Supplementary online appendix

for

Thomann, E. (2018). *Customized implementation of European Union food safety policy: United in diversity?* Palgrave Macmillan, International Series on Public Policy.

3 Appendix for chapter 3

Table 3.A: List of interview partners, legal experts and written statements

Case study	*Interviewees*	*Affiliation of interviewees*	*Legal expert*	*Written statements*
European Union	Gérard Moulin Wolfgang Trunk Karin Krauss	Heads of Medicines Agencies DG SANCO DG SANCO	Karin Krauss	--
France	Claude Andrillon Arnaud Deleu Gérard Moulin Daniel Parizot	Syndicat National des Vétérinaires d'Exercice Libéral Syndicat de l'Industrie du Médicament Vétérinaire et réactif Agence Nationale du Médicament Vétérinaire Groupement de Défense Sanitaire du Cher – GDS	Claude Andrillon	--
Germany	Prof. Dr. Thomas Blaha Dr. Martin Schneidereit Prof. Dr. Manfred Kietzmann	Stiftung Tierärztliche Hochschule Hannover Bundesverband für Tiergesundheit e.V. Stiftung Tierärztliche Hochschule Hannover	Prof. Dr. Manfred Kietzmann	Dr. Ute Tietjen, Bundestierärztekammer Berlin Dr. Arno Piontkowski, Bundesverband der beamteten Tierärzte
Austria	Prof. Dr. med. vet. Ivo Schmerold Dr. Marina Mikula Dr. Walter Holzhacker	Veterinärmedizinische Universität Wien Bundesamt für Gesundheit Österreichische Tierärztekammer	Dr. Marina Mikula	Eugen Obermayr, Österreichische Agentur für Gesundheit und Ernährungssicherheit Dr. Wilhelm Petracek, Österreichische Tierärztekammer Mag. pharm. Dr. Wolfgang Jasek, Österreichische Apothekerkammer
United Kingdom	John FitzGerald Dr. Martha Spagnuolo-Weaver Phil Sketchley Catherine McLaughlin	Department for Environment, Food and Rural Affairs Department for Environment, Food and Rural Affairs National Office of Animal Health National Farmers Union	Caroline Povey, Veterinary Medicines Directorate	Ian Scott, Animal Health Distributors Association John FitzGerald, Responsible Use of Medicines in Agriculture Alliance

Table 3.B: FVO reports included in analysis

Food and Veterinary Office (FVO). 2008. REPORT OF A SPECIFIC AUDIT CARRIED OUT IN GERMANY FROM 22 TO 29 SEPTEMBER 2008 IN ORDER TO EVALUATE THE CONTROL OF RESIDUES AND CONTAMINANTS IN LIVE ANIMALS AND ANIMAL PRODUCTS, INCLUDING CONTROLS ON VETERINARY MEDICINAL PRODUCTS. PART B – SECTOR SPECIFIC ISSUES. DG(SANCO)/2008/7775 MR – Final.
Food and Veterinary Office (FVO). 2010. FINAL REPORT OF A SPECIFIC AUDIT CARRIED OUT IN FRANCE FROM 22 FEBRUARY TO 01 MARCH 2010 IN ORDER TO EVALUATE THE CONTROL OF RESIDUES AND CONTAMINANTS AND THE USE OF VETERINARY MEDICINAL PRODUCTS IN FOOD PRODUCING ANIMALS IN THE CONTEXT OF A GENERAL AUDIT. DG(SANCO) 2010-8435 - MR FINAL.
Food and Veterinary Office (FVO). 2011. FINAL REPORT OF A MISSION CARRIED OUT IN SWITZERLAND FROM 17 TO 21 JANUARY 2011 IN ORDER TO EVALUATE THE MONITORING OF RESIDUES AND CONTAMINANTS IN LIVE ANIMALS AND ANIMAL PRODUCTS, INCLUDING CONTROLS ON VETERINARY MEDICINAL PRODUCTS. DG(SANCO) 2011-8907 - MR FINAL.
Food and Veterinary Office (FVO). 2011. FINAL REPORT OF AN AUDIT CARRIED OUT IN AUSTRIA FROM 14 TO 20 JUNE 2011 IN ORDER TO EVALUATE THE MONITORING OF RESIDUES AND CONTAMINANTS IN LIVE ANIMALS AND ANIMAL PRODUCTS, INCLUDING CONTROLS ON VETERINARY MEDICINAL PRODUCTS. DG(SANCO) 2011-8910 - MR FINAL.
Food and Veterinary Office (FVO). 2009. FINAL REPORT OF A SPECIFIC AUDIT CARRIED OUT IN THE UNITED KINGDOM FROM 16 FEBRUARY TO 23 FEBRUARY 2009 IN ORDER TO EVALUATE THE CONTROL OF RESIDUES AND CONTAMINANTS AND THE USE OF VETERINARY MEDICINAL PRODUCTS IN FOOD PRODUCING ANIMALS IN THE CONTEXT OF A GENERAL AUDIT. DG(SANCO)/ 2009-8128 - MR - FINAL.

4 Appendix for chapter 4

4.1 Raw data

Table 4.A: Codings of sub-indicators

Country	*Power to exert influence of…*					
	Veterinarians	*Pharmacies*	*Livestock owners*	*Decentrali-zation*	*Bicameralism*	*corporatism*
AU	2	2	3	1	0	4.625
GE	3	1	3	3	2	4.125
FR	2	1	3	1	0	2.25
UK	3	1	3	2	0	2

4.2 Truth tables

Table 4.B: Truth table: Analysis of sufficiency for extensive customization

RESP	SAL	RES	VPO	VPL	COERC	CUSTOM	Number	Consistency
1	1	0	1	0	0	1	1	1.000
1	1	0	1	0	1	1	2	1.000
1	1	1	0	0	1	1	3	1.000
1	1	1	1	0	1	1	4	1.000
1	1	1	1	1	1	1	4	1.000
1	1	1	0	1	1	1	2	0.993
1	1	1	0	0	0	1	3	0.974
1	0	0	1	1	1	1	3	0.935
1	0	0	1	0	1	1	5	0.919
1	1	0	0	0	0	1	4	0.894
1	0	0	0	1	1	1	5	0.826
0	0	0	1	0	0	1	1	0.793
0	0	0	0	1	1	1	4	0.773
0	0	0	1	1	1	1	1	0.764
0	0	0	0	0	1	0	2	0.669
0	1	1	1	0	1	0	2	0.641
0	0	0	1	0	1	0	6	0.640
0	1	1	1	1	1	0	5	0.565
0	1	0	0	0	0	0	5	0.549
1	0	0	1	0	0	0	1	0.507
0	1	1	1	0	0	0	3	0.504
0	1	1	0	1	1	0	1	0.470
0	1	0	0	0	1	0	1	0.446
0	0	0	0	0	0	0	4	0.434
0	1	0	0	1	1	0	1	0.431
1	0	0	0	0	0	0	3	0.321

Software: fs/QCA 2.5

Prime implicants: RESP*SAL*res*VPO*vpl; resp*res*VPO*coerc OR resp*sal*VPO*coerc OR resp*RES*vpo*VPL

The present data display tied logically redundant prime implicants, i.e. some degree of ambiguity (Schneider and Wagemann 2012: 108ff). The alternative intermediate solutions fully overlap with the one chosen for presentation. Additionally, the former contain two or three more redundant paths with unique coverage 0.000, covering cases that are already explained by the other paths. Some alternative complex and parsimonious solutions also contain redundant paths.

Directional expectations: RESP → CUSTOM, SAL → CUSTOM, RES → CUSTOM, VPO → CUSTOM, VPL → CUSTOM.

Full intermediate solution:

sal*COERC*VPL + RESP*SAL*coerc + RESP*VPO*COERC + RESP*SAL*RES + resp*res*VPO*coerc → CUSTOM.

The path resp*res*VPO*coerc has been omitted from Table 1 and from the theory evaluation due to its very low empirical relevance. It only covers one case, a1au (membership 0.62 in path ,0.65 in CUSTOM).

Complex solution (omission of fully redundant path (s)):

sal*res*VPL*COERC + RESP*SAL*RES*COERC + RESP*SAL*vpo*vpl*coerc + RESP*res*VPO*vpl*COERC + resp*sal*res*VPO*vpl*coerc + RESP*SAL*res*vpl*coerc → CUSTOM (solution consistency 0.878, solution coverage 0.689).

Parsimonious solution (omission of redundant path(s)):

sal*VPL + RESP*SAL + RESP*COERC + resp*res*VPO*coerc → CUSTOM (solution consistency 0.734, solution coverage 0.823).

Limited diversity:

38 out of 64 possible configurations are not observed empirically - 'a rather common scenario in applied QCA' (Schneider and Wagemann 2012: 169). 11 (CUSTOM), respectively 4 (custom), of these clustered (not arithmetic) logical remainders served as 'easy counterfactuals'. The careful use of directional expectations derived from previous Europeanization research has improved the results' parsimony, while ensuring their plausibility and coherence.

Simplifying assumptions for intermediate solution (11 logical remainders included into logical minimization):

RESP*SAL*res*VPO*VPL*COERC + sal*RES*VPL*COERC + RESP*sal*RES*VPO*COERC + RESP*SAL*VPL*coerc + RESP*SAL*RES*VPO*coerc.

Table 4.C: Truth table: Analysis of sufficiency for limited customization

RESP	SAL	RES	VPO	VPL	COERC	custom	Number	Consistency
0	1	0	0	0	1	1	1	1.000
0	1	0	0	1	1	1	1	1.000
0	1	1	0	1	1	1	1	1.000
0	0	0	0	0	0	1	4	1.000
1	0	0	0	0	0	1	3	0.989
1	0	0	1	0	0	1	1	0.985
0	1	1	1	0	0	1	3	0.908
0	0	0	0	0	1	0	2	0.868
0	0	0	1	0	0	0	1	0.824
0	0	0	1	1	1	0	1	0.824
0	1	1	1	1	1	0	5	0.784
0	1	1	1	0	1	0	2	0.758
0	1	0	0	0	0	0	5	0.751
0	0	0	1	0	1	0	6	0.747
0	0	0	0	1	1	0	4	0.728
1	0	0	1	1	1	0	3	0.644
1	1	0	1	0	0	0	1	0.624
1	1	1	0	1	1	0	2	0.617
1	0	0	0	1	1	0	5	0.538
1	1	0	1	0	1	0	2	0.538
1	1	1	1	1	1	0	4	0.526
1	1	1	1	0	1	0	4	0.513
1	0	0	1	0	1	0	5	0.513
1	1	1	0	0	1	0	3	0.509
1	1	0	0	0	0	0	4	0.506
1	1	1	0	0	0	0	3	0.482

Software: fs/QCA 2.5

Prime implicants: resp*RES*coerc OR resp*RES*vpl*coerc; resp*sal*res*vpo*vpl

The present data display tied logically redundant prime implicants, i.e. some degree of ambiguity (Schneider and Wagemann 2012: 108ff). In the analysis for limited customization, this has led to slightly differing complex and parsimonious solutions, with varying redundant paths and consistency and coverage values, depending on the order in which the fs/QCA 2.5 software chooses the prime implicants. The intermediate solution, which is interpreted here, remains robust regarding the non-redundant paths displayed in the paper.

Directional expectations: resp → custom, sal → custom, res → custom, vpo → custom, vpl → custom.

Full intermediate solution:

resp*RES*vpl*coerc + resp*sal*vpo*vpl*coerc + resp*SAL*vpo*COERC + RESP*sal*res*vpl*coerc + resp*SAL*VPO*vpl*coerc + sal*res*vpo*vpl*coerc → cust (solution consistency 0.952, solution coverage 0.411).

Two paths with unique coverage of 0.000 omitted from table 4.5: resp*SAL*VPO*vpl*coerc + sal*res*vpo*vpl*coerc. The first of these covers only case a3au which is a deviant case for consistency in kind; the second path covers no empirical cases (logical remainder).

Untenable assumptions: sal*VPL + RESP*SAL + RESP*COERC + resp*res*VPO*coerc.

Complex solution (omission of fully redundant path(s)):

sal*res*vpo*vpl*coerc + RESP*sal*res*vpl*coerc + resp*SAL*vpo*VPL*COERC + resp*SAL*RES*VPO*vpl*coerc → custom (solution consistency 0.965, solution coverage 0.377).

Parsimonious solution (under exclusion of untenable assumptions, omission of fully redundant path):

sal*vpo*vpl*coerc + RESP*sal*vpl*coerc + resp*RES*vpl*coerc + resp*SAL*RES*coerc + resp*SAL*vpo*COERC → custom (solution consistency 0.947, solution coverage 0.440).

Simplifying assumptions for intermediate solution (4 logical remainders included into logical minimization):

resp*sal*RES*vpl*coerc + resp*SAL*RES*vpo*vpl + resp*RES*vpo*vpl*coerc.

4.3 Theory evaluation

Following Schneider and Wagemann's (2012: 295-305) refinement of Ragin's principles of theory evaluation, the theoretical hunches T can be evaluated by comparing them with the solution terms S. First, T and S are negated. The set ~T denotes all the scenarios that are not predicted by the theoretical propositions. The set ~S denotes all the scenarios that were not observed in the solution term. Based on this, three questions can be answered. First, which parts of the theory are supported by the findings? This is, on the one hand, the Boolean intersection T*S – the area in which theory and results overlap. On the other hand, the intersection ~T*~S denotes those scenarios that neither theory nor the results deem sufficient for the outcome. Second, in which directions it should theory be expanded? This is the intersection ~T*S, the hitherto overlooked cases with regard to which the theory should be reformulated. Third, which parts need to be dropped? This is the intersection T*~S, namely the cases fort which theory predicts the occurrence for the outcome but which the solution does not capture, hence suggesting a delimitation of the theory.

Schneider and Wagemann (2012: 300ff) extend this framework by integrating the cases covered by these intersections. First, only cases that have membership in the intersection T*S and also display the outcome Y support the theory. Conversely, cases with ~Y indicate that both theory and empirics predict the outcome which, however, does not materialize. Second, cases in ~T*S that display the outcome Y suggest the direction in which theoretical expectations should be extended. Cases with ~Y, however, weaken this need for modification of the theory. Furthermore, in both intersections with S, logical remainders can materialize, which have no empirical coverage. Third, only cases that display both T*~S and ~Y indicate a delimitation of the theory. Low coverage indicates a low empirical importance to delimit theory. Cases with Y

support theory and weaken the plausiblity of the solution. Fourth, if all cases in ~T*~S also have ~Y, then there is no evidence that contradicts both T and S. Conversely, cases with Y contradict both T and S and indicate that hitherto overlooked explanations for the outcome should be explored.

I apply this technique first for the hypotheses on extensive customization and second for the hypotheses on limited customization (software: TOSMANA). For the sake of reader-friendliness, I use lower-case letter notation instead of the '~ sign to denote the negation of condition and outcome sets.

In formal terms, H1, H3 and H4 are present the following set relations, where the forward arrow '→' reads as 'is sufficient for': and '←' means 'is necessary for':

H1: RESP ← CUSTOM

H3: SAL*RES*(VPO + VPL) → CUSTOM

H4: RESP*COERC → CUSTOM

These hypotheses can be resumed into the following expected explanation for extensive customization:

T(CUSTOM): RESP*SAL*RES*VPO + RESP*SAL*RES*VPL + RESP*COERC → CUSTOM

With the intermediate solution obtained (for complexity reasons, without the path resp*res*VPO*coerc covering only one case) being

S(CUSTOM): RESP*SAL*coerc + RESP*SAL*RES + sal*VPL*COERC+ RESP*VPO*COERC → CUSTOM

I obtain the following set negations:

~T(CUSTOM): resp + sal*coerc + res*coerc + vpo*vpl*coerc

~S(CUSTOM): resp*SAL + resp*vpl + sal*vpo*vpl + sal*coerc + SAL*res*vpo*COERC + res*vpo*vpl*COERC + resp*coerc

The resulting intersections are

T(CUSTOM)*S(CUSTOM):

RESP*SAL*RES*VPO + RESP*SAL*RES*VPL + RESP*SAL*RES*COERC + RESP*sal*VPL*COERC + RESP*VPO*COERC

~T(CUSTOM)*S(CUSTOM):

RESP*SAL*res*coerc + RESP*SAL*vpo*vpl*coerc + resp*sal*VPL*COERC

T(CUSTOM)*~S(CUSTOM): RESP*sal*vpo*vpl*COERC + RESP*SAL*res*vpo*COERC + RESP*res*vpo*vpl*COERC

~T(CUSTOM)*~S(CUSTOM): resp*SAL + resp*vpl + resp*coerc + sal*coerc

These intersections are represented in Table 4.6. The combinations of conditions proposed by the hypotheses were factored out.

Furthermore, H2 and H5 are formally represented as:

H2: resp → custom

H5: resp*coerc → custom

The theoretical expectation for limited customization is hence

T(custom): resp + resp*coerc → custom

The intermediate solution has yielded

S(custom): resp*RES*vpl*coerc + resp*sal*vpo*vpl*coerc + resp*SAL*vpo*COERC + RESP*sal*res*vpl*coerc → custom

Both sets are then negated:

~T(custom): RESP

~S(custom): RESP*RES + SAL*res*coerc + resp*res*VPO + sal*VPL + VPL*coerc + sal*COERC + SAL*res*VPO + VPO*VPL + RESP*SAL + VPO*COERC + RESP*VPL + RESP*COERC

Based on this, the following intersections are calculated:

T(custom)*S(custom): resp*SAL*vpo*COERC + resp*coerc*RES*vpl + resp*coerc*sal*vpo*vpl

~T(custom)*S(custom): RESP*sal*res*vpl*coerc

T(custom)*~S(custom): resp*res*VPO + resp*sal*VPL + resp*sal*COERC + resp*VPO*VPL + resp*VPO*COERC + resp*coerc*SAL*res + resp*coerc*VPL

~T*(custom)~S(custom): RESP*RES + RESP*SAL + RESP*VPL + RESP*COERC

These intersections are represented in Table 4.7. The combinations of conditions proposed by the hypotheses were factored out.

5 Appendix for chapter 5

Table 5.A: Logical remainders

Omitted from Table 5.2:	**Table 5.3:**
Intermediate domestic resistance High institutional constraints Flexible EU rule Coercive interventionist style	Weak resistance Flexible EU instrument Coercive interventionist style Macro issue
Weak resistance Flexible EU instrument Non-coercive interventionist style	Strong resistance Flexible EU instrument Micro issue
Intermediate resistance High institutional constraints Flexible EU instrument Coercive interventionist style	**Table 5.4:** Weak resistance Flexible EU instrument Coercive interventionist style Directive 90/167/EEC
	Intermediate resistance Low institutional constraints Flexible EU instrument Non-coercive interventionist style Directives 2001/82/EC, 2006/130/EC

6 Appendix for chapter 6

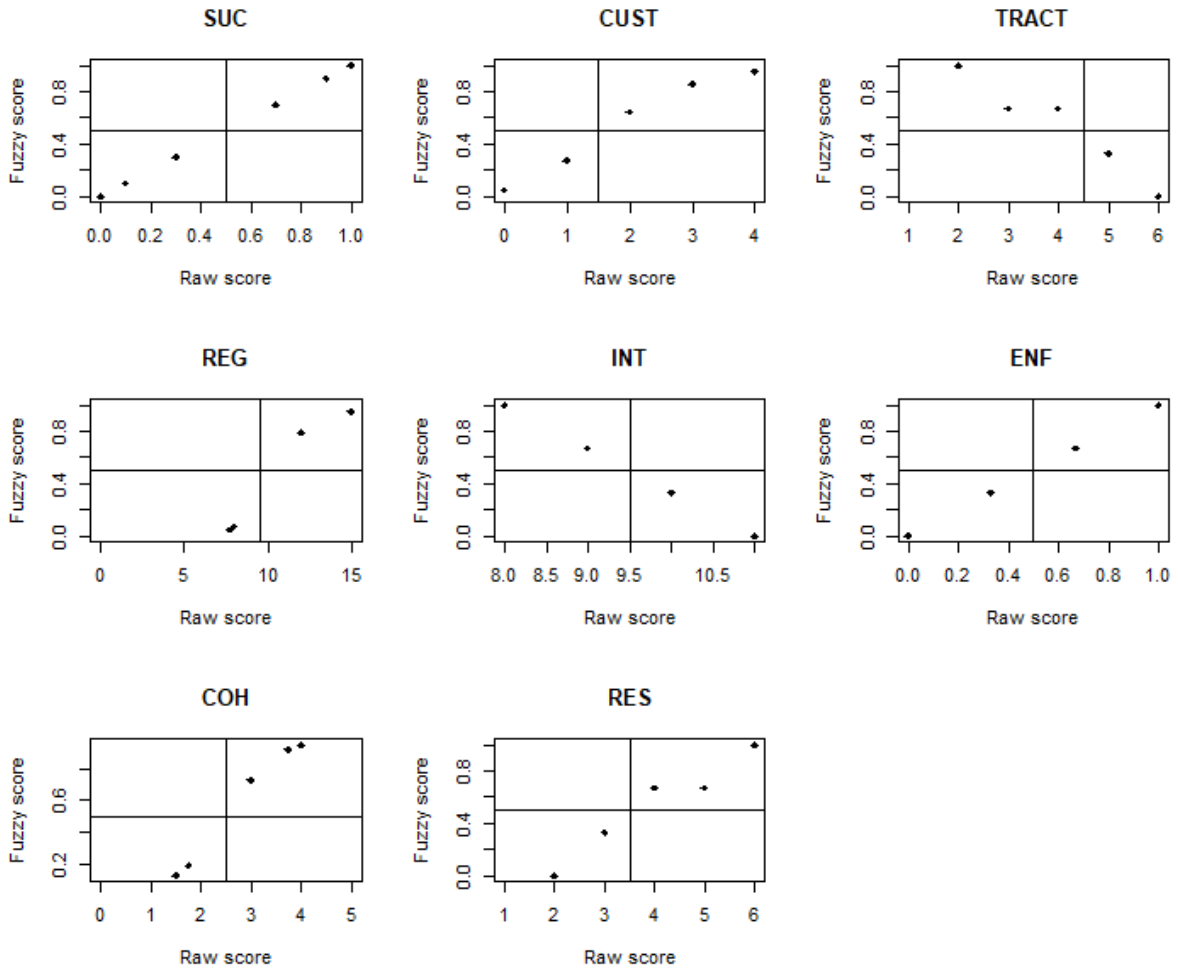
Table 6.A: Descriptive statistics of raw variables, set skewness

Variable	*Min-imum*	*Max-imum*	*Mean*	*Median*	*Stand-ard devia-tion*	*Set skewness*
Successful implementation	0	1	0.57	0.7	0.34	62.1
Customized density	0	2	0.89	1	0.81	-
Customized restrictiveness	0	2	0.94	1	0.91	-
Customization	0	4	1.92	2	1.26	70.5
Problem tractability	2	6	4	4	1.26	52.6
Regional self-rule	7.75	15	10.95	12	2.75	60
Integrated implementation structure	8	11	9.60	10	1.03	40
Centralized implementation structure	-	-	-	-	-	60
Active enforcement approach	0	1	0.81	1	0.36	81
External coherence	0	1	0.60	1	0.49	-
Suitable enforcement structure	0	1	0.80	1	0.40	-
Coherent definition of problem	0	1	0.40	0	0.49	-
Coherent objectives	0	1	0.60	1	0.49	-
Coherent functional parameters	0	1	0.40	0	0.49	-
Coherent organizational parameters	0	1	0.40	0	0.49	-
Policy design coherence	1.5	4	2.80	3	1.02	60
Domestic resistance	2	6	3.81	3	1.48	36.8

N = 95.

Skewness= per cent of cases with set membership > 0.5.

Figure 6.1: Raw values and calibrated fuzzy values with crossover points



6.1 Model evaluation

Box 6.A: Setting the raw consistency threshold

Measurement error and discretionary analytic decisions can affect the robustness of QCA results (Maggetti and Levi-Faur 2013; Thiem et al. 2015). In particular, how raw consistency thresholds are set decisively affects the results. Different parameters help researchers decide about appropriate raw consistency thresholds: Raw consistency values indicate the sufficiency of a row for the outcome, PRI values, its simultaneous sufficiency for the negated outcome, and deviant cases for consistency in kind (DCCK) indicate cases that "falsify" the sufficiency claim (Schneider and Wagemann 2012). Especially with large-N analyses, the parameters of fit can sometimes be misleading (Haesebrouck 2015). In order to account for possible pitfalls, I use all these criteria for setting raw consistency thresholds, checking for different options to enhance the robustness of and confidence in my results. Among the resulting models (see below), I identified the 'best-ranking' model regarding the equally weighted criteria of consistency, coverage, number of covered cases, number of deviant cases for consistency in kind, and model ambiguity. The ranking was based on the average percent to which the given model reached the optimum (100 percent) on the five indicators. The optimum consistency and coverage is 1. The optimum for covered cases was 59 for SUC and 36 for ~SUC. The optimum for non-deviant cases for consistency in kind (DCCK) was the number of covered cases. The optimum ambiguity is 3 models (1 conservative, 1 intermediate and 1 parsimonious). The results are reported below in Table 6.B.

Successful implementation (SUC)

As Table C2 shows, raw consistency values and PRI values tend to be generally high and there are no clearly identifiable gaps or sharp declines in raw consistency values. One reason for this is that the outcome set is slightly skewed toward high membership. However, this makes it difficult to identify an obvious choice for a raw consistency threshold. Generally speaking, the parameters of fit are difficult to interpret in analysis using both a large N and fuzzy sets, since they are heavily influenced by the scores of substantively irrelevant cases (Haesebrouck 2015). I therefore additionally use PRI and the presence of DCCK as an indicator.

Option 1. A first obvious decline in PRI values is found in row 45. However, that row has high consistency and no DCCK. A next decline in PRI values follows in row 64. Indeed,

there we see that the share of DCCK is 50 per cent, whereas it is much lower in the higher-ranked rows. The subsequent row 59 has 100% DCCK. A first, obvious threshold is therefore 0.859 (including row 63, excluding row 64).

Option. 2 Option 2 includes two more rows with no DCCK but a PRI above 0.6 (rows 53, 16 and 22), while excluding all rows with more than 25% DCCK. Accordingly, I apply a raw consistency threshold of 0.819 and exclude rows 64, 59, 46, 51, and 3.

Option 3. As a third option, I modify option 2 such that all rows with 25% or more DCCK are excluded (Raw consistency threshold 0.819, exclude rows 64, 27, 59, 46, 51, and 3).

Option 4. As a fourth option, I derive a solution for all truth table rows that contain no DCCK (raw consistency threshold 0.781, excluding rows 27, 63, 64, 59, 46, 51, 3, 32, 48, 62, 23, 61, 15, 49).

Option 5. Fifth, I derive a solution for all truth table rows with less than 25% DCCK (raw consistency threshold 0.781, excluding rows 27, 64, 59, 46, 51, 3, 32, 48, 62, 23, 61, 15, 49).

Option 6. Finally, I derive a solution for all truth table rows with 25% DCCK or less (raw consistency threshold 0.781, excluding rows 64, 59, 46, 51, 3, 32, 48, 62, 23, 61, 15, 49).

As Table 6B shows, the model resulting from option 6 performs best on average in the ranking and is therefore interpreted in the main text and used for determining the untenable assumptions that guide the analysis of unsuccessful implementation (~SUC). Five out of nine terms are robust across all six options, whereas the other terms appear in between 3 and 5 of the six models. Overall, this points to a good robustness of the results.

Unsuccessful implementation (~SUC)

In contrast to the truth table for SUC, raw consistencies and PRI values are generally low in the analysis for ~SUC. Again, this may partly be due to the outcome being skewed toward low membership.

Option 1. A first option is to set the raw consistency threshold where there is a first sharp decrease in PRI accompanied by a significant share of DCCK in row 61 (threshold 0.774).

Option 2. Secondly, I set the raw consistency threshold at the usually recommended lower limit of 0.75 while excluding rows with a majority of DCCK (rows 61, 49, 21).

Option 3. In the face of low coverage values, I lower the raw consistency threshold to 0.7

while excluding rows with a majority of DCCK (rows 61, 49, 21, 53, 16, 37, 22, 46, 64, 45). This threshold is lower than what is usually recommended; however, parameters of fit and therefore also thresholds are highly contingent on the specific research context (Schneider and Wagemann 2010). Here they seem to be artificially low as an artefact of calibration and case distributions (Thomann and Maggetti 2017); lowering the threshold seems appropriate to correct for this.

From the resulting solutions, option 2 ranks best on average and, being robust, is therefore chosen for the analysis.

Table 6.B: Model evaluation

Option	*Conservative Solution Terms*	*Solution Consistency*	*Solution Coverage*	*Ambiguity*	*Number of Cases Covered*	*Number of DCCK*	*Model Rank*
	Outcome: Successful implementation (SUC)						
1	cust*CENT*enf*COH*res + CUST*cent*ENF*coh*RES + CUST*TRACT*cent*coh*RES + CUST*tract*CENT*ENF*res + CUST*TRACT*cent*ENF*RES + cust*TRACT*enf*COH*res + TRACT*CENT*ENF*COH*res	0.886	0.639	5	37	2	73.96
2	cust*CENT*enf*COH*res + CUST*cent*ENF*coh*RES + CUST*TRACT*cent*coh*RES + CUST*TRACT*cent*ENF*coh + CUST*tract*CENT*ENF*res + CUST*TRACT*cent*ENF*RES + cust*TRACT*enf*COH*res + TRACT*cent*ENF*coh*RES + TRACT*CENT*ENF*COH*res + cust*tract*CENT*ENF*COH*RES	0.879	0.685	6	41	2	74.20
3	CUST*cent*ENF*coh*RES + CUST*TRACT*cent*coh*RES + CUST*TRACT*cent*ENF*coh + CUST*tract*CENT*ENF*res + CUST*TRACT*cent*ENF*RES + TRACT*cent*ENF*coh*RES + TRACT*CENT*ENF*COH*res + cust*tract*CENT*enf*COH*res + cust*tract*CENT*ENF*COH*RES + cust*TRACT*cent*enf*COH*res	0.883	0.655	5	38	1	75.12
4	TRACT*cent*ENF*coh + CUST*cent*ENF*coh*RES + CUST*TRACT*cent*coh*RES + CUST*tract*CENT*ENF*res + CUST*TRACT*cent*ENF*RES + cust*tract*cent*enf*coh*RES + cust*tract*CENT*enf*COH*res + cust*tract*CENT*ENF*COH*RES + cust*TRACT*cent*enf*COH*res + cust*TRACT*CENT*ENF*COH*res	0.885	0.617	6	33	0	71.23
5	TRACT*cent*ENF*coh + CUST*cent*ENF*coh*RES + CUST*TRACT*cent*coh*RES + CUST*tract*CENT*ENF*res + CUST*TRACT*cent*ENF*RES + TRACT*CENT*ENF*COH*res + cust*tract*cent*enf*coh*RES + cust*tract*CENT*enf*COH*res + cust*tract*CENT*ENF*COH*RES + cust*TRACT*cent*enf*COH*res	0.885	0.669	5	40	1	76.14
6	**TRACT*cent*ENF*coh (5) + cust*CENT*enf*COH*res (3) + CUST*cent*ENF*coh*RES (6) + CUST*TRACT*cent*coh*RES (6) + CUST*tract*CENT*ENF*res (6) + CUST*TRACT*cent*ENF*RES (6) + cust*TRACT*enf*COH*res (3) + TRACT*CENT*ENF*COH*res (6) + cust*tract*cent*enf*coh*RES (3) + cust*tract*CENT*ENF*COH*RES (5)**	**0.881**	**0.7**	**5**	**43**	**2**	**77.27**

Option	*Conservative Solution Terms*	*Solution Consistency*	*Solution Coverage*	*Ambiguity*	*Number of Cases Covered*	*Number of DCCK*	*Model Rank*
	Outcome: Unsuccessful implementation (~SUC)						
1	cust*CENT*ENF*coh*res + cust*tract*CENT*ENF*coh + cust*TRACT*cent*enf*coh*RES + CUST*TRACT*CENT*enf*COH*res + CUST*TRACT*CENT*ENF*coh*RES	0.81	0.512	5	9	1	66.73
2	**cust*CENT*ENF*coh*res (3) + cust*tract*CENT*ENF*coh (3) + CUST*TRACT*enf*COH*res (2) + cust*TRACT*cent*enf*coh*RES (3) + cust*TRACT*CENT*ENF*COH*RES (2) + CUST*TRACT*CENT*ENF*coh*RES (3)**	**0.773**	**0.585**	**5**	**11**	**1**	**68.53**
3	cust*CENT*ENF*coh*res + cust*tract*CENT*ENF*coh + CUST*TRACT*cent*enf*COH + CUST*TRACT*enf*COH*res + cust*tract*cent*enf*COH*res + cust*TRACT*cent*enf*coh*RES + cust*TRACT*CENT*ENF*COH*RES + CUST*TRACT*CENT*ENF*coh*RES	0.771	0.63	9	14	2	64.03

Bold font: best-performing model chosen for interpretation.
Numbers in brackets refer to the number of models in which the prime implicant is contained.

6.2 Truth tables

Table 6.C: Truth table for successful implementation (SUC)

Row Nr.	*CUST*	*TRACT*	*CENT*	*ENF*	*COH*	*RES*	*OUT*	*n*	*Raw cons.*	*PRI*	*% DCCK*
19	0	1	0	0	1	0		1	0.972	0.931	0
50	1	1	0	0	0	1		2	0.941	0.849	0
11	0	0	1	0	1	0		1	0.892	0.778	0
38	1	0	0	1	0	1		6	0.886	0.823	0
54	1	1	0	1	0	1		1	0.880	0.722	0
47	1	0	1	1	1	0		7	0.879	0.776	0
56	1	1	0	1	1	1		2	0.878	0.756	0
45	1	0	1	1	0	0		3	0.872	0.676	0
31	0	1	1	1	1	0		4	0.870	0.734	0
27	0	1	1	0	1	0		4	0.870	0.738	25
63	1	1	1	1	1	0		8	0.863	0.740	12.5
64	1	1	1	1	1	1		2	0.858	0.654	50
59	1	1	1	0	1	0		1	0.852	0.574	100
53	1	1	0	1	0	0		2	0.839	0.649	0
46	1	0	1	1	0	1		3	0.838	0.625	33.3
16	0	0	1	1	1	1		1	0.832	0.636	0
51	1	1	0	0	1	0		1	0.825	0.583	100
3	0	0	0	0	1	0		1	0.825	0.614	100
22	0	1	0	1	0	1		1	0.823	0.605	0
32	0	1	1	1	1	1		1	0.818	0.576	100
48	1	0	1	1	1	1		5	0.811	0.630	40
21	0	1	0	1	0	0		1	0.810	0.551	100
62	1	1	1	1	0	1		2	0.810	0.465	0
23	0	1	0	1	1	0		1	0.804	0.625	100
61	1	1	1	1	0	0		5	0.803	0.519	40
15	0	0	1	1	1	0		4	0.802	0.603	75
49	1	1	0	0	0	0		2	0.797	0.532	50
2	0	0	0	0	0	1		1	0.786	0.647	0
55	1	1	0	1	1	0		2	0.780	0.600	100
40	1	0	0	1	1	1		3	0.768	0.613	66.7
29	0	1	1	1	0	0		3	0.759	0.387	66.7
14	0	0	1	1	0	1		1	0.755	0.428	100
37	1	0	0	1	0	0		2	0.749	0.520	50
13	0	0	1	1	0	0		2	0.736	0.335	66.7

Limited diversity: 37 out of 64 truth table rows are observed empirically (57.8%). Limited diversity is due to clustered, not arithmetic remainders.

Raw consistency threshold 0.781, rows 64, 59, 46, 51, 3, 32, 48, 62, 23, 61, 15, 49 are excluded. Directional expectations see Table 1. Row dominance was applied.

Conservative solution:

TRACT*cent*ENF*coh + cust*CENT*enf*COH*res + CUST*cent*ENF*coh*RES + CUST*TRACT*cent*coh*RES + CUST*tract*CENT*ENF*res + CUST*TRACT*cent*ENF*RES +

cust*TRACT*enf*COH*res + TRACT*CENT*ENF*COH*res + cust*tract*cent*enf*coh*RES + cust*tract*CENT*ENF*COH*RES → SUC (solution consistency 0.882, solution coverage 0.699).

Parsimonious solutions:

The present data display tied logically redundant prime implicants, and hence, a modest degree of model ambiguity. All solutions are reported below (Baumgartner and Thiem 2015; Schneider and Wagemann, 2012: 108ff). The two parsimonious models differ only in path 9 regarding the role of COH (M1) versus res (M2), respectively.

M1: cust*CENT*enf + CUST*cent*coh*RES + cust*tract*COH*RES + tract*cent*coh*RES + TRACT*cent*ENF*coh + TRACT*cent*ENF*RES + CUST*tract*CENT*res + TRACT*CENT*ENF*COH*res + (cust*TRACT*enf*COH) → SUC (solution consistency 0.866 solution coverage 0.713).

M2: cust*CENT*enf + CUST*cent*coh*RES + cust*tract*COH*RES + tract*cent*coh*RES + TRACT*cent*ENF*coh + TRACT*cent*ENF*RES + CUST*tract*CENT*res + TRACT*CENT*ENF*COH*res + (cust*TRACT*enf*res) → SUC (solution consistency 0.866, solution coverage 0.712).

Intermediate solution:

CUST*cent*coh*RES + tract*cent*coh*RES + TRACT*cent*ENF*coh + TRACT*cent*ENF*RES + cust*CENT*enf*COH*res + cust*tract*ENF*COH*RES + cust*TRACT*enf*COH*res + TRACT*CENT*ENF*COH*res + CUST*tract*CENT*ENF*res → SUC (solution consistency 0.881, solution coverage 0.700).

The two intermediate solutions (resulting from the two parsimonious models) are identical.

Table 6.D*: Simplifying assumptions (PS M1) and easy counterfactual (SUC)*

Row	*CUST*	*TRACT*	*CENT*	*ENF*	*COH*	*RES*	*Easy counterfactual (used for intermediate solution)*
4	0	0	0	0	1	1	
6	0	0	0	1	0	1	X
8	0	0	0	1	1	1	X
9	0	0	1	0	0	0	
10	0	0	1	0	0	1	
12	0	0	1	0	1	1	
20	0	1	0	0	1	1	
24	0	1	0	1	1	1	X
25	0	1	1	0	0	0	
26	0	1	1	0	0	1	
28	0	1	1	0	1	1	
34	1	0	0	0	0	1	X
41	1	0	1	0	0	0	

Table 6.E: Truth table for unsuccessful implementation (~SUC)

Row Nr.	*CUST*	*TRACT*	*CENT*	*ENF*	*COH*	*RES*	*OUT*	*n*	*Raw cons.*	*PRI*	*% DCCK*
13	0	0	1	1	0	0	1	2	0.867	0.665	0.0
29	0	1	1	1	0	0	1	3	0.848	0.613	33.3
62	1	1	1	1	0	1	1	2	0.834	0.535	0.0
14	0	0	1	1	0	1	1	1	0.816	0.572	0.0
59	1	1	1	0	1	0	1	1	0.801	0.426	0.0
18	0	1	0	0	0	1	1	1	0.788	0.567	0.0
61	1	1	1	1	0	0	0	5	0.774	0.448	60.0
49	1	1	0	0	0	0	0	2	0.769	0.468	50.0
21	0	1	0	1	0	0	0	1	0.767	0.449	100.0
51	1	1	0	0	1	0	1	1	0.755	0.417	0.0
32	0	1	1	1	1	1	1	1	0.753	0.424	0.0
45	1	0	1	1	0	0	0	3	0.733	0.324	100.0
64	1	1	1	1	1	1	0	2	0.733	0.346	50.0
46	1	0	1	1	0	1	0	3	0.730	0.375	66.7
22	0	1	0	1	0	1	0	1	0.729	0.395	100.0
37	1	0	0	1	0	0	0	2	0.728	0.480	50.0
3	0	0	0	0	1	0	0	1	0.721	0.386	0.0
52	1	1	0	0	1	1	0	3	0.712	0.479	33.3
16	0	0	1	1	1	1	0	1	0.707	0.364	100.0
53	1	1	0	1	0	0	0	2	0.703	0.351	100.0
15	0	0	1	1	1	0	0	4	0.700	0.397	25.0
54	1	1	0	1	0	1	0	1	0.689	0.278	100.0
48	1	0	1	1	1	1	0	5	0.678	0.370	60.0
39	1	0	0	1	1	0	0	5	0.676	0.480	20.0
23	0	1	0	1	1	0	0	1	0.673	0.375	0.0
50	1	1	0	0	0	1	0	2	0.670	0.151	100.0
55	1	1	0	1	1	0	0	2	0.670	0.400	0.0
31	0	1	1	1	1	0	0	4	0.642	0.266	100.0
40	1	0	0	1	1	1	0	3	0.633	0.387	33.3
27	0	1	1	0	1	0	0	4	0.632	0.262	75.0
19	0	1	0	0	1	0	0	1	0.627	0.069	100.0
56	1	1	0	1	1	1	0	2	0.621	0.244	100.0
11	0	0	1	0	1	0	0	1	0.621	0.222	100.0
63	1	1	1	1	1	0	0	8	0.610	0.260	87.5
2	0	0	0	0	0	1	0	1	0.608	0.353	100.0
47	1	0	1	1	1	0	0	7	0.580	0.224	100.0
38	1	0	0	1	0	1	0	6	0.469	0.177	100.0

Limited diversity: 37 out of 64 truth table rows are observed empirically (57.8%). Limited diversity is due to clustered, not arithmetic remainders.

Raw consistency threshold 0.75, rows 61, 49, and 21 are excluded. Directional expectations see Table 1.Row dominance was applied.

Untenable assumptions:

Intermediate solution for SUC: CUST*cent*coh*RES + tract*cent*coh*RES + TRACT*cent*ENF*coh + TRACT*cent*ENF*RES + cust*CENT*enf*COH*res + cust*tract*ENF*COH*RES +

cust*TRACT*enf*COH*res + TRACT*CENT*ENF*COH*res + CUST*tract*CENT*ENF*res

Conservative solution:

cust*CENT*ENF*coh*res + cust*tract*CENT*ENF*coh + CUST*TRACT*enf*COH*res + cust*TRACT*cent*enf*coh*RES + cust*TRACT*CENT*ENF*COH*RES + CUST*TRACT*CENT*ENF*coh*RES → suc (solution consistency 0.786, solution coverage 0.539).

Parsimonious solutions (without excluding untenable assumptions):

High model ambiguity (4 different models, see R replication code).

Enhanced parsimonious solutions (excluding untenable assumptions):

The present data display tied logically redundant prime implicants, and hence, a modest degree of model ambiguity. All solutions are reported below (Baumgartner and Thiem 2015; Schneider and Wagemann, 2012: 108ff). The two enhanced parsimonious models differ only in path 5 regarding the role of coh versus RES respectively. M1 is preferable since it has both higher consistency and coverage.

M1: cust*CENT*coh + CUST*enf*COH*res + TRACT*CENT*coh*RES + cust*TRACT*CENT*RES + (cust*TRACT*enf*coh) → suc (solution consistency 0.773, solution coverage 0.585).

M2: cust*CENT*coh + CUST*enf*COH*res + TRACT*CENT*coh*RES + cust*TRACT*CENT*RES + (cust*TRACT*enf*RES) → suc (solution consistency 0.772, solution coverage 0.585).

Intermediate solutions:

M1: cust*CENT*coh + CUST*enf*COH*res + TRACT*CENT*coh*RES + cust*TRACT*CENT*RES + cust*TRACT*enf*coh*RES → suc (solution consistency 0.773, solution coverage 0.585).

M2: cust*CENT*coh + CUST*enf*COH*res + TRACT*CENT*coh*RES + cust*TRACT*CENT*RES + cust*TRACT*enf*coh*RES → suc (solution consistency 0.773, solution coverage 0.585).

The two intermediate models are identical.

Table 6.F: Simplifying assumptions (enhanced parsimonious solution, M1) and easy counterfactual (suc)

Row	*CUST*	*TRACT*	*CENT*	*ENF*	*COH*	*RES*	*Easy counterfactual (used for intermediate solution)*
9	0	0	1	0	0	0	X
10	0	0	1	0	0	1	X
17	0	1	0	0	0	0	
25	0	1	1	0	0	0	X
26	0	1	1	0	0	1	X
28	0	1	1	0	1	1	X
30	0	1	1	1	0	1	X
35	1	0	0	0	1	0	X
43	1	0	1	0	1	0	X
58	1	1	1	0	0	1	X

Simplifying assumptions for enhanced parsimonious solution (without simplifying untenable assumptions).