gef IEO Independent Evaluation Office
GLOBAL ENVIRONMENT FACILITY

# QUALITATIVE COMPARATIVE ANALYSIS

## WHAT, WHY, HOW, AND UNDER WHAT CONDITIONS

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# WHAT IS QCA?

- method to systematically compare cases and find common patterns using set theory/ Boolean algebra
  - bridges qualitative and quantitative analysis
  - has roots in social science research (developed by Ragin in 1987), first used in evaluation by Befani, Lederman and Sager (2007)
  - answers the question: what combination/s of factors lead to a specific outcome? More specifically:
    - Are any factors necessary and/or sufficient for an outcome?
    - Are any factors necessary for a combination to be sufficient?
    - What works, why, and under what conditions?

# THE USUAL QUANTITATIVE METHODS

- Statistics is based on the probability of something being true based on frequency of occurrence
  - typically tries to reduce a large population into a single number to "summarize" a particular characteristic that is then easy to compare with another population
  - if sample size is small, or samples quantitatively not very different, result will be "no significant difference" = "unable to assess"
  - multivariate statistics (e.g. regression, clustering, PCA) still focus *mostly* on degrees of influence of individual variables rather than on interaction effects
- Experimental/ quasi-experimental evaluation aims to isolate the effect of a specific variable
  - to test effects of multiple "treatments", a comparable group for each combination of treatments has to be set up
  - "with" and "without" groups have to be as identical as possible (or are assumed to be)

# WHAT QCA IS USEFUL FOR

- Fills the gap of the "no man's land" of 5 to 30 cases
  - Too many for case study approaches to "fit in one's head", too few for statistical analyses
  - Developments in technology make large sample size no longer an issue
- Generalizes across a specific set of cases while preserving nuances of each case
- Makes explicit the theoretical assumptions between causes and effects
- Allows testing and refining of different hypotheses on the same set of cases
- Uncovers multiple causal pathways in complex systems
- For impact evaluation: built-in counterfactual analysis when comparing cases

# BASIC STEPS

1. Identify the outcome of interest and cases that exhibit this outcome.
2. Identify cases where the outcome was expected, but did not happen.
3. Identify the streamlined causal factors/ "recipes" that might lead to the outcome (detailed theories of change).

# STEPS 1 AND 2

- OUTCOME: Mass protest against austerity measures mandated by IMF as conditions for debt renegotiation
- Positive cases – e.g. Peru, Argentina, Tunisia
- Negative cases *(debtor countries but no mass protest = outcome could be expected but did not happen)* – e.g. Mexico, Costa Rica

# STEP 3

- Some relevant causal factors
  - Severity of austerity measures, degree of debt, living conditions, consumer prices, prior levels of political mobilization, government corruption, trade dependence, investment dependence, urbanization
  - Streamlining: high levels of trade dependence OR high levels of investment dependence are manifestations of international economic dependence → combine two factors as one
  - One causal recipe: severe austerity measures*government corruption, rapid consumer price increases*high level of prior mobilization = mass protest

# BASIC STEPS

4. Collect consistent data on most relevant factors, and define scoring criteria for each factor and outcome.
5. Construct a truth table with most probable "recipes" to map out cases with comparable data and see patterns.
6. Identify cases with similar combination of factors but different outcomes. Resolve contradictions using in-depth case knowledge, revising scores and factors, or excluding cases as appropriate.

| ROW | Prior Mobilization | Severe austerity | Corrupt govt | Rapid price rise | *Cases w/ Protest* | *Cases w/o Protest* | *Consistency* |
|---|---|---|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 | 0 | 0 | ?? |
| **2** | 0 | 0 | 0 | 1 | 0 | 0 | ?? |
| **3** | 0 | 0 | 1 | 0 | 0 | 4 | 0.0 |
| **4** | 0 | 0 | 1 | 1 | 1 | 5 | 0.167 |
| **5** | 0 | 1 | 0 | 0 | 0 | 0 | ?? |
| **6** | 0 | 1 | 0 | 1 | 4 | 0 | 1.0 |
| **7** | 0 | 1 | 1 | 0 | 0 | 0 | ?? |
| **8** | 0 | 1 | 1 | 1 | 5 | 0 | 1.0 |
| **9** | 1 | 0 | 0 | 0 | 0 | 3 | 0.0 |
| **10** | 1 | 0 | 0 | 1 | 1 | 7 | 0.125 |
| **11** | 1 | 0 | 1 | 0 | 0 | 10 | 0.0 |
| **12** | 1 | 0 | 1 | 1 | 0 | 0 | ?? |
| **13** | 1 | 1 | 0 | 0 | 1 | 5 | 0.167 |
| **14** | 1 | 1 | 0 | 1 | 6 | 0 | 1.0 |
| **15** | 1 | 1 | 1 | 0 | 6 | 2 | 0.75 |
| **16** | 1 | 1 | 1 | 1 | 8 | 0 | 1.0 |

| ROW | Prior Mobilization | Severe austerity | Corrupt government | Rapid price rise | *Cases w/ Protest* | *Cases w/o Protest* | *Consistency* |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | ?? |
| 2 | 0 | 0 | 0 | 1 | 0 | 0 | ?? |
| 3 | 0 | 0 | 1 | 0 | 0 | 4 | 0.0 |
| 4 | 0 | 0 | 1 | 1 | 1 | 5 | 0.167 |
| 5 | 0 | 1 | 0 | 0 | 0 | 0 | ?? |
| 6 | 0 | 1 | 0 | 1 | 4 | 0 | 1.0 |
| 7 | 0 | 1 | 1 | 0 | 0 | 0 | ?? |
| 8 | 0 | 1 | 1 | 1 | 5 | 0 | 1.0 |
| 9 | 1 | 0 | 0 | 0 | 0 | 3 | 0.0 |
| 10 | 1 | 0 | 0 | 1 | 1 | 7 | 0.125 |
| 11 | 1 | 0 | 1 | 0 | 0 | 10 | 0.0 |
| 12 | 1 | 0 | 1 | 1 | 0 | 0 | ?? |
| 13 | 1 | 1 | 0 | 0 | 1 | 5 | 0.167 |
| 14 | 1 | 1 | 0 | 1 | 6 | 0 | 1.0 |
| 15 | 1 | 1 | 1 | 0 | 6 | 2 | 0.75 |
| 16 | 1 | 1 | 1 | 1 | 8 | 0 | 1.0 |

Perfect consistency!

# STEP 6

- Possible combinations but not observed in any case sampled = ??
- Contradictory combinations = between 0 and 1
  - 0.5 = perfect inconsistency → some other factor might be making the difference or factors are not that relevant
- Three unexpected positive cases (rows 4,10, 13) are spillovers of sympathy for neighboring countries → irrelevant to this recipe, so can be taken out
- Two unexpected negative cases (row 15) have very repressive regimes → add "repressive regime" as factor and revise truth table

# Revised truth table → no inconsistencies

| Prior Mobilization | Severe austerity | Corrupt government | Rapid price rise | Non-repressive regime | ***Cases w/ Protest*** | ***Cases w/o Protest*** | *Consistency* |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 | 0 | 4 | 0.0 |
| 0 | 0 | 1 | 1 | 0 | 0 | 5 | 0.0 |
| 0 | 1 | 0 | 1 | 0 | 4 | 0 | 1.0 |
| 0 | 1 | 1 | 1 | 1 | 5 | 0 | 1.0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0.0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 7 | 0.0 |
| 1 | 0 | 1 | 0 | 0 | 0 | 10 | 0.0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 5 | 0.0 |
| 1 | 1 | 0 | 1 | 0 | 6 | 0 | 1.0 |
| 1 | 1 | 1 | 0 | 1 | 6 | 0 | 1.0 |
| 1 | 1 | 1 | 0 | 0 | 0 | 2 | 0.0 |
| 1 | 1 | 1 | 1 | 1 | 8 | 0 | 1.0 |

# BASIC STEPS

7. Using the software, simplify combinations of factors through paired case comparisons and theoretical combinations (?? = not represented by actual cases).
8. Software will generate smaller set of simpler combinations with positive outcome. Evaluate resulting combinations against cases and existing theories for consistency, new insights, etc.
9. Revise factors, outcome and scores as needed through further within-case analysis, especially after investigating "deviant" cases.

# STEP 7

| Prior Mobilization | Severe austerity | Corrupt government | Rapid price rise | Non-repressive regime | OUTCOME |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 0 | 1 | I |
| 1 | 1 | 1 | 1 | 1 | I |

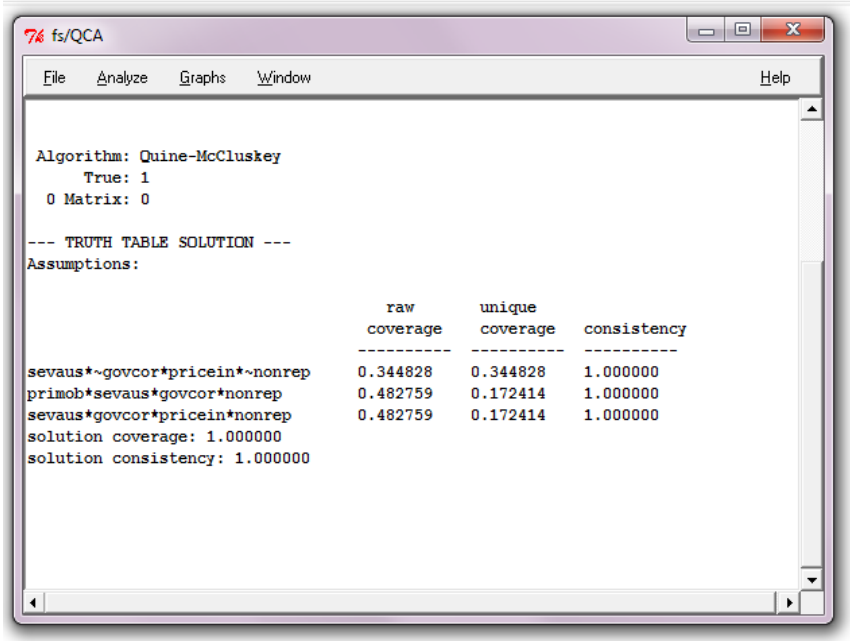
Counterfactual analysis!

→ can eliminate "Rapid price increase" in one combination

| Prior Mobilization | Severe austerity | Corrupt government | Rapid price rise | Non-repressive regime | OUTCOME |
|---|---|---|---|---|---|
| 0 | 1 | 0 | 1 | 0 | I |
| 0 | 1 | 1 | 1 | 0 | ?? → Change to I |

*Is a corrupt government more likely to result in protest or no protest?*

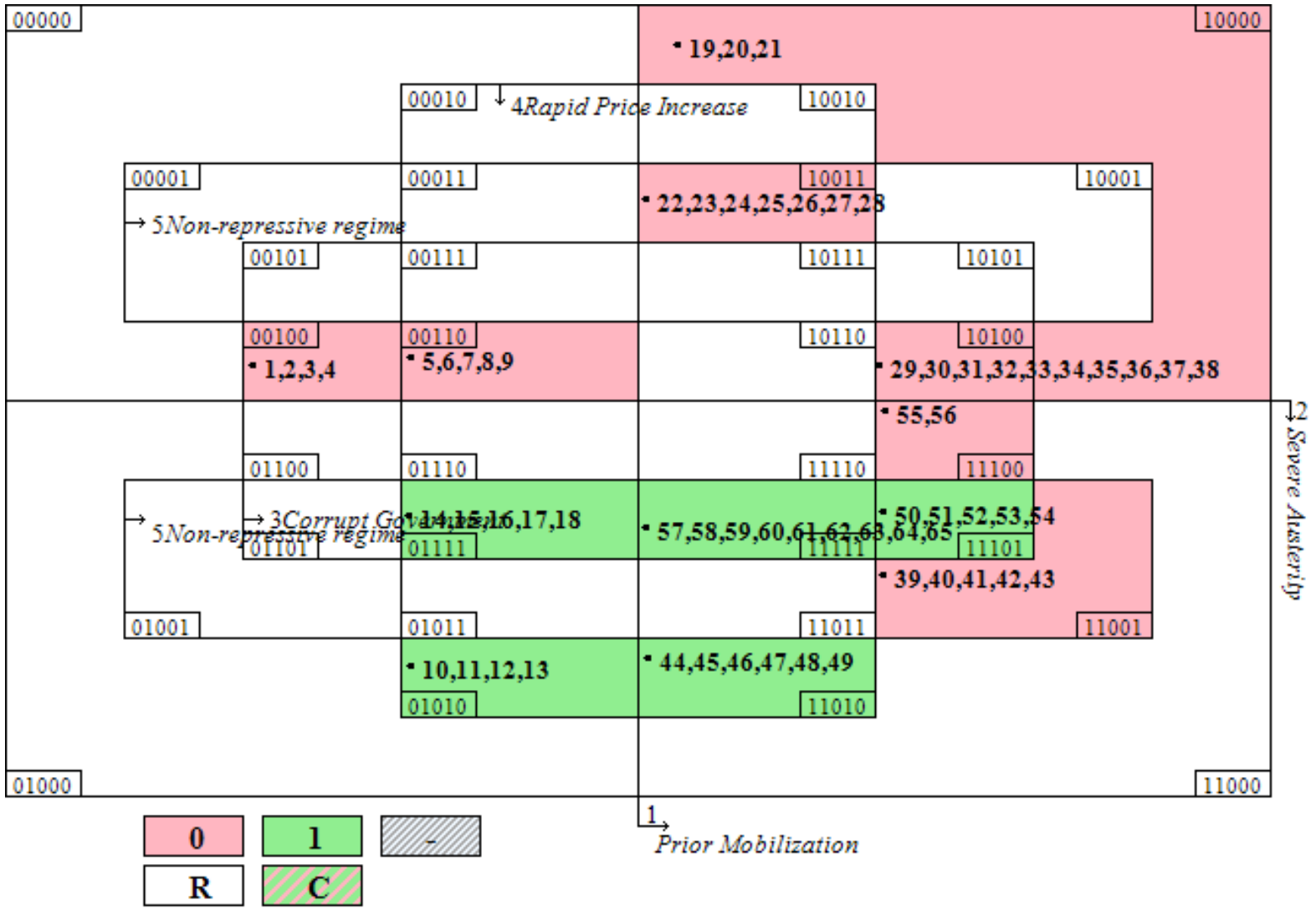
→ can eliminate "Corrupt government" in one combination




*fsQCA*

- Necessary but insufficient: Severe austerity
- Sufficient combinations but not necessary: each green square

*Tosmana*



# VARIATIONS IN USE AND POTENTIAL COMBINATIONS

- Multi-value (mvQCA)
- Different degrees of membership (fsQCA)
- Realist evaluation (context-mechanism-outcome)
- Multi-step/ scalar approach (e.g. remote and proximate factors, national and local)
- Longitudinal comparison
- Process tracing, contribution analysis
- Bayesian statistics, multiple regressions

# QCA IN THE GEF IEO

- Progress towards Impact
  - codified TEs, used most dominant factors for QCA as next step
  - broader adoption initiated by project*stakeholder support*project design NOT poor = Broader adoption initiatives adopted or implemented (89%)
- Biodiversity
  - Done at levels of PA and PA System (two scales of GEF support)
  - Field work by different consultants then two-day workshop to identify factors and score them
  - 27 factors, grouped into Management Capacity, Community, and Context to reflect hypothesis
  - showed importance of community awareness, not necessarily participatory approaches; supported results of mixed-effects modeling and METT data
  - INUS analysis not completed → in what sufficient combinations of factors is GEF support necessary for the outcome to occur, if any?

# QCA IN THE GEF IEO

- Programmatic Approaches
  - will test the importance of country ownership (and maybe particular elements of country ownership) in success of programmatic approaches
  - need to carefully define what outcome we want to find causal pathways for
  - select cases both successful and unsuccessful in that outcome, and ideally cases that have both presence and absence of country ownership
- Multiple Benefits….

# LESSONS LEARNED

- Can be time-consuming
  - needs a lot of time for reflection, common understanding among evaluators
  - iterative interaction between team and methods specialist → need to be very involved in calibration of scores, minimization of factors using theoretical combinations, review of cases showing sufficient combinations
- Results can be very sensitive to changes in scoring or causal recipes tested
  - need very narrow definitions to distinguish "1" and "0"
  - need to identify factors with clear, distinct and direct causal links to outcome
  - need complete data for all cases across variables

# LESSONS LEARNED

- Not a substitute for in-depth within-case analysis methods
- Best if some prior analysis is done by codifying field data, apart from less structured methods

# SUMMARY OF COMPARATIVE ADVANTAGES

- Adds more rigor to case study synthesis and comparison, mitigates biases in traditional qualitative approaches
  - Internally valid because uses replicable procedures based on mathematical logic
- Based on empirical data, no need to set up control and treatment → "natural experiment"
- Assumes complex causality that can be stated in terms of set theory (necessity and sufficiency)
- Can handle/ uncover non-linear relationships (not 1:1 progression, tipping points) e.g. same factors may have different effects when combined with other factors
- Considers context (other factors) when assessing the effect of a factor's presence or absence → absence of a factor ("0") is also a contributing factor
- Tests for necessity and/ or sufficiency of factors for producing outcome vs. effect of factor on outcome
  - Interaction effects can be calculated using statistics only to a certain degree, but is different from logical intersection

# SUMMARY OF LIMITATIONS AND WAYS TO MITIGATE

- May miss unidentified factors
  - more in-depth examination of contradictory cases
- May be subject to systematic biases (e.g. selection bias)
  - re-examine theory of change to thoroughly account for factors
  - search for examples of other possible outcomes/ causes in literature
- Needs in-depth knowledge of cases and enough time for several rounds of within-case analysis and cross-case comparisons
  - results obtained through can induce further case selection and/or redefinition of sets that describe the conditions and the outcome; inform further within-case analyses and expand the knowledge of the cases; and generate new hypotheses/ theories

# QUESTIONS?

# BASIC STEPS

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7. Using the software, simplify combinations of factors through paired case comparisons and theoretical combinations (not represented by actual cases).
8. Software will generate smaller set of simpler combinations with positive outcome. Evaluate resulting combinations against cases and existing theories for consistency, new insights, etc.
9. Revise factors, outcome and scores as needed through further within-case analysis, especially after investigating "deviant" cases.

- Combines strengths of qualitative and quantitative methods by linking theory and evidence while providing increased measurement precision
- Refocuses attention on context vs "best practices"