Synthesis of solutions in relation to counterfactual related challenges from ENVIEVAL case studies

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Quick outline

- **Counterfactuals and sample selection**

- **Options to construct a counterfactual**

- **Four examples**

- **Key messages**

Reminder on counterfactuals

- **Not** a method

- A change requires something to base the change on, i.e.
  a point of comparison

- **All** evaluations include a counterfactual
  – acknowledged or implicit, it is there

- Aim to understand and define the point of comparison well

Sample selection

Participant vs. non-participant

MAY NOT
ACT ALIKE
(OVER TIME)
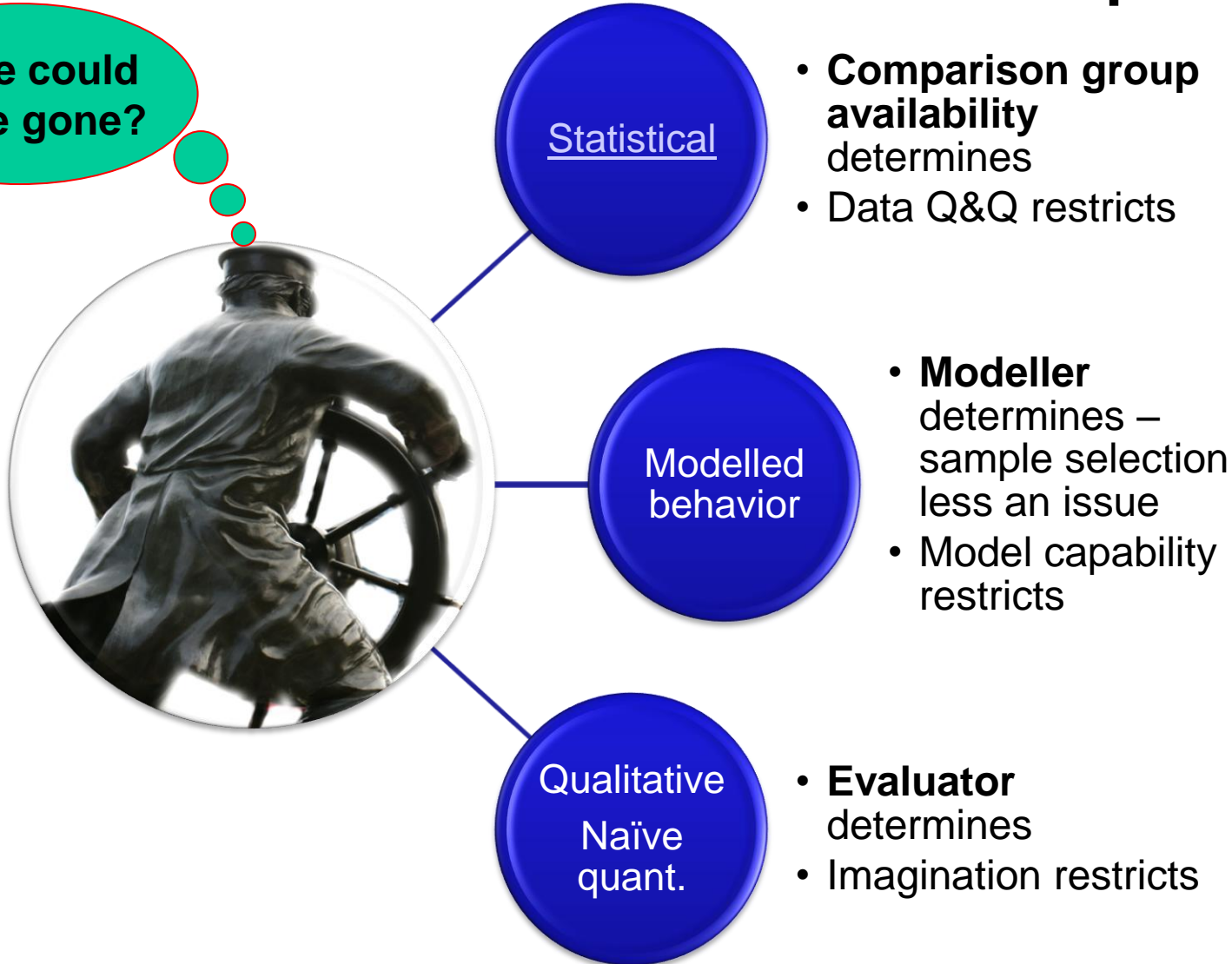
Why?

External and internal factors at farm level

Targeted measures

… … …

Counterfactual – a choice of three options

Where could I have gone?

Statistical

- **Comparison group availability** determines
- Data Q&Q restricts

Modelled behavior

- **Modeller** determines – sample selection less an issue
- Model capability restricts

Qualitative

Naïve quant.

- **Evaluator** determines
- Imagination restricts

Hungary: Biodiversity: Wildlife (1)

Before/After

Challenge

Evalua

Indicat

Baseline: - = lost over time

Partial participation: - = lost

Near full participation: - = no loss

Counte **er time**

Sample selection: Cannot determine **why** larger AEM area occurs
→ **Assume** non-participant indicator change as baseline trend

Macro: AEM **maintained** biodiversity at quadrate level (1999-2014)
Micro: Naturalness plays a **larger role** than AEM in terms of the number of bird species found at survey spots (2009-2014)

Hungary: Biodiversity: Wildlife (2)

Issues:
1. Linking **farm-level data** to indicator data **challenging**
2. External factors: annual **weather variability**

Keys to success and workarounds:
1. Long-term spatial **data available**
2. **Spatial analyses:**
    linking indicator values and area participation rate
    taking an **external factor into account** (naturalness)

Italy: Biodiversity: HNV(1)
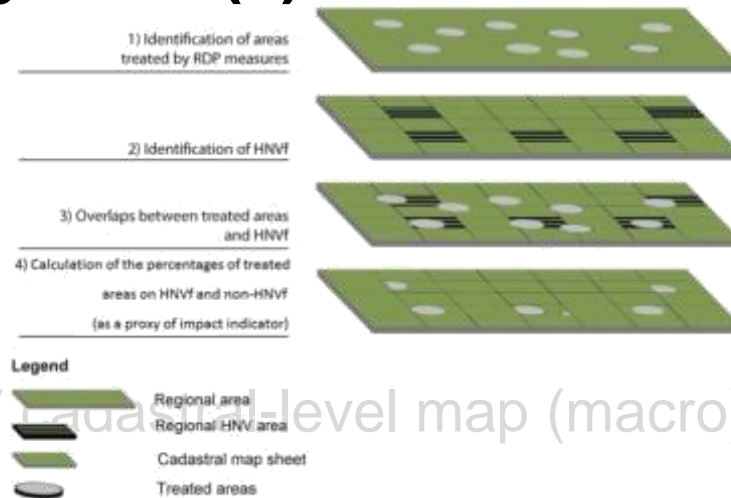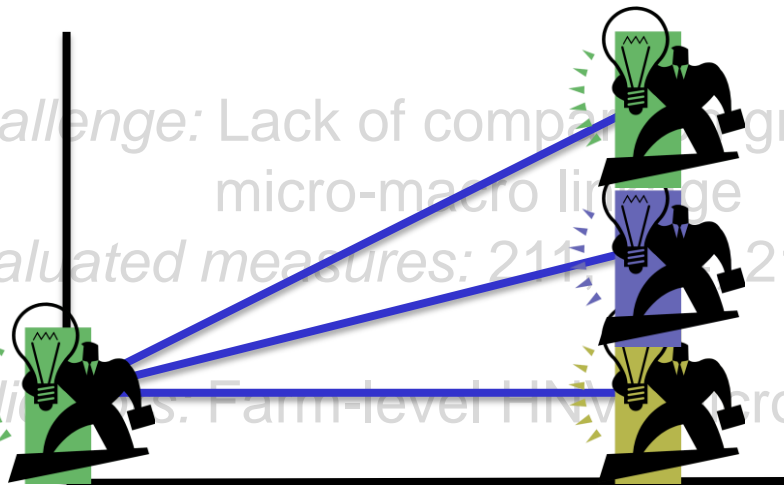
Challenge: Lack of comparison groups, micro-macro linkage

Evaluated measures: 211, 214, 216, 221

Indicators: Farm-level HNV (micro), HNV cadastral-level map (macro)

Counterfactual: Participation **rate** comparison **groups on cadastral map level** (macro), farm level **before-and-after** for participants (micro)

Sample selection: non-participant data **unavailable** (micro), not covered (macro)

Macro: UAA/HNV high for 214/E (restoration and maintenance of grasslands) and 211. Most area on the plains, highest values at mountains
Micro: Participating 211, 214 indicate higher HNV score among RDP participants (2008-2013). RDP participation + HNV share increase

Italy: Biodiversity: HNV (2)

Issues:
1. Participant farm **observations insufficient** for statistical analysis
2. HNV maps are **not updated** regularly with sufficient detail:
   a before-and-after comparison was not possible in macro
3. Impossible to **distinguish** sub-measure participation from FADN
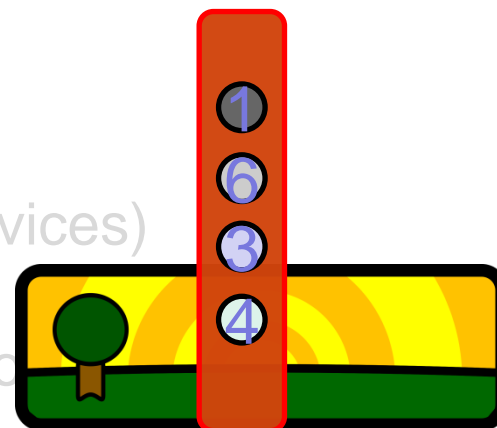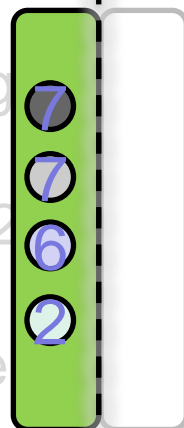
Workarounds:
1. Evaluate impact differences **among** participants (micro)
2. Think using **inter-regional samples** with similar RDP for macro?

Germany: Water quality (1)

Challenge: Lack of comparison g

Evaluated measure: 214, 114, 32 (isory services)

Indicator: Gross nce en (micro

Counterfactual: Participants vs. non-participants from **another area** (micro)

Sample selection: **Explicitly covered** using propensity score matching, similar participant and non-participant farms matched

Micro: Depending on non-participant data source and matching, AEMs may have had a decreasing effect on GNB.

Germany: Water quality (2)

Issues:

1. Merging non-participants from alternate data sources may be problematic - data comparability and reliability **limited**
2. Sufficient data available for PSM, but was it enough?
   Poor explanatory power but better than naïve guess.

Workarounds:

1. Use many non-participant data sources, they were there

Italy: Climate stability (1)

Challe... ...icators

Evalua... ...14, 216 ...nv.),
121 ...
Indica... ...tprint – process level (micro)
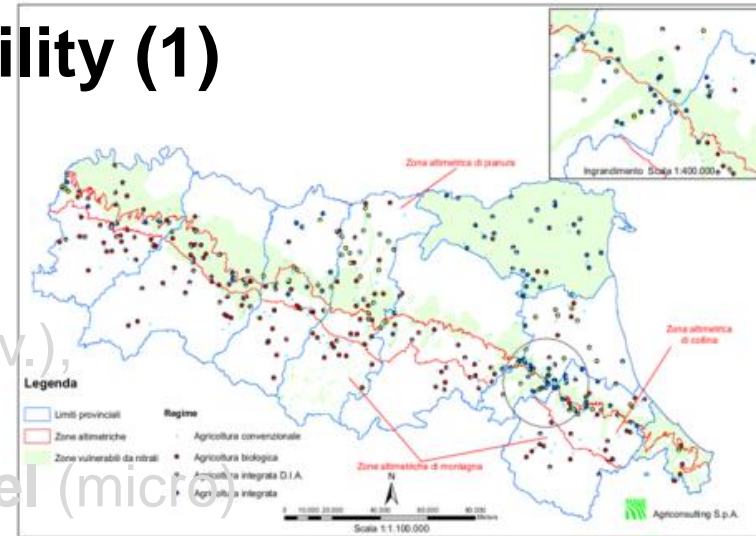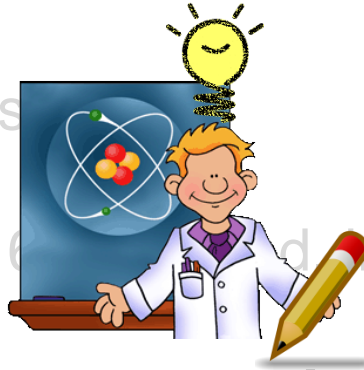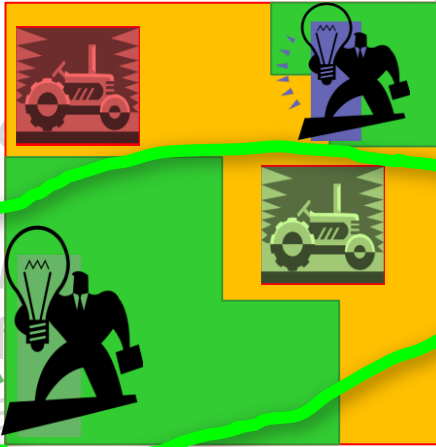
Counterfactual: Participant vs. non-participant comparison (micro)

Sample selection: Expert determined sampling, not fully covered

Micro: Organic management has lower emissions per hectare compared to Integrated and Advanced Integrated management (2009-2011)

Italy: Climate stability (2)

Issues:
1. The Carbon Footprint requires details on farming practices and management only available through **additional ad-hoc surveys**.
2. Data exists for only **one point in time** and had **difficult access** due to administrative reasons and poor data storage structure.

Workaround:
1. Use experts to determine which observational units are comparable - spatial neighborhood helps covering external factors

Key messages

General findings

Spatial data allows estimating environmental impact

Area-based impacts vs. participation ratio is a jump forward…

… but causes problems in covering sample selection

Covering sample selection requires better links

Participation explaining factors tied to farm-level

Environmental impact often at another, larger level

Proxy indicators (partially) available at farm-level

WORK REMAINS, YET…

No excuse for aggregate comparisons…

… workarounds are many in form!

1. Cover sample selection through expert sampling
2. Switch methods to less data demanding ones
3. Switch to macro-level assessment, enlarge study areas
4. Use one point in time instead of before-and-after data
5. Compare participant sub-groups
6. Use other data
   - alternate indicators
   - 3rd party data, much exists
   - older data with similar conditions
   - alternate data sources for non-participants

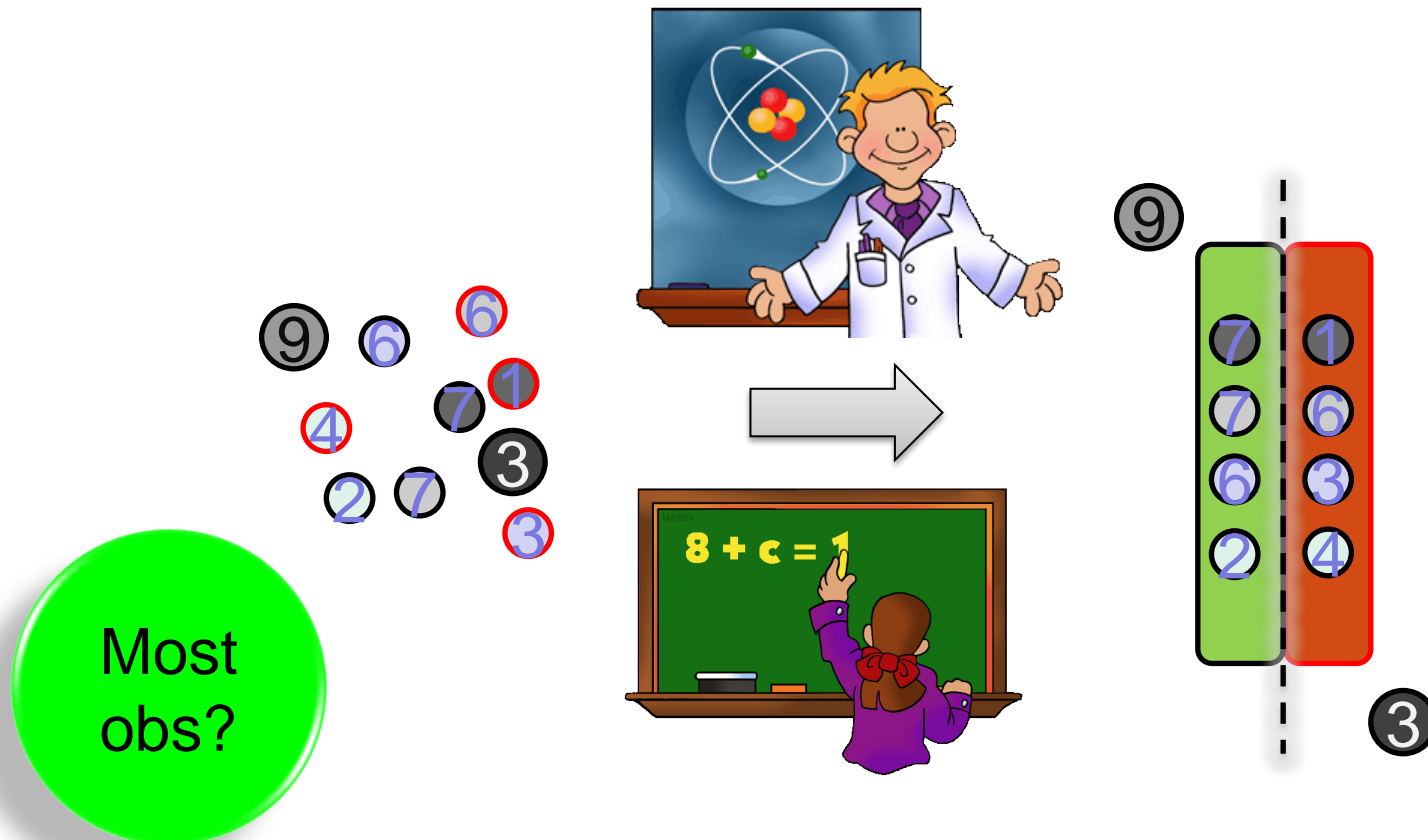# How much can we do with current data?

A LOT

– Linking, collecting, recognizing, and accessing the right data
  - Data to understand reasons for participation AND non-part.
  - Timing the data collection AND access to suit evaluation

Thank you!

Propensity score matching

Most obs?

With severe sample selection, PSM may not work - you need identifiable, similar participants and non-participants

Sample selection
ATT/ATE

Participant

Non-participant

Mr. Elusive