / Key messages**

- Resilience = Robustness, Adaptability and Transformability
- Various sources of risk are the underlying challenges
- Risk management is a key process in fostering resilience
- Risk management tools should enable not just robustness, but also adaptability and transformability
- Digitization and innovation in agriculture has a tremendous opportunity to support risk analysis and designing optimal risk management portfolios
- A good understanding of farm risk behaviour is a crucial component



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## Thank you!

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