

## **Making the most of configurational comparative analysis:**

### **An assessment of QCA applications in comparative welfare state research**

#### **Abstract**

The capacity of QCA to align with complex theoretical expectations and configurational relationships is rarely used to the full. To make the most of QCA we emphasize in line with guidelines on best-practice the importance of expressing (complex) theoretical expectations in set-theoretical terms, going back to the cases when interpreting the formal results, and carrying out robustness tests. In this assessment of comparative welfare state research using QCA, however, we find that only half of the studies made complex propositions formulated in set-theoretical terms. Moreover, despite the case-oriented nature of QCA, only few scholars went back to the cases after the formal analysis. Finally, not all studies carried out robustness checks of their findings. We argue that improvements on these issues can increase the quality of QCA applications.

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## **Introduction**

There has been a remarkable growth of textbooks, method chapters and articles on qualitative configurational methods, especially QCA (see, for example, Ragin 2008; Rihoux & Ragin 2009; Schneider & Wagemann 2010). Although these publications give valuable advice on many aspects of applying QCA, it is not clear to what extent scholars actually stick to best-practice with regard to justifying the choice of QCA and with regard to interpreting the results of the formal QCA analysis. We argue that medium-N studies using QCA should express the (complex) theoretical expectations in set-theoretical terms, go back to the cases when interpreting the formal results, or carry out robustness tests. Our argument is that the capacity of QCA to align with complex theoretical expectations and deal with configurational relationships is not used to the full. We advance this argument by demonstrating and assessing how researchers have used QCA in the field of comparative welfare state research.

There are good reasons for the choice of comparative welfare state research: First, QCA renders itself to comparative welfare state research because of the limited number of countries with welfare states that can meaningfully be compared, because of elaborate theoretical frameworks suggesting that the development of welfare states is characterized by multiple configurational causation, and the view of cases being configurations of different dimensions. Thus, it is not surprising that QCA is frequently used and accepted as a valuable tool in comparative welfare state research in sociology and political science (cf. Amenta & Hicks 2010; Rihoux et al. 2011). Second, and related, in the methodological literature on QCA, comparative welfare state data have often served illustrative purposes (e.g. Amenta & Poulsen 1994; Hicks 1994; Ragin 2000). This means that it should be relatively straightforward for researchers in this field to relate the guidelines to their studies. Basically, we argue that if any one field is suitable for an assessment of QCA applications, it would be comparative welfare state research.

The paper proceeds as follows. First, we describe the criteria for the selection of studies to examine, provide an overview of the nineteen studies included, and discuss the contributions these studies made to comparative welfare state research. Second, we discuss how scholars have specified their theoretical expectations. Third, we assess how researchers have performed with regard to the interpretation of the formal QCA results. We conclude with a few remarks on the main findings and a call for more conscious use of some comparative advantages of configurational comparative analysis.

### **1. QCA and comparative welfare state research**

We include 19 articles in our survey of QCA in comparative welfare state research. First, we limited our focus to ‘causal research’ with welfare states (or some core aspect thereof) as the outcome that has been published in English language journals.<sup>1</sup> Second, we searched for the combination of ‘QCA’ and ‘welfare state’ or ‘social policy’ in five databases - Academic Search Elite, JSTOR, Periodicals Achieve Online, Project Muse, and ProQuest. Third, we supplemented with studies in the bibliographical database on the COMPASSS (2011) website and in the review article on QCA in public policy studies by Rihoux et al. (2011).

As Table 1 shows, there has been a surge of studies using fsQCA since 2009 whereas csQCA dominates in the years before. The number of cases included in the studies varies from six to 79, and no less than 17 of them have a case numbers between 11 and 53 cases, qualifying them to be medium-N studies. The remaining information presented in the table on the number of conditions etc. is used in the discussions below on the specification of theoretical expectations and the

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<sup>1</sup> This excludes a number of studies published in other languages than English (e.g. Kittel et al. 2000; Emmenegger 2008), in books (e.g. Janoski & Hicks 1994; Kenworthy & Hicks 2008), and those with a conceptual-descriptive focus (e.g. Hudson & Kühner 2010; Kvist 1999, 2007; Vis 2007).

interpretation of formal QCA results.

[Table 1 about here]

As described, the area of comparative welfare state research renders itself ideal for QCA with its view of multiple conjunctural causation, cases as combinations of aspects and multidimensional outcomes in a context of medium-N populations. Since Charles Ragin (1987, 2000) also used the development of the welfare state as his main example, it may thus come as little surprise that QCA applications have contributed to the advancement of comparative welfare state research (see also Lee 2011). Table 1 shows how studies have gradually expanded to cover more areas of the welfare states starting with csQCA studies on old-age pensions over health insurance to social care and services and a new wave of fsQCA studies on various labour market issues like corporate social responsibility, social pacts, job security regulations, active labour market policies and wage inequality.

## **2. Complex relationships and their proposition in set-theoretic terms**

Charles Ragin has emphasized that multiple conjunctural causation is a key feature of configurational thinking, meaning that, “The effect of any particular causal condition may depend on the presence or absence of other conditions, and several different conditions ... may be causally equivalent at a more abstract level” (Ragin 2000: 40). Consequently, the task of empirical investigations is not to test linear additive models but to uncover asymmetrical relationships; and it is not to point out the variables with the biggest net effect but to identify complex relationships in the form of multiple conjunctural causation, that is, how different combinations of conditions are connected to similar outcomes (Ragin 2008).

A focus on the net effect of individual conditions is thus not in accordance with the view of

multiple conjunctural causation. Based on the application of csQCA or fsQCA, researchers might be able to conclude that individual conditions are not sufficient or necessary (Schneider & Wagemann 2010: 411-412). However, in most applications of these methods, the results indicate that the interplay between conditions has to be taken into account when formulating propositions and interpreting the results. In short, researchers should always consider if their interpretation of the results is in line with configurational thinking.

We argue that too little attention has been paid to the specification of theory preceding the analysis. More specifically, given the configurational perspective, theoretical propositions should not be formulated as correlational arguments but as set-theoretical relationships, that is, in terms of necessary and (often jointly) sufficient conditions.<sup>2</sup> For at least two reasons it is important to follow this advice. First, it might be that QCA has a competitive edge vis-à-vis statistical methods when it comes to the identification of asymmetrical and complex patterns (Schneider & Wagemann 2010: 400), but if the theoretical claims are not stated appropriately, the correspondence between the propositions to be tested and the actual test is blurred. Second, a study with concrete hypotheses based on an elaborate theoretical framework is generally more convincing and interesting, no matter the employed method, than a study that simply includes the ‘usual suspects’ of explanatory conditions and lets the data speak for themselves.

But to what extent do the welfare state studies handle these issues? The short answer is that although they differ a lot, there are examples of both net effect thinking and of not formulating propositions in set-theoretical terms. Some studies conclude on the impact of individual conditions even if these are included in the solution formulas only as parts of complex pathways (e.g. Aleman 2009; Jang 2009; Peillon 1996). This problem is not totally unexpected due to the widespread and deeply engrained net-effects and correlational thinking among researchers (cf. Ragin 2000, 2008).

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<sup>2</sup> Alternatively, theoretical propositions could be formulated as subset or superset relations.

Most likely, this situation has also inflicted the (lack of) complex propositions formulated in set-theoretical terms. As shown in Table 1, only eight of the 19 studies use set-theoretic terms to phrase their expectations, and ten formulate complex propositions of varying concreteness. There is a large – although not perfect – overlap between the articles doing both as many complex relationships can be formulated as set-theoretic statements. Moreover, none of the 19 studies are merely interested in examining the existence of individually sufficient or necessary conditions.

Nonetheless, the theoretical expectations included in eight of the articles do not fulfill any of the two principles, meaning that when discussing the theoretical basis of their study, the scholars neither state the expected relationships in set-theoretical terms nor do they specify any propositions of causal complexity. Some of them do not offer concrete expectations. However, among the studies that do construct hypotheses, a selection of these illustrates a common problem:

- Social-democratic welfare regimes enjoy more popular support, liberal regimes less (Peillon 1996: 180)
- The presence of a dominant executive improves the political feasibility of NHI (Blake & Adolini 2001: 690)
- Countries with larger Catholic populations are more likely to support the development of family allowance policies (Misra 2003: 194)

Since these expectations are clearly formulated as correlational relationships, they do not square with the QCA's emphasis on configurational relationships. Obviously, it is not a solution to the problem to skip initial theoretical discussions altogether as do Kim & Lee (2008: 227), who merely argue that, "This article looks into the causal relationship between welfare state development and various independent variables that have had their validity checked in previous studies."

Whereas the misinterpretation of results undermines our faith in the conclusions drawn, the

inappropriate formulation of hypotheses does not influence the formal QCA results, although it makes the alignment between theory and method less evident. Moreover, fine examples of QCA applications formulating complex propositions in set-theoretical terms and interpreting the results in line with the configurational logic do exist. For example, Amenta and various collaborators show how the study becomes more compelling when a strong link between theoretical statements and the choice of QCA as a method is established. Amenta et al.'s (2005) treatment of this task is a recommendable example in several ways. First, they both set out established theories – and standard institutional politics model – and carefully elaborate their own political mediation theory of social movement consequences. Second, the expectations based on both models are formalized by the help of Boolean operators and also described in plain English in the following way (Amenta et al. 2005: 528):

The configurational theoretical expectations from the institutional politics model of social policy ... for generous old-age spending ... are as follows:

$\text{polltax} * \text{patronage} * \text{ADMIN} * \text{DEMOCRAT}$

... States without poll taxes and without patronage-oriented parties and with strong administrative powers and with Democratic party regimes are expected to produce generous social programs. By contrast, the political mediation argument suggests ... the following expression:

$\text{polltax} * \text{patronage} * (\text{MOBILIZED} * (\text{DEMOCRAT} + \text{ADMIN}) + \text{ASSERTIVE})$

This means that in structurally conducive and politically favorable short-term situations, only challenger mobilization is needed to produce collective benefits. When short-term political conditions are less favorable, more assertive action is the best strategy. This type of activity is sufficient to bring results.

Finally, the interpretation of the results is done with the appropriate respect for configurational

thinking. Fortunately, the work of Amenta et al. is not the only study performing well on these parameters. Other scholars in the field, such as Hicks et al. (1995) and Vis (2011), have also managed to construct their propositions and interpret the results in correspondence with the emphasized criteria.

To be sure, most of us are ‘raised’ to think in terms of independent variables and net effects. Users of QCA can therefore be inclined to tone down, disregard, or even misunderstand the logic behind configurational theorizing and analysis, sometimes drawn in that direction by reviewers, editors, and others not familiar with QCA. The good news is that appropriate references to the fundamental logic of complex relationships supplemented by illustrative examples are normally well-received. Moreover, the positive examples underline that if we are conscious thinkers (cf. Sartori 1970), the problems are not insurmountable. A more explicit and rigorous formulation and interpretation of set-theoretic relationships is a challenge to the researcher, but it will certainly help strengthening the application and status of QCA.

### **3. The interpretation of QCA results after the formal analysis**

The results of a formal QCA cannot stand alone. Ragin and others (Cronqvist 2011; Thiem & Dusa 2012; Longest & Vaisey 2008; Ragin 2009) have developed software packages that have greatly facilitated the usage of QCA as an analytical technique. Once the outcome and the conditions are calibrated, it is a matter of minutes, if not seconds, to find the most complex, the most parsimonious, and the intermediate solutions. However, the results of the formal QCA are but a midpoint in the analysis. The results need to be complemented by a qualitative discussion of the different solution terms. These discussions are to show whether the observed configurations indeed represent causal relationships. If so, the identified solution terms offer a causal recipe for the case-level interpretations. Hence, the formal fsQCA does not substitute for the study of cases “just as

reading a detailed map is not a substitute for taking a hike in the mountains” (Ragin 2000: 283).

QCA loses one of its major strengths in medium-N analysis if cases disappear behind computer-based algorithms and parameters of fit (Schneider & Wagemann 2010: 410).

Fourteen of the 19 articles on welfare state related topics evaluate, or at least illustrate, the significance of the solution formulas using case knowledge (see Table 1). The studies show different ways of tackling the challenge of journal space limitations. In the best of worlds, scholars can publish case studies in separate journal articles based on the formal fsQCA and refer to these articles in the discussion of the QCA results (cf. Amenta et al. 2005; Bleijenbergh & Roggenband 2007; Emmenegger 2011). As a minimum, scholars should use graphs or tables to link solution formulas back to the cases and document to what extent cases are covered by the different solution terms (cf. Avdagic 2010; Blake & Adolino 2001; Vis 2009ab, 2011). In four studies, the formal QCA is followed by an extensive evaluation of the solution formulas (Emmenegger 2011; Gjørberg 2009; Hicks et al. 1995; Misra 2003). For instance, having published their discussions of the calibration of set membership scores as online appendixes on the journal website, Emmenegger (2011) and Gjørberg (2009) can devote respectively 30 and 20 percent of the main text to discussions of the findings of the formal QCA on a case-by-case basis. Only Hicks et al. (1995) and Misra (2003) manage to evaluate the results of the formal QCA within their journals’ space constraints and without complementary publications.

A case-by-case discussion of the results of the formal QCA is not always possible. Certainly, in the case of large-N QCA (cf. Ragin & Fiss 2008), researchers cannot be expected to have any detailed case knowledge. In a similar vein, researchers are likely to lack the space to discuss the solution formulas on a case-by-case basis if the number of cases is around 50 or higher (cf. Aleman 2009; Amenta et al. 1992; Amenta & Poulsen 1996; Vis 2011). In addition, some researchers document solution formulas for multiple outcomes (Aleman 2009; Greckhamer 2011). For instance,

Greckhamer (2011) discusses solution formulas for eleven different outcomes, while Aleman (2009) first analyzes all social pacts together before he distinguishes between three different types of social pacts (comprehensive pacts, tripartite wage agreements, and single issue pacts).

When the results of the formal QCA are not evaluated on a case-by-case basis, the need increases for tests of the robustness of the findings to case selection, empirical data, set calibration, frequency and consistency thresholds, number of conditions, and choice of prime implicants. In a recent article, Skaaning (2011) demonstrates different techniques to gauge the sensitivity of QCA results. For instance, researchers can test whether reasonable changes in the breakpoints defining set-memberships, the frequency of cases linked to configurations, and the choice of consistency thresholds affect results to a nontrivial degree. A detailed documentation of these robustness tests could be published in online appendices.

Among the 19 articles on welfare state related topics, eleven document some kind of robustness check (see Table 1).<sup>3</sup> Amenta and his coauthors (Amenta et al. 1992, 2005; Amenta & Halfmann 2000; Amenta & Poulsen 1996) use regression analyses to cross-validate the findings of the formal QCA and to test other observable implications of their theory. Hicks et al. (1995) and Misra (2003) assess to what extent their solution formulas are sensitive to the recoding of set-memberships, while Gjørberg (2009) experiments with different consistency thresholds. Amenta & Poulsen (1996), Avdagic (2010) and Emmenegger (2011) test the sensitivity of the solution formulas to changes in the set of explanatory conditions, while Vis (2011) uses an alternative operationalization of her set by using data on active labor market policy spending as a percentage of GDP rather than per unemployed to gauge the robustness of her findings. Finally, Peillon (1996) analyzes the absence of the outcome to assess the robustness of the solution formula for the presence of the outcome.

The robustness of solution formulas is a particularly crucial hurdle for QCA to overcome when the

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<sup>3</sup> It is certainly possible that researchers have conducted robustness tests without reporting them.

number of cases is too low compared to the number of conditions considered. Using randomly created data matrices, Marx (2010) has recently demonstrated that QCA struggles to differentiate real from random data if scholars integrate too many conditions in the formal analysis. Of the 19 articles on welfare states using QCA (see Table 1), six are potentially suffering from this problem because it cannot be completely ruled out that the identified relationships are in fact random (Avdagic 2010; Bleijenbergh & Roggenband 2007; Emmenegger 2011; Jang 2009; Kim & Lee 2006; Peillon 1996).<sup>4</sup> The probability that the formal QCA is unable to distinguish random from real data is above 33 percent in four studies, i.e., Avdagic (2010), Bleijenbergh & Roggenband (2007), Jang (2009) and Peillon (1996). As a rule of thumb, a medium-sized population of around 20 cases should not be analyzed using more than five conditions.

If the number of theoretically relevant conditions is higher than methodologically acceptable in view of the size of the population, researchers face difficult choices. Certainly, in such situations, robustness tests become particularly important. In addition, several measures can be taken to reduce the number of conditions. For instance, conditions can be combined into higher order constructs (cf. Bleijenbergh & Roggenband 2007; Gjølberg 2009). Alternatively, different sets of conditions can be analyzed. For instance, Avdagic's (2010) analysis covers eleven conditions and 14 cases. However, instead of incorporating all eleven conditions at once (yielding 2048 possible configurations of conditions), she runs multiple models containing various combinations of four to five causal conditions and selects the best models in terms of their explanatory potential – measured

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<sup>4</sup> Marx (2010) only estimated benchmarks tables for csQCA. To what extent fuzzy set or multi-value QCA are better (or worse) in distinguishing random from real data is an open issue (Marx 2010: 142). Of the six articles, two use fuzzy set QCA (Avdagic 2010; Emmenegger 2011), while the other four use crisp set QCA (see Table 1). For the latter four articles, the problem of too many conditions and too few cases certainly applies.

through solution consistency and coverage – for in-depth discussion. While Avdagic’s (2010) approach does certainly not correspond to standard practice, it is a pragmatic way of dealing with too many explanatory conditions.

Robustness tests are not always necessary. Given the case-oriented nature of QCA, a case-by-case discussion of the results of the formal QCA is often preferable. As a general rule, we suggest to resort to robustness tests the higher the number of cases and conditions, the less evident the choice of thresholds, and the weaker the theoretical expectations.

### **Concluding remarks**

Our survey of medium-N studies in comparative welfare state research using QCA gave important insights into how scholars formulate their theoretical propositions and how they interpret findings from formal QCA analysis. Only about half of the studies made complex propositions or propositions formulated in set-theoretical terms, although this is the core advantage of QCA over statistical methods and also most interesting from a scientific point of view. Given the different logic in QCA compared to conventional case studies and statistical analyses, it is surprising that many scholars do not make a better job in aligning in their formulation of theoretical propositions and their choice of method.

There is also a need on at least two accounts for scholars to rethink the interpretation of the results of the formal QCA. Few made a large effort to go back to the cases when having found what solutions or paths are followed by what cases. Indeed, some scholars do not attach the cases to the solution formulas in the first place. This is regrettable given the case orientation in QCA. With regard to assessing the robustness of solution formulas, practice seemed better with more than two-thirds of the studies trying to undertake some form of test.

There is no reason to believe that the problems identified in this paper are particular to comparative

welfare state research. To the contrary, many scholars contributing to the methodological literature on QCA are also engaged in comparative welfare state research, meaning that they are in a position to improve the applications by providing advice to other scholars, function as reviewers, and publish works using QCA themselves. Moreover, and partly as a consequence, many introductory texts on QCA use examples from this field of research. Against this background, comparative welfare state research should be one of the least likely research fields to experience low quality in the usage of QCA.

In sum, we argue that many scholars can make more out of using QCA by being more explicit about the configurational and complex nature of their theoretical propositions and by returning to the cases after having done the formal QCA analysis. If QCA practitioners live up to the ontological and methodological nature and requirements of QCA, they will not only improve the quality of their own work, but also raise the social scientific community's awareness of QCA as a valuable tool.

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Table 1: QCA applications in comparative welfare state research

Year	Authors	Outcome	csQCA or fsQCA?	Complex propositions	Propositions formulated in set-theoretical terms	Discussion of cases after formal analysis	Robustness test	Number of cases	Number of conditions
1992	Amenta et al.	Old-age pensions	csQCA	Yes	Yes	None	Regression	48	6
1995	Hicks et al.	Welfare state development	csQCA	Yes	Yes	Evaluation	Recoding of sets	15	5
1996	Amenta and Poulsen	Old-age assistance and work programs	csQCA	Yes	Yes	Illustration	Regression / different sets of explanatory conditions	48	6
1996	Peillon	Welfare state legitimacy	csQCA	No	No	None	Analysis of absence of outcome	25	9
2000	Amenta and Halfmann	Work programs	csQCA	Yes	Yes	Illustration	Regression	48	5
2001	Blake and Adolino	National health insurance	csQCA	No	No	Illustration	None	20	5
2003	Misra	Family allowances	csQCA	No	No	Evaluation	Recoding of sets	18	5
2005	Amenta et al.	Old-age assistance	csQCA	Yes	Yes	None	Regression	48	6
2007	Bleijenbergh and Roggenband	Social care	csQCA	No	Yes	Illustration	None	6	4
2008	Kim and Lee	Pension and employment	csQCA	No	No	Illustration	None	16	6

2009	Jang	Social security and social services	csQCA	No	No	Illustration	None	11	8
2009	Vis	Welfare state reform	fsQCA	Yes	No	Illustration	None	25	3
2009	Vis	Welfare state reform	fsQCA	Yes	Yes	Illustration	None	23	3
2010	Avdagic	Social pacts	fsQCA	Yes	No	Illustration	Different sets of explanatory conditions	14	11
2011	Emmenegger	Job security regulations	fsQCA	Yes	No	Evaluation	Stepwise removal of explanatory conditions	19	6
2011	Greckhamer	Wage inequality	fsQCA	No	No	None	None	44	6
2011	Vis	Active labor market polices	fsQCA	Yes	Yes	Illustration	Alternative operationalization of outcome	53	5