Three Approaches to Longitudinal QCA: Opportunities and Challenges

Santi Furnari
Professor of Strategy
Cass Business School, City, University of London
santi.furnari.1@city.ac.uk

Incorporating time in QCA: three possible approaches

THE PROBLEM OF TIME IN QCA

- QCA has been originally designed as a approach to systematically compare cases at one point in time (Ragin, 1987)
- Thus, QCA has been criticized for being "atemporal", obscuring *"the sequential nature of paths of causation"* (Caren & Panofsky, 2005: 147)
- QCA-enabled management research mostly neglects "*how configurations evolve in form and substance over time"* (Ketchen, 2013: 305)

3 APPROACHES TO TIME IN QCA

1. **Analysis of temporally ordered configurations** (tQCA) (e.g. Caren and Panofsky, 2005; Hak et al. 2013).
2. **Analysis of configurations over time (lagged time windows)** (e.g. Aversa Furnari and Haefliger, 2015; Meuer & Rupietta, 2015)
3. **Case-oriented calibration of change patterns** (Ragin, 2014)

Analysis of Temporally Ordered Configurations (tQCA)

(e.g. Caren and Panofsky, 2005; Hak, Jaspers and Dul, 2013)

The approach in a nutshell

- It focuses on causal conditions that occur in a specific temporal order:

  A/B/C = A occurs first, then B, then C

- **The key question is whether the sequence between conditions matter to produce an outcome (Abbott, 1998)**

  A/B/C → Y?

  or B/A/C → Y

Opportunities

- Capture the extent to which the sequential order between conditions of a configuration matter and study "configurations of events"

Challenges

- Often difficult to specify order between conditions *a priori* (lack of theory)
- Limited diversity in truth table increases exponentially. **With 4 conditions, the logically possible configurations will be:**

  16 in QCA (2^4)

  384 in tQCA ($4! * 2^4$)

Analysis of Configurations over Time (lagged time windows)

(e.g. Aversa, Furnari, Haefliger, 2015; Meuer & Rupietta, 2015; Fainshmidt et al. 2017)

The approach in a nutshell

- It focuses on how the inner composition of the configurations associated with an outcome change over time (e.g. ***do the same configurations recur regularly? How do configurations differ at different periods?)***

- It also focuses on changes of cases' membership into different configurations and "moves" of cases between configurations over time

- Ideally, the analyst goes back to the cases to interpret changes and stability of configurations over time

An example from Formula 1 (Aversa, Furnari, Haefliger, 2015)

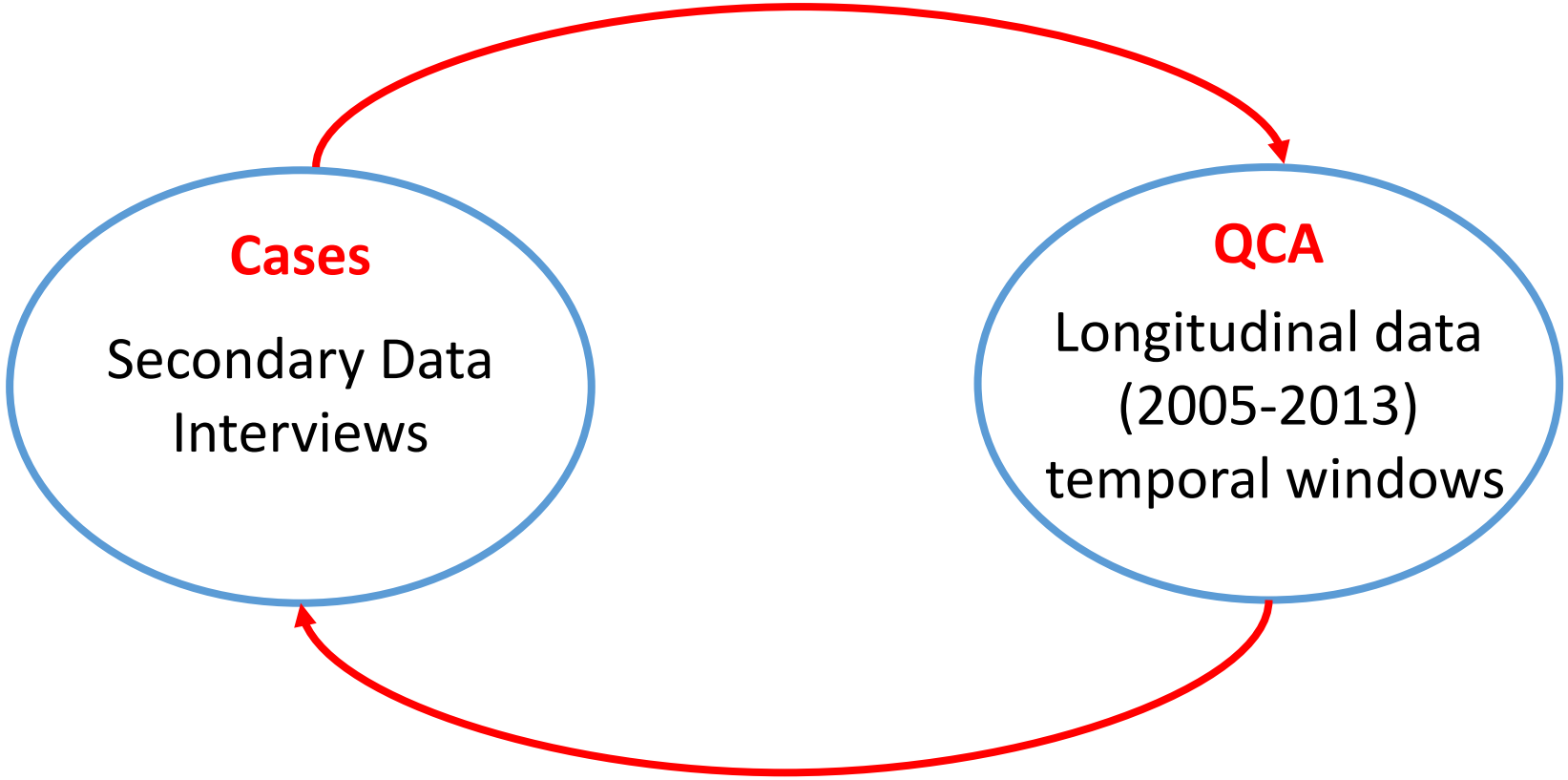
Table 5. High-performing configurations of business models identified via QCA

	Configurations		Configurations	Configurations		Configurations		Configurations		Configurations		Configurations	
	2005–2006		2006–2007	2007–2008	2008–2009		2009–2010		2010–2011		2011–2012		2012–2013	
	a	b	c	d	e	f	c	d	c	d	e	f	c	d
Internal knowledge (BM1)	●	●		●	⊗	●		●		●	⊗	●		●
External knowledge (BM2)	●	⊗	⊗		⊗	●	⊗		⊗		⊗	●	⊗	
F1 supply (BM3)	⊗	●	●	●	●	●	●	●	●	●	●	●	●	●
Talent (BM4)	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Consistency	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Raw coverage	0.25	0.25	0.40	0.40	0.25	0.25	0.75	0.75	0.80	0.80	0.20	0.20	0.60	0.60
Unique coverage	0.25	0.25	0.40	0.40	0.25	0.25	0.25	0.25	0.20	0.20	0.20	0.20	0.20	0.20
Overall solution consistency	1.00		1.00	1.00	1.00		1.00		1.00		1.00		1.00	
Overall solution coverage	0.50		0.40	0.40	0.50		1.00		1.00		0.40		0.80	
Number of cases per analysis	10		11	11	11		10		12		12		12	

Note: The gray box highlights robust configurational patterns associated with high performance across time (robust to environmental and regulatory changes over time and to changes in the samples of cases examined over time).

Inductive identification of conditions and calibration anchors

Inductive qualitative data analysis and coding



Going back to the cases

Identification via QCA of cases whose “moves” between configurations over time resulted in outcome changes and qualitative analysis of mechanisms

Analysis of Configurations over Time (lagged time windows)

(e.g. Aversa, Furnari, Haefliger, 2015; Meuer & Rupietta, 2015; Fainshmidt et al. 2017)

The approach in a nutshell

- It focuses on how the inner composition of the configurations associated with an outcome change over time (e.g. do the same configurations recur regularly? How do configurations differ at different periods?)
- It also focuses on changes of cases' membership into different configurations and "moves" of cases between configurations over time
- Ideally, the analyst goes back to the cases to interpret changes and stability of configurations over time

Opportunities

- It allows to identify which configurations (or single conditions) are more regularly associated with an outcome over time ("robust configurational patterns") and "punctuated equilibrium shifts" in the relationship between config. and outcome

Challenges

- It takes into account time in a limited way because it uses discrete time windows or "snapshots" (meaningful identification of time window is essential)

Case-oriented Calibration of Change Patterns

(e.g. Ragin, 2014)

The approach in a nutshell

- Identify substantively meaningful *change patterns* of interest (in the conditions and the outcome) and label them (e.g. “quantum change” or “permanently failing”)
- Use Fuzzy-set calibration to assess cases’ degrees of membership in the *change pattern* identified.
- Use fs/QCA to investigate how both initial levels and change patterns in causal conditions are associated with change patterns in the outcome

Example (hypothetical): Patterns of change in org centralization

Case (Firm)	Centralization Time 1 (fuzzy set)	Centralization Time 2 (fuzzy set)	Centralization Time 3 (fuzzy set)	Centralization Time 4 (fuzzy set)	"Radical decrease in Centralization" (fuzzy set)
Firm 1	0.76	0.67	0.23	0.09	1
Firm 2	0.96	0.65	0.25	0.23	0.76
Firm 3	0.79	0.66	0.33	0.11	0.66

A change pattern emerging from the data is "radical decrease in centralization"

- Examine data **horizontally** by time (rather than vertically as in panel data) and **identify longitudinal patterns in the fuzzy membership scores for the condition** (or outcome)
- Identify a substantively meaningful pattern of change in the condition
- **Use fuzzy-set calibration to assess the degree to which cases have membership in the specific change pattern** identified→ change pattern as fuzzy set

Case-oriented Calibration of Change Patterns

(e.g. Ragin, 2014)

The approach in a nutshell

- Identify substantively meaningful *change patterns* (in the conditions and the outcome) of interest and label it (e.g. “quantum change” or “stagnation”)
- Use Fuzzy-set calibration to assess cases’ degrees of membership in the *change pattern* identified.
- Use fs/QCA to investigate how both initial levels and change patterns in causal conditions are associated with change patterns in the outcome

Opportunities

- Identify qualitatively important change patterns in conditions and outcomes and analyze their set-theoretic intersections across cases
- More truthful to QCA case-oriented spirit (no artificial inflation of number of cases and change is calibrated at the case level).

Challenges

- Difficult to identify meaningful change patterns when the number of time periods (t) is high
- Adding change patterns increases model complexity (but less so than in tQCA)

The three approaches are better suited for different questions

Approach	Analytical focus	Assumptions about time and cases
Temporally-ordered configurations	• Focus is on sequence between conditions	• Time as ordered • Cases as configurations of events
Analysis of configurations over time	• Focus is on inner composition of configurations and on case memberships	• Time as discontinuous • Cases as trajectories between configs.
Calibration of change patterns	• Focus is on qualitative change patterns in config and/or outcome	• Time as discontinuous • Cases as trajectories between configs

References

- Abbott, A. (1998). 'Sequence Analysis: New Methods for Old Ideas.' *Annual Review of Sociology* 21:93-113.
- Aversa P., Furnari, S., Haefliger, S. (2015), 'Business Model Configurations and Performance: A qualitative comparative analysis in Formula One racing, 2005-2013', *Industrial and Corporate Change*, 24(3), 655-676.
- Caren, N., Panofsky, A. (2005). 'TQCA: A Technique for Adding Temporality to Qualitative Comparative Analysis.' *Sociological Methods & Research* 34 (2):147-72.
- Fainshmidt, S., Smith, A., & Guldiken, O. (2017). Orchestrating the flow of human resources: Insights from Spanish soccer clubs. *Strategic Organization*, *15*(4), 441-460.
- Hak, T., Jaspers, F., Dul, J. (2013). "The analysis of temporally ordered configurations: Challenges and Solutions. Configurational Theory and Methods in Organizational Research", *Research in the Sociology of Organizations*, 38, 107-127.
- Ketchen, D. J. (2013). Chapter 13 We Try Harder: Some Reflections on Configurational Theory and Methods. In *Configurational theory and methods in organizational research*(pp. 303-309). Emerald Group Publishing Limited.
- Meuer, J. Rupietta, C. (2015). "Qualifying "Fit": The Performance Dynamics of Firms' Change Tracks through Organizational Configurations", *COMPASSS Working Paper* 2015-81
- Ragin, C. C. (2014). "QCA and Panel Data", *presentation at 2nd International QCA Expert Workshop*, Zurich 5-7 November, ETH.

Thank you!

If you have any questions, feel free to email me at santi.furnari.1@city.ac.uk