

# Is it all about the resources? A fuzzy-set Qualitative Comparative Analysis of street-level performance in Switzerland

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## Abstract

This article refines Lipsky's (1980) assertion that resource scarcity negatively affects output delivery. It uses fuzzy-set Qualitative Comparative Analysis to analyse the nuanced interplay of contextual and individual determinants of the output performance of Swiss veterinary inspectors as street-level bureaucrats (SLBs). Moving 'beyond Lipsky', the study builds on recent theoretical contributions and systematically compares SLBs across organizational contexts. Against a widespread assumption, performance is not all about the resources. The impact of perceived available resources hinges on caseloads, which prove to be more decisive. These contextual factors interact with individual attitudes emerging from the SLBs' diverse accountabilities. The results put the often-emphasized importance of worker-client interaction into context. In a setting where clients cannot escape the interaction, SLBs are not primarily held accountable by them. Studies of street-level performance should thus sensibly consider gaps between what is being demanded of and offered to SLBs, and the latter's multiple embeddedness.

Keywords: Street-level bureaucracy, public service gap, public accountability, output performance, Qualitative Comparative Analysis (QCA)

## Introduction

This article studies the interplay of contextual and individual determinants of the performance of street-level bureaucrats. Public servants are often expected to provide services in contexts where they are not given the resources to do so adequately (Lipsky 1980). Street-level bureaucrats are typically urged to maximize output while also minimizing cost: to ensure the prudent use of taxpayer money, budgets are limited and performance targets introduced (Tummers *et al.* 2012b). Situations may occur when the policy or the clients require the street-level bureaucrats to do something that is not possible given the available resources (Dias and Maynard-Moody 2007, p. 191; Brodtkin 2011). As a result, public policies might not be implemented in ways that resolve the policy problem, or services might not be delivered such that target groups are served. Resource scarcity hence crucially interferes with the effective implementation of policies at the street-level (Lipsky 1980). Particularly pressures for efficiency under New Public Management reforms and the current increased austerity measures create a need for a better understanding of these interferences (Hupe and Van der Krogt 2013, pp. 61-62). Research suggests that street-level bureaucrats virtually always face resource limitations (Kosar 2011), and that this strongly affects the attitudes and behaviour of caseworkers (Ricucci *et al.* 2004; Brodtkin 2012).

However, frontline workers' discretion when delivering output is a multi-faceted phenomenon (Meyers and Vorsanger 2003, p. 245). Multiple accountabilities guide and constrain the street-level bureaucrats' use of discretion (Hupe and Hill 2007). Street-level bureaucrats are faced with various demands from their environment (Hupe and Buffat 2014). Policies require them to perform output tasks; their organizations provide them with resources to do so; clients want them to take their situation into account; professional peers establish good practices (Hupe and Hill 2007). Caseloads matter (Brodtkin 2011): when insufficient resources are coupled with a high workload, street-level bureaucrats are required to 'do more with less'. Such a

mismatch between resources and the demands of work has been conceptualized by Hupe and Buffat (2014) as a ‘public service gap’. Empirical studies suggest that this is particularly detrimental for output delivery (Brodkin 2012, p. 944). Conversely, street-level bureaucrats may not automatically perform as prescribed when the resources suffice. They might face other conflicting or competing demands; for example, the policy might require them to act against professional standards. The role of resources is hence context-dependent and mediated by the individual perceptions and dilemmas of street-level bureaucrats (Johansson 2012).

It is therefore not enough to state that ‘resources are usually inadequate in street-level bureaucracies’ (Lipsky 1980, p. 29). Instead, this paper explores how the influence of a public service gap on street-level performance depends on the street-level bureaucrats’ policy alienation (Tummers 2012) and role conflicts (Tummers *et al.* 2012b). Thereby, the article moves ‘beyond Lipsky’ and applies and tests recent conceptualizations of the core notions of street-level bureaucracy. The paper analyses the output performance of 19 Swiss constituent state (cantonal) public veterinarians. Output performance is conceived as compliance with the targets for inspections on livestock farms in 2010, as set out by the Swiss Ordinance on Veterinary Medicinal Products (OVMP) (X 2012).

Implementation research faces the challenge to capture the cases’ particularities while still producing some modest level of generalization. The ‘complexity of implementation processes and the influences of multiple, interacting factors on street-level workers’ (Meyers and Vorsanger 2003, p. 245) has led to a predominance of case studies (Meyers and Vorsanger 2003, p. 251). As a consequence, ‘little comparative research on street-level bureaucracy that draws inferences across organizational contexts’ has been conducted (Hupe and Buffat 2014, p. 549). This paper intends to contribute to an ‘agenda for street-level bureaucracy research with a more systematic comparative logic’ (Hupe and Buffat 2014, p. 549). Its contribution lies, first, in emphasizing the role of context, in terms of what is being asked of street-level

bureaucrats in relation to what is offered to them. The paper studies how context interacts with individual factors. This article hence conceives of output performance as a multilayer phenomenon. Performance can have several distinct explanations that consist of configurations of diverse factors. This facilitates, second, to take into account the ‘multiple embeddedness’ of street-level bureaucrats (Hupe and Hill 2007, p. 291). Empirically, third, this study compares street-level bureaucrats across organizational contexts (Winter 2003, pp. 216-217, 221; Hupe and Buffat 2014) by using the method of fuzzy-set Qualitative Comparative Analysis (fsQCA) (Ragin 2000).

Resource constraints alone prove not to be as harmful as often assumed (Kosar 2011). The results underscore the importance of a public service gap for output performance.

Unexpectedly, the workload faced by street-level bureaucrats proves more decisive than the budgetary and personnel resources they report to have at hand. The influence of these factors is mediated by the street-level bureaucrats’ individual perceptions: first, of the policy’s compatibility with professional values and second, of its contribution to societal goals.

Conversely, street-level bureaucrats who mostly allocate sanctions are not primarily held accountable by their clients in a setting where the latter cannot escape the interaction.

The paper proceeds accordingly: in the next section, I elaborate on the theoretical foundations of factors influencing output delivery in street-level bureaucracies, and I derive three hypotheses about these influences. A brief presentation of the example of the OVMP, the method and research design follows. I then present the results and conclude with a discussion of their implications.

## **Street-level performance: Is it really all about the resources?**

‘There is always an implicit tension between resource constraints and the inexorable

demands for public services.’

Michael Lipsky (1980, p. 172)

The term ‘street-level bureaucrat’ refers to agents who implement public policies and ‘interact with and have wide discretion over the dispensation of benefits or the allocation of public sanctions’ (Lipsky 1980, p. xi), such as cops, teachers and counsellors (Moody and Musheno 2003). This study looks at veterinary inspectors as street-level bureaucrats. The work of these veterinary inspectors is crucially characterized by direct interaction with livestock farmers as clients (Brodkin 2012), relatively high degrees of discretion and a relative autonomy from organizational authority (Hupe and Hill 2007, p. 280). Street-level bureaucrats work at the interface between target groups and the state. As a consequence, they can significantly influence how public policies are put into practice (Lipsky 1980; Meyers and Vorsanger 2003, p. 246). For example, some inspectors are known to be more rigorous or consultative than others during controls (XY 2014). This study applies a relatively narrow conception of output performance (cf. Brodkin 2011). It asks whether and why the output goals set out by the policy are met by an street-level bureaucrat (Hupe and Hill 2007, p. 294) – specifically, whether the veterinary inspectors control the required number of livestock farms per year. Compliance with output goals has a timeless relevance and the advantages of visibility and comparability (Winter 2003, pp. 217ff).

A proper understanding of frontline implementation requires knowledge about the work context and pressures street-level bureaucrats experience (Johansson 2012; Lipsky 1980). Discretion – in other words, the freedom to act - is inherent in street-level bureaucracies, and simultaneously ‘always constrained’ (Hupe and Van der Krogt 2013, p. 59). Street-level bureaucrats are embedded within multiple accountabilities. Accountability refers to social relationships in which the street-level bureaucrats feel an obligation to explain and to justify

their conduct to some significant other (Hupe and Hill 2007, p. 286). The state, but also the profession and society provide street-level bureaucrats with norms and demands for expected behavior. These norms, called *action prescription*, guide the street-level bureaucrats' behaviour (Hupe and Van der Krogt 2013; Hupe and Buffat 2014). This study focuses on the required number of inspections as the formal caseload imposed by the state (Meyers and Vorsanger 2003, p. 249). However, demands on street-level bureaucrats can also stem from professional norms, e.g. good practices, and expectations from the society or target groups (Hupe and Buffat 2014, p. 557).

Street-level bureaucrats attempt to meet these multiple demands stemming from their environment. However, institutional incentives and resources crucially establish the boundaries within which they can act (Brodkin 1997). *Action resources* denote a 'range of acts that enable street-level bureaucrats to fulfil their tasks, (...) such as training, education, professional experience, time, information, staff, and last but not least, the budget itself' (Hupe and Buffat 2014, p. 557). The focus here is on 'hard' public budgetary and personnel resources. However, broader views of resources include time, skills, knowledge and understanding (Ricucci *et al.* 2004). As the above quote illustrates, Lipsky (1980) states a chronic problem of demand and supply in street-level bureaucracies. The latter 'characteristically provide fewer resources than necessary for workers to do their job adequately'. As a consequence, street-level bureaucrats 'typically cannot fulfill their mandated responsibilities' (Lipsky 1980, p. 29). Lipsky essentially assumes that the street-level bureaucrats' mode of coping with such resource scarcities will be to 'do what they can' (Brodkin 1997, p. 24), which results in an implementation failure. A first hypothesis captures this assumption:

*H1: Resource scarcity leads street-level bureaucrats to perform deficiently.*

This statement grants resources a very high importance: it also implies that street-level bureaucrats *need* sufficient resources to perform appropriately. Yet bureaucrats deal with work pressures in manifold ways (e.g., Brodtkin 2011; Hupe and Van der Krogt 2013). In the light of the multiple embeddedness of street-level bureaucrats, Lipsky's (1980) assertion should be tested and refined. Under what circumstances do resource inadequacies affect street-level performance? Are resource constraints really a sufficient condition for lacking performance, or do other factors compensate for them? Does it follow that adequate resources motivate street-level bureaucrats to perform well? According to Lipsky (1980, p. 33), 'the salience of solutions to problems of resource inadequacy varies not only with the demands on services and the resources available, but also with the importance to an individual of deriving a satisfactory solution to these problems'. This statement has two implications relevant for this study.

First, resource constraints should be understood as the discrepancy between the goals to be attained and the means provided for doing so. Such a public service gap 'occurs when what is required of street-level bureaucrats exceeds what is provided to them for the fulfilment of their tasks' (Hupe and Buffat 2014, p. 557). This should be particularly detrimental to output delivery (Brodtkin 2012). The notion of a public service gap explicitly conceptualizes tensions between supply and demand as a relative statement. This enables a comparison across contexts (Hupe and Buffat 2014). The public service gap links existing results on the influence of resources (e.g., Brodtkin 1997; Riccucci *et al.* 2004) and of caseloads (e.g., Dias and Maynard-Moody 2007; Brodtkin 2011) on street-level performance. Second, Lipsky (1980) indeed implies that street-level bureaucrats can be more or less susceptible to the resource constraints they are facing: individual factors mediate their relevance. A second hypothesis hence links the interplay of a public service gap with individual perceptions to

performance (Johansson 2012):

*H2: In combination with unfavourable attitudes, high action prescriptions lead to deficient performance if the action resources do not suffice to meet these demands.*

Referring to these attitudes, I now discuss the ways street-level bureaucrats perceive the action prescriptions of the state, the profession and society, and the context in which they use their discretion.

## **Policy alienation, role conflicts and context**

Personal characteristics and subjective experiences influence decisions made at the street-level. Different attitudes may lead to different ‘styles’ of rule application (Winter 2003, p. 219; Tummers *et al.* 2012a). Specifically, that implementers identify with the policy is a prerequisite for effective implementation (May and Winter 2009). The street-level bureaucrat’s expectation to make a difference for real societal problems acts as an important accountability mechanism (Hupe and Van der Krogt 2013, p. 62). In this vein, policy alienation denotes the ‘psychological disconnection from the policy program being implemented by a public professional who interacts directly with clients on a regular basis’ (Tummers 2012, p. 516). Street-level bureaucrats with high levels of policy alienation have proven less willing to support the implementation of the policy (Tummers 2012). For instance, a veterinary inspector who thinks that the OVMP does not improve food safety might make little effort to control compliance with the regulations. Out of the two dimensions of policy alienation, Tummers (2012) finds only a weak correlation of feelings of powerlessness with implementation willingness. Consequently, I focus on policy

meaninglessness, conceived as the lack of an added-value of the policy to socially relevant goals (*societal meaninglessness*) and for the clients (*client meaninglessness*).

Besides identifying with policies to different degrees, street-level bureaucrats also interact with diverse reference groups. These interactions create roles, which in turn generate requirements for behaviour that legitimize the use of discretion. Accountability is not only practised in vertical relations such as managerial control, but, ‘essentially multiple’ (Moody and Musheno 2003, p. 20; Hupe and Hill 2007, p. 279). A lack of compatibility between multiple demands from different role providers can create role conflicts. Such role conflicts affect the willingness to perform (Tummers *et al.* 2012b). Street-level expertise is practised in horizontal relations with the wider circle of professionals as a first reference group. This leads to ‘professional accountability’. Professional, ‘ethical’ values shape how the street-level bureaucrats conceive their own role. Professional values are an important basis upon which street-level bureaucrats decide how to manage their work (Lipsky 1980, p. 147). Such values also help street-level bureaucrats to overcome the challenges met during implementation (Hupe and Van der Krogt 2013, pp. 56-57). This can create some kind of self-binding mechanisms or ‘defences against discretion’ (Hupe and Hill 2007, pp. 282-283, 289). For example, veterinary inspectors are trained veterinarians. As such, they are aware of the importance of cleaning technical feeding facilities after every use to prevent antibiotic resistances, even if the livestock farmers complain that the rules are overly strict. However, *policy-professional role conflicts* can occur when ‘professionals tasked with implementing a policy perceive the role requirements demanded by the policy contents to be incongruent with their professional attitudes, values and behaviour’ (Tummers *et al.* 2012b, p. 4). For example, a veterinary inspector may think that the content of the required inspections actually makes little sense.

The policy addressees are the second reference group of street-level bureaucrats. Hupe and Hill

(2007, p. 290) refer to ‘participatory accountability’ when saying that ‘the latter hold the former accountable but the opposite can be assumed to happen as well.’ For example, the livestock holders might urge the inspectors to consider that the OVMP is hard to implement both correctly and cost-effectively. *Policy-client role conflicts* occur when the street-level bureaucrats perceive the role behaviour demanded by their clients to be incongruent with the role behaviour demanded by the policy content (Tummers *et al.* 2012b, pp. 4, 13). If a street-level bureaucrat faces policy-professional or policy-client role conflicts, then it reduces implementation willingness (Tummers *et al.* 2012b).

Lipksy (1980, p. 47) argues that street-level bureaucrats are not primarily held accountable by their clients. Clients are usually non-voluntary; for instance, the livestock farmers cannot choose which inspector controls them, and the inspections are compulsory. Since they cannot escape the relationship, clients are not in a position to effectively discipline the street-level bureaucrat (XY 2014). For example, Keiser (2010) finds that street-level bureaucrats’ decisions are hardly influenced by their evaluation of the clients in the absence of face-to-face interaction. Hupe and Hill (2007, p. 294) assume that public-administrative accountability is more predominant than participatory accountability in ‘performance’ modes of implementation. I hence expect Swiss street-level bureaucrats to be held accountable more by the state, their professional peers and broader society than by their clients:

*H3: Action prescriptions and resources, policy alienation and policy-professional role conflicts are more relevant for output performance than policy-client role conflicts.*

Besides the contextual and individual factors mentioned above, the working context of street-level bureaucrats is structured by the institutional and policy design. This in turn varies on a range of dimensions that determine the situations in which street-level bureaucrats decide on

their use of, and the extent to which they have, discretion (Hupe and Hill 2007, p. 281). First, the ‘what’ factor (Tummers *et al.* 2012a): street-level bureaucracies differ in terms of professions, of policies and tasks carried out, and of the involved agencies (Hupe and Hill 2007, p. 284). This points to the ‘where’ factor in terms of the implementing organization’s characteristics (Tummers *et al.* 2012a; Garrow and Grusky 2013; Hupe and Van der Krogt 2013, pp. 59-60). Political attention and managerial factors weakly influence output behaviour (May and Winter 2009, p. 469). Oversight structures and political control serve to align the interests of implementing agents with policy making principals (Meyers and Vorsanger 2003, pp. 245-246). At the macro level, implementation contexts differ across political-administrative settings and specific implementation arrangements (Hupe and Buffat 2014). As I argue below, the design of this study holds most of these factors constant.

-- Table 1 about here --

Based on these theoretical and empirical insights, Table 1 summarizes the conditions for performance. Especially when evaluating H2, I seek to exploratively discover how action prescriptions and action resources as contextual factors interact with individual perceptions. Hence, I am not interested in the single conditions’ discrete effects. Notwithstanding, the direction of their influence should be as expected in the second column of Table 1. Surprising results then provide opportunities for further explorations to refine theory (Rihoux and Ragin 2009). This procedure is applied to an illustrative type of street-level bureaucracy within the context of federal Switzerland, namely the decentralized implementation structure of the OVMP.

## **Veterinary inspections on Swiss livestock farms**

During the last two decades, a host of food scandals related to animal diseases have increased the regulatory importance of food safety issues. One instance of this is the OVMP, which came into force in 2004 to ensure human and animal health. It regulates the supply and use of veterinary drugs for livestock. The livestock owners (farmers) as target group often administer the medications, supplied by veterinarians, to the animals single-handedly. The OVMP mandates that the public veterinarians of the 22 cantonal (regional) veterinary offices inspect each livestock farm every ten years to detect and sanction infringements of its provisions. Veterinary premises are presumably inspected every five years, but no official data exist. There are only 22 offices because the four 'Urkantone' share one veterinary office. The same goes for Appenzell Innerrhodes and Ausserrhodes, and Basel City and Basel Land. Liechtenstein is subject to the OVMP and treated as 'canton' henceforth.

The inspections on livestock farms serve to check compliance with several agricultural regulations. Amongst them are the provisions of the OVMP concerning the correct storage and use of veterinary drugs and the documentation thereof, including the drugs' labelling and inventory. Public veterinarians are responsible for carrying out the required inspections in their canton, and allocating sanctions for infringements. They interact directly and regularly with the clients when visiting farms, checking the livestock, the documents and the drugs' storage, and taking samples (XY 2014). The OVMP's target only concerns control frequencies. The cantonal implementation laws differ slightly regarding the arrangement of the inspections, but hardly their content (X 2012, p. 95).

-- Figure 1 about here --

There are strong indications that the public veterinarians use their discretion: Instead of the target of ten per cent, only 6.24 per cent of Swiss livestock farms have been monitored, on average, from 2004 to 2010 (ISVET). The lack of substantial differences between years precludes a cohort effect. A closer look at output delivery in 2010 (Figure 1) reveals large differences in the extent to which the cantonal veterinarians meet the OVMP's inspection target. This is the outcome I aim to explain.

These cantonal differences occur in the following context: all street-level bureaucrats have a comparable professional background, high discretion and organizational autonomy. They are subject to the identical regime of (lacking) public-administrative accountability (Hupe and Hill 2007, p. 288). Political oversight over these street-level bureaucrats is virtually absent: the Federal Veterinary Office publishes the data on the implementation of the inspections on livestock farms in a national database (ISVET). However, there are no enforcement measures against veterinary offices that do not comply with their control function (X 2012, p. 19ff). All public veterinarians are trained veterinarians and practitioners, not primarily managers (XY 2014).

Cantonal differences prevail in the number of livestock premises, the available resources and the interaction with clients. Between 305 and 6053 livestock farms exist in the assessed cantons, ten per cent of which must be inspected per year. The overall staff of cantonal veterinary offices comprises between one to forty persons. The personnel resources for the inspections of the OVMP range from 20 to 280 per cent of one full-time employee, with a budget of between 7500 and 600'000 Swiss francs (X 201, p. 26). Veterinary offices also grant permits upon charge. Specifically the larger offices also offer information and counselling services, but inspections are the public veterinarians' main task. The power relationship between inspectors allocating sanctions and the inspectees is asymmetric. This might imply that they practise lower levels of participatory accountability than street-level

bureaucrats in service delivery (XY 2014).

## Data and methods

This paper relies on semi-structured telephone interviews. These were conducted during the formative evaluation of the OVMP for the Swiss Federal Office of Public Health in spring 2012 (X 2012) in each veterinary office with the chief public veterinarian. The latter regularly and personally carry out inspections on livestock farms. Ticino and Zug did not participate; the respondent in Bern assumed office after 2010 (N = 19). The interviews comprised 85 closed and 25 open questions, lasted between one and three hours and were audio-recorded. Topics covered the respondents' general judgement of the OVMP and its instruments, the judgement and implementation of the control arrangement, the actor competencies, the roles of the public veterinarians and their experiences and relationship with the clients (X 2012, p. 83). The cantons are named alphabetically to ensure the respondents' anonymity.

Due to their contextual similarity as outlined above, the comparison of Swiss cantons facilitates to focus on selected determinants of output behaviour (Rihoux and Ragin 2009, pp. 22, 28). The Swiss cantons share their institutional and cultural macro-context and political-administrative settings. I compare street-level bureaucrats who enact the same policy within the same type of organization. Narrowing the number of relevant causal factors is a prerequisite for using Qualitative Comparative Analysis (QCA). QCA is increasingly applied to comparatively study complex social phenomena (Rihoux *et al.* 2011). The method entails the assumption that appropriate performance can have a different explanation than deficient performance (*causal asymmetry*). 'The assumption of *equifinality* allows for different, mutually non-exclusive explanations of the same phenomenon. Instead of assuming isolated effects of single variables, the assumption of *conjunctural causation* foresees the effect of a single condition unfolding only in combination with other (...) conditions' (Schneider and

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Wagemann 2012, p. 78, emphasis in the original). QCA is suitable for analysing intermediate numbers of cases. Since I seek to disentangle the nuanced interplay of action prescriptions with action resources and other factors, I consider QCA the appropriate method for the analysis.

QCA is a set-theoretic method: cases have membership in sets which represent variables, e.g., in the set of 'appropriate performance'. FsQCA (Ragin 2000), which is applied here, allows cases that display features to different degrees. FsQCA hence integrates a certain probabilistic element. QCA identifies complex combinations of conditions (configurations, paths) that are necessary and/or sufficient for an outcome. An explanation X is necessary ( $\leftarrow$ ) for the appropriate performance if appropriate performance cannot occur without X. X is sufficient ( $\rightarrow$ ) for appropriate performance if X always leads to appropriate performance.

The method has been described by Rihoux and Ragin (2009) and Schneider and Wagemann (2012). Based on a dialogue with the cases and theory, the membership of each case is first determined in each set (a process called 'calibration'), and then in each logically possible configuration. The entirety of these configurations are represented in the rows of a 'truth table'. During the following 'logical minimization' process, the shortest possible causal expression for the configurations causing the outcome is formulated – the solution term. The basic idea is that if an outcome D is present in a case displaying A, B and C as well as in another case which displays A and C, but not B, then it does not make a difference for the occurrence of D whether B is present or not. Subsequently, capital letters are used to indicate that a feature is present, while lower case letters denote its absence. FsQCA uses the logical operators 'or' (+) and 'and' (\*) of Boolean algebra. Hence, if we observed that  $A*B*C + A*b*C \rightarrow D$ , then this can be minimized to  $A*C \rightarrow D$ . I use the fsQCA 2.5 software and follow the Enhanced Standard Analysis procedure (ESA). I hence make theoretically informed directional expectations for single conditions (Table 1), and I make sure that no

combination of conditions is assumed to lead both to appropriate *and* deficient performance (Schneider and Wagemann 2012, 167ff, 200ff). The raw data and fuzzy set scores (Tables A and B), the complex and parsimonious solution terms, truth tables and directional expectations (Tables D and E) are reported in the online appendix.

There are two performance indicators for the results, both ranging from zero to one. The basis upon which appropriate thresholds for these indicators are chosen should be research-specific (Schneider and Wagemann 2010, p. 406). Consistency measures the degree to which the statement of sufficiency or necessity is in line with the empirical evidence. Consistency sufficiency can be indicated for truth table rows (raw consistency), single paths of, or the whole solution term. When choosing appropriate raw consistency levels, I checked for ‘gaps’ in the raw and PRI consistency values and the presence of contradictory cases with qualitatively different membership in the configuration and the outcome. Coverage then indicates to what extent the observations are explained by the configurations. Raw coverage expresses how much of the outcome is covered by a single path, solution coverage does the same for the solution term, while unique coverage indicates how much a path uniquely covers. Based on interview excerpts, I discuss typical cases, unexplained cases and contradictory cases, which display qualitatively different membership scores in a truth table row and the outcome (Schneider and Wagemann 2012, pp. 127-128, 139, 143ff) . Open answers were translated from German and French by the author.

## **Measurement and calibration**

I now turn to the measurement and calibration of the outcome and conditions, as resumed in Table 2. Closed survey questions were used to operationalize all attitude conditions. Using the direct calibration method (Schneider and Wagemann 2012, pp. 35-38), set membership ranges from 0 (e.g., fully deficient performance) to 1 (fully appropriate performance) with a

crossover point at 0.5 (neither deficient nor appropriate performance). Contrary to usual measurement scales, the crossover point is decisive: a membership of above 0.5 indicates that a feature is more present than absent (more appropriate than deficient performance), whereas fuzzy membership of less than 0.5 means that the feature is rather to fully absent (Ragin 2000).

*Performance*, measured as the per cent of farms in a canton that were inspected in 2010, is appropriate (PERF) if a canton practically complies with the inspection target (at least 8.5 per cent), and deficient (perf) if the percentage of inspected farms is below 1.5. The crossover point of 5.8 per cent expresses whether a canton performed above or below average in 2010.

*Action prescriptions* is a measure of the caseloads, specifically, the ten per cent of the total number of farms to be inspected in a canton. In the absence of a meaningful theoretical criterion, the calibration expresses whether these numbers are high compared to other cantons (PRES), or low (pres). The crossover point of 275 was chosen due to a gap in the values slightly above the sample average. For the measure for *action resources*, the respondents indicated, on a scale from 1 to 4, whether their personnel and budgetary resources were sufficient or rather sufficient (RES), or rather insufficient or insufficient (res) for performing the inspections (crossover point 2.5). A public service gap prevails when objectively high caseloads combine with the street-level bureaucrat's subjective perception of resource scarcity; formally, PRES\*res.

*Societal meaninglessness* is measured via the street-level bureaucrat's appraisal of the extent to which two rules related to his or her duties contribute to the OVMP's overarching goals. The responses are added into one index ranging from societal meaningfulness (sm) to societal meaninglessness (SM). In terms of *client meaninglessness*, the OVMP contains two major provisions, which specifically regulate the farmers' everyday use of the medicine. The street-level bureaucrats indicated whether they perceived these two provisions as useful (cm) or not

(CM). To address a possible social desirability response bias emerging from a tendency to avoid open criticism, I consider added-values of 5 resulting from one ‘rather positive’ and another ‘rather negative’ response already as more meaningless than meaningful. I thus set the crossover point at 4.5. I follow this procedure for setting the crossover point for all conditions that consist of an eight-value index.

If the number and the content of inspections do not make sense to the street-level bureaucrat, then conducting the inspections cannot seem sensible to him or her (8-value index). This leads to a *policy-professional role conflict* (PC). A *policy-client conflict* prevails if the street-level bureaucrat finds it impossible for the livestock farmers to implement the provisions of the OVMP (CC), which is what he or she monitors and sanctions during inspections. The calibration is parallel to the one for RES, with an index value of 4 (not realizable) corresponding to a full conflict.

-- Table 2 about here --

## **Resource constraints: omni-present and detrimental?**

I first assess necessary conditions for deficient and appropriate performance. The assumption still prevails that resources for street-level bureaucracies seldom suffice to meet demand (Kosar 2011). I contest this claim to a degree with my data on the Swiss street-level bureaucrats: only one third of them complain about insufficient resources, and a public service gap is a rare phenomenon prevailing in only four cantons. Indeed, no single necessary condition for output performance was detected (Table C online appendix). Figure 2 illustrates that perceived sufficient resources do not necessarily make street-level bureaucrats perform appropriately. Furthermore, perceived resource scarcity is far from consistently leading to

deficient output performance. Hypothesis 1 has hence been refuted: it is not all about the resources. The pattern for high and low caseloads is similar. In the cantons E, O and Q, a public service gap is indeed associated with deficient performance, whereas J faces a public service gap, but still performs appropriately.

-- Figure 2 about here --

### **Deficient performance and the public service gap**

What leads the cantonal public veterinarians in Switzerland to not perform the required number of inspections? The second and third columns in the first row of Table 3 illustrate the two paths that are sufficient for deficient performance. The consistency and coverage indicators for the single paths, as well as for the overall intermediate solution term, are listed below. The second row indicates the cantons that display the respective combination of factors. High action prescriptions or low resources are prominent in both scenarios, pointing to their crucial relevance.

-- Table 3 about here --

In three cantons (path 1), the street-level bureaucrat faces a public service gap: action prescriptions are high (PRES) and resources insufficient (res). The street-level bureaucrat thinks that the OVMP's regulations are realizable for the clients (cc), but finds the regulations unsuitable to achieve the overarching goals (SM), and useless for the clients (CM). The public veterinarian from O narrates how the accumulated effect of these factors makes it is nearly impossible, but also seemingly unnecessary, to comply with the inspection requirements:

‘Yes, the number of inspections that we perform is insufficient (...) the reason is that we lack personnel for controlling so many farms. (...) The existing control system is expensive and serves for little. (...) the implementation of the written agreement is sometimes rather symbolic and of little added value for the farmers (...) The burden for livestock holders to document the use of drugs is rather reasonable, but in large livestock farms, they often don’t do it to spare the effort. In a regular inspection, it is hardly feasible to check such huge piles of papers. It’s also really not relevant for us.’

Interview, 4.1.2012.

The single canton A (path 2) is amongst the cantons with the most agricultural sites (PRES) and the street-level bureaucrat’s identification with inspection duties is low (PC). In this context, the street-level bureaucrat’s perception that the regulations are *not* realizable for the farmers (CC) adds to deficient performance. The street-level bureaucrat emphasizes the accumulated demotivating effect of the high action prescriptions, specifically the complexity and amount – with a resulting lack of time - of work:

‘The documentation requirements urgently need to be loosened (...) They’re too complex and time-consuming, both for the livestock holders who have to do it, and for us to control it. We would really accomplish the same with less.’

Interview, 3.1.2012.

The results partly support hypothesis 2: the interplay of high action prescriptions with unfavourable attitudes leads to deficient performance. However, unexpectedly, path 2 shows

that high action prescriptions do not have to combine with a perceived lack of resources to lead to deficient performance. Furthermore, in favour of hypothesis 3, the role of a policy-client conflict is ambiguous and context-dependent.

-- Figure 3 about here --

The low solution coverage suggests that the assessed factors have quite a limited ability to explain deficient performance. Figure 3 visualizes the cases' membership in the solution term and the outcome set. The fact that there are no contradictory cases highlights the good consistency of this solution. However, the four cases situated in the upper left quadrant – half of all cantons performing deficiently – still require explanation.

### **Low caseloads and appropriate performance**

What are the sufficient conditions for appropriate performance? Table 4 shows three different paths that lead the street-level bureaucrats to perform the required inspections. The absence of a public service gap implies that there are either low caseloads or sufficient resources (formally,  $pres + RES$ ) (Schneider and Wagemann 2012, p. 82). This is the case in all three paths; thus, the absence of a public service gap is an essential part of the story why Swiss street-level bureaucrats perform appropriately. It catches the eye that low caseloads are empirically much more relevant than sufficient action resources.

-- Table 4 about here --

The perception that resources suffice (RES) is only causally relevant in P (path 3). In addition, the street-level bureaucrat conceives the policy as meaningful (sm\*cm) and does not face a policy-professional role conflict (pc). Hence, thinking that the clients cannot easily comply with the policy (CC), the street-level bureaucrat does monitor them. Professional values appear more decisive for this street-level bureaucrat than the clients' needs.

In line with hypothesis 3, the roles of both conditions that refer to the clients (client meaninglessness and policy-client role conflict) are ambivalent. If resource constraints or caseloads are low and the professional can identify with the duties to be carried out, then the thought that the OVMP's regulations are hard to implement for farmers (CC) makes the street-level bureaucrat perform appropriately. This is also the case in two small, mountainous, French-speaking cantons (path 1). The cantonal veterinarian of I explains how, since action prescriptions are low (pres) and a policy-professional role conflict is absent (pc), the inspections are used as an opportunity to improve target group behaviour:

'The requirements to count stocks are not equally suitable for all types of livestock farms (...) we should take the time to explain their usefulness to the livestock owners.'

Interview, 11.1.2012.

By contrast, in four predominantly German-speaking cantons (path 2), the *absence* of a policy-client role conflict somewhat 'rules out' client meaninglessness. The street-level bureaucrat has a manageable workload (pres), and simultaneously thinks that the regulations are useless for the clients (CM), but, in principle, realizable for them (cc). The quote from the cantonal veterinarian in G, one of the cantons with the least agricultural sites, illustrates how this again leads the street-level bureaucrat to focus on enforcement as a means to raise the

farmers' compliance with the policy:

'For the livestock holders, the problem is that the rules for the use of drugs are constricting (...) the reason why they don't comply with the documentation requirements is pure lazyness and indifference, it's not in bad faith (...) The farmers are insufficiently aware of what we are trying to accomplish with the OVMP (...) we have to raise their awareness.'

Interview, 11.1.2012

Figure 4 illustrates that the empirical evidence is highly consistent with the statement that these three paths are sufficient for appropriate performance. M is nonetheless a contradictory case, which displays path 2, but has deficient performance. Furthermore, the appropriate performance of three cantons (C, J, S) is not explained by this solution. Given the considerably higher coverage of these results, the theorized conditions have proven more apt for understanding *appropriate* performance than for previously explaining why street-level bureaucrats do *not* perform appropriately.

-- Figure 4 about here --

In sum, the results mostly reflect the expected interplay of action prescriptions and resources, societal meaninglessness and the policy-professional role conflict (H2). Yet perceived resource scarcity does not play the vital role assumed in H1. H3 is supported and can be amended to client meaninglessness. The context-dependent role of factors referring to clients suggests that clients are indeed not the primary source of accountability for the Swiss street-level bureaucrats.

## **Puzzling cases and limitations**

To shed light on the limitations of the study, I now compare the ‘most deviant cases’ for consistency and coverage of S, F and M to cantons with similar constellations of explanatory factors, but the opposite outcome. The aim is to identify additional factors that made the difference (cf. Schneider and Wagemann 2012, pp. 307ff).

What distinguishes the unexplained case of S from H is that S aids other cantons with the inspections of veterinary premises – and so do the two other large cantons whose appropriate performance has remained unexplained. The high degree of professionalization, the higher service-orientedness and exposure of the activities of the veterinary office in S reportedly create a certain ‘role model’ effect and sensitize the staff. The role of the organizational context (Tummers *et al.* 2012a; Garrow and Grusky 2013) was neglected in this study because of weak prior empirical evidence (May and Winter 2009; Tummers *et al.* 2012b).

Why is F is one of the worst-performing cantons, whereas N performs adequately? Contrary to the latter, F has international borders. Buying cheap veterinary drugs abroad is a widespread, difficult-to-detect illegal practice among livestock farmers. This practice is reportedly most salient in cantons that are close to an international border. Foreign veterinarians can also import small amounts of medicines without bureaucratic procedures (X 2012). This leads the inspector of F to feel powerless to resolve the ‘real’ problem:

‘We have a severe problem of transboundary traffic (...) we have to intervene in this matter. It crucially takes means to control and stop these people. (...) We don’t even know which veterinarians are legally allowed to practise in Switzerland.’

Interview, 13.2.2012.

Vicinity to borders may also be why performance is deficient in the other three unexplained cantons, including the contradictory case M. Although Tummers (2012) has found a weak linkage of feelings of powerlessness with change willingness, my analysis suggests that such feelings could negatively affect output performance. I conclude by discussing these results' implications for the study of street-level performance.

## **Conclusions**

This study has analysed Lipsky's (1980) basic assertion that a lack of resources affects the output delivery of street-level bureaucrats negatively, yet depending on the workload and individual dilemmas they face. Based on the framework of public accountability (Hupe and Hill 2007) and through the application of QCA, I have merged and empirically applied the recently developed measures of a public service gap, policy alienation and role conflicts. These concepts have proven useful to explain the performance of Swiss veterinary inspectors. The study involves two major findings. First, the interplay of a tension between demand and supply (Hupe and Buffat 2014) with unfavourable individual perceptions emerging from the street-level bureaucrats' multiple embeddedness has explained why street-level bureaucrats perform deficiently. The absence of a public service gap is also an important part of the story why street-level bureaucrats perform appropriately. Interestingly, results suggest that the objective caseloads of street-level bureaucrats help us understand output performance, more than the latter's subjective perception of their budgetary and personnel resources. Hence, the Swiss case somewhat challenges the view that resource scarcities dominantly 'virtually overdetermine' street-level behaviour (Brodkin 2012, p. 943; Kosar 2011). It is not all about the resources. The results encourage the view that the *combination* of objectives and resources

shapes the setting in which street-level bureaucrats act (Johansson 2012, p. 1034; Hupe and Buffat 2014). Furthermore, one must consider the street-level bureaucrats' multiple demands for behaviour (Hupe and Van der Krogt 2013, p. 66).

Second, the Swiss street-level bureaucrats refer more consistently to the action prescriptions of the state, the profession, and broader society than to their clients when using their discretion. These results underscore Lipsky's (1980, p. 47) assumption that street-level bureaucrats are not primarily held accountable by their clients if the latter cannot effectively discipline them. In addition to Keiser (2010), I find evidence for this even if direct interaction is given. My results do not contest the assertion that worker-client interactions are relevant in principle (e.g., Maynard-Moody and Musheno 2003). However, they suggest that participatory accountability might not be *predominant* in 'performance' modes of implementation (Hupe and Hill 2007, p. 294), especially when an asymmetric power relationship is given as with inspectors who allocate sanctions (XY 2014). When clients are non-voluntary, the street-level bureaucrat's feelings of societal meaninglessness (Tummers 2012) and policy-professional role conflicts (Tummers *et al.* 2012b) in their interplay with contextual factors might be more decisive for output performance.

Two factors were neglected in the assessment: first, the degree of professionalism in the organizational context (e.g., Garrow and Grusky 2013) matters for appropriate performance. Second, feelings of powerlessness (Tummers 2012) contribute to deficient performance. The results presented in this study have a limited generalizability, that is, a limited ability to 'travel' to different country or policy contexts (Meyers and Vorsanger 2003, p. 251). A more fine-grained operationalization of 'softer' resources such as time or education (Riccucci *et al.* 2004) and other sources of action prescriptions in combination with a diachronic design would enhance our understanding of different types of public service gaps (Hupe and Buffat 2014).

Notwithstanding these limitations, the implementation of the OVMP illustrates that the workload faced by street-level bureaucrats and/or resource constraints might prominently range amongst the reasons for output performance. Thus, a profound understanding of street-level performance should sensibly involve an explicit analysis of the differences between what is being asked of and offered to public servants. By accounting both for the demand and the supply side, the concept of a public service gap enables a differentiated and explicit analysis of efficiency pressures met by street-level workers, which easily ‘travels’ across organizational contexts. It should therefore definitively enter the analytical toolbox of researchers interested in the ways in which resource scarcity impacts on performance. The public service gap is a useful concept to capture this contextual aspect in comparisons of street-level bureaucracies.

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## **References**

Brodkin, E.Z. 2012. ‘Reflections on Street-Level Bureaucracy: Past, Present, and Future’, *Public Administration Review*, 72, 6, 940-949.

Brodkin, E.Z. 2011. ‘Policy Work: Street-Level Organizations Under New Managerialism’, *Journal of Public Administration Research and Theory*, 21(suppl2), i253-i277.

Brodkin, E.Z. 1997. ‘Inside the Welfare Contract: Discretion and Accountability in State Welfare Administration’, *Social Service Review* 71, 1, 1-33.

- Dias, J.J. and S. Maynard-Moody. 2007. 'For-profit welfare: contracts, conflicts, and the performance paradox', *Journal of Public Administration Research and Theory*, 17, 189-211.
- Garrow, E.E. and O. Grusky. 2013. 'Institutional Logic and Street-Level Discretion: The Case of HIV Test Counseling', *Journal of Public Administration Research and Theory*, 23, 1, 103-131.
- Hupe, P.L. and A. Buffat. 2014. A Public Service Gap: Capturing Contexts in a Comparative Approach of Street-Level Bureaucracy, *Public Management Review*, 16, 4, 548-569.
- Hupe, P.L. and M.J. Hill. 2007. 'Street-Level Bureaucracy and Public Accountability', *Public Administration*, 85, 2, 85-102.
- Hupe, P.L. and Th.P.W.M. Van der Krogt. 2013. 'Professionals Dealing with Pressures', in M. Noordegraaf and A. Steijn (eds), *Professionals Under Pressure: Perspectives on professionals and professionalism*. Amsterdam: Amsterdam University Press, pp. 55-72.
- Kosar, K.R. 2011. 'Street Level-Bureaucracy: The Dilemmas Endure', *Public Administration Review*, 71, 2, 299-302.
- Johansson, V. 2012. 'Negotiating Bureaucrats', *Public Administration*, 90, 4, 1032-1046.
- Keiser, L.R. 2010. 'Understanding Street-Level Bureaucrats' Decision Making: Determining Eligibility in the Social Security Disability Program', *Public Administration Review*, 70, 2, 247-257.
- Lipsky, M. 1980. *Street-Level Bureaucracy. Dilemmas of the Individual in Public Services*. New York: Russell Sage.
- May, P.J. and S.C. Winter. 2009. 'Politicians, Managers, and Street-Level Bureaucrats: Influence on Policy Implementation', *Journal of Public Administration Research and Theory*, 19, 3, 453-76.
- Maynard-Moody, S. and M. Musheno. 2003. *Cops, Teachers, Counsellors*. Ann Arbor, MI:

University of Michigan Press.

Meyers, M.K. and S. Vorsanger. 2003. 'Street-Level Bureaucrats and the Implementation of Public Policy', in B.G. Peters and J. Pierre (eds), *Handbook of Public Administration*. London: Sage, pp. 245-246.

Ragin, C.C. 2000. *Fuzzy-set Social Science*. Chicago and London: University of Chicago Press.

Riccucci, N.M., M.K. Meyers, I. Lurie and J.S. Han. 2004. 'The Implementation of Welfare Reform Policy: The Role of Public Managers in Front-Line Practices', *Public Administration Review*, 64, 4, 438-448.

Rihoux, B. and C. Ragin (eds). 2009. *Configurational comparative methods. Qualitative Comparative Analysis (QCA) and related techniques*. Thousand Oaks and London: Sage.

Rihoux, B., I. Rezsöházy and D. Bol. 2011. 'Qualitative Comparative Analysis (QCA) in Public Policy Analysis: an Extensive Review', *German Policy Studies*, 7, 3, 9-82.

Schneider, C.Q. and C. Wagemann. 2012. *Set-Theoretic Methods for the Social Sciences. A Guide to Qualitative Comparative Analysis*. New York: Cambridge University Press.

Schneider, C.Q. and C. Wagemann. 2010. 'Standards of Good Practice in Qualitative Comparative Analysis (QCA) and Fuzzy-sets', *Comparative Sociology*, 9, 3, 397-418.

Tummers, L. 2012. 'Policy Alienation of Public Professionals: The Construct and its Measurement', *Public Administration Review*, 72, 4, 516-525.

Tummers, L., B. Steijn and V. Bekkers. 2012a. 'Explaining the willingness of public professionals to implement public policies: Content, context, and personality characteristics', *Public Administration*, 90, 3, 716-736.

Tummers, L., B. Vermeeren, B. Steijn and V. Bekkers. 2012b. 'Public Professionals and Policy Implementation. Conceptualizing and measuring three types of role conflicts', *Public*  
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*Management Review*, 14, 8, 1041-1059.

Winter, S.C. 2003. 'Implementation Perspectives: Status and Reconsideration', in *Handbook of Public Administration*, B.G. Peters and J. Pierre (eds), *Handbook of Public Administration*. London: Sage, pp. 212-222.

X 2012. *Blinded author reference*.

XY 2014. *Blinded author reference*.

## Tables in text

TABLE1 *Conditions for performance and directional expectations*

| <b>Condition</b>                        | <b>Expected direction of isolated influence on appropriate performance (PERF)</b> |
|-----------------------------------------|-----------------------------------------------------------------------------------|
| High action prescriptions<br>PRES       | No expectation                                                                    |
| Insufficient action resources<br>Res    | -                                                                                 |
| Societal meaninglessness<br>SM          | -                                                                                 |
| Client meaninglessness<br>CM            | -                                                                                 |
| Policy-professional role conflict<br>PC | -                                                                                 |
| Policy-client role conflict<br>CC       | No expectation                                                                    |

TABLE 2 *Outcome and conditions: measurement and calibration*

| Set                                                 | Measurement                                                                                                                                                                                                                                                                                                                                                                               | Full member-ship | Cross-over point | Full non-member-ship |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|----------------------|
| Appropriate performance (PERF) <sup>1</sup>         | % of farms inspected in 2010                                                                                                                                                                                                                                                                                                                                                              | 8.5              | 5.8              | 1.5                  |
| High action prescriptions (PRES) <sup>1</sup>       | Number of farms to be inspected in 2010 (10% of livestock farms in canton)                                                                                                                                                                                                                                                                                                                | 450              | 275              | 100                  |
| Sufficient action resources (RES) <sup>2</sup>      | Are the personnel and economic resources at your disposal sufficient to perform the inspections as prescribed by the OVMP? <sup>3</sup>                                                                                                                                                                                                                                                   | 1                | 2.5              | 4                    |
| Societal meaningfulness (SM) <sup>2</sup>           | Overall, do you find the inspection system/ the documentation provisions of the OVMP suitable to achieve the policy's goals (correct use of veterinary drugs, food safety, animal health)? <sup>3</sup>                                                                                                                                                                                   | 8                | 4.5              | 2                    |
| Client meaningfulness (CM) <sup>2</sup>             | How would you rate the usefulness of the <ul style="list-style-type: none"> <li>- written agreement (<i>TAM-Vereinbarung</i>) that enables private veterinarians to dispense veterinary drugs to livestock farmers for on-farm storage?<sup>4</sup></li> <li>- required biannual visits by private veterinarians to livestock farms if a written agreement exists?<sup>4</sup></li> </ul> | 8                | 4.5              | 2                    |
| Policy-professional role conflict (PC) <sup>2</sup> | Do you think the number of required inspections is adequate? <sup>3</sup>                                                                                                                                                                                                                                                                                                                 | 8                | 4.5              | 2                    |
| Policy-client role conflict (CC)                    | Do you find the content of the inspections as required by the OVMP to be practicable and does it make sense? <sup>3</sup>                                                                                                                                                                                                                                                                 | 4                | 2.5              | 1                    |
|                                                     | Are the regulations of the OVMP realizable on livestock farms? <sup>3</sup>                                                                                                                                                                                                                                                                                                               | 4                | 2.5              | 1                    |

<sup>1</sup> Source: ISVET.

<sup>2</sup> Source: X 2012.

<sup>3</sup> Response categories: yes (1), rather yes (2), rather no (3), no (4).

<sup>4</sup> Response categories: useful (1), rather useful (2), rather not useful (3), not useful (4).

TABLE 3 Analysis of sufficiency for the outcome 'deficient performance'

| Solution             | PRES*res*SM* CM *cc | +       | PRES* PC*CC | →                    | perf  |
|----------------------|---------------------|---------|-------------|----------------------|-------|
| Single case coverage |                     | E, O, Q |             | A                    |       |
| Consistency          |                     | 0.839   |             | 0.777                |       |
| Raw coverage         |                     | 0.338   |             | 0.285                |       |
| Unique coverage      |                     | 0.193   |             | 0.140                |       |
|                      |                     |         |             | Solution consistency | 0.821 |
|                      |                     |         |             | Solution coverage    | 0.478 |

Raw consistency threshold 0.733 to account for canton A. One contradictory truth table row is excluded (Table E online appendix). The next highest consistency score is 0.707.

TABLE 4 Analysis of sufficiency for the outcome 'appropriate performance'

| Solution             | pres*pc*CC | + | pres*CM*cc       | + | RES*sm*cm*pc*CC | →                    | PERF  |
|----------------------|------------|---|------------------|---|-----------------|----------------------|-------|
| Single case coverage | I, R       |   | B, D, G, K, N, M |   |                 | P                    |       |
| Consistency          | 0.933      |   | 0.931            |   |                 | 0.911                |       |
| Raw coverage         | 0.272      |   | 0.456            |   |                 | 0.255                |       |
| Unique coverage      | 0.064      |   | 0.263            |   |                 | 0.116                |       |
|                      |            |   |                  |   |                 | Solution consistency | 0.928 |
|                      |            |   |                  |   |                 | Solution coverage    | 0.651 |

**Bold: contradictory case.**

Raw consistency threshold 0.926. The next highest consistency score is 0.881; the row contains only one case, which is contradictory.

## Figure legends

FIGURE 1 Output performance in 2010

Source: ISVET.

## FIGURE 2 *Action resources and performance*

Cases situated below the diagonal are consistent with the statement of necessity (Schneider and Wagemann 2012, p. 76).

## FIGURE 3 *Sufficient conditions for deficient performance*

Cases situated above the diagonal are fully consistent. In the upper left quadrant are deviant cases for coverage, in the lower right quadrant are contradictory cases. Cases in the lower left quadrant are not directly relevant (Schneider and Wagemann 2012, pp. 67ff, 308).

## FIGURE 4 *Sufficient conditions for appropriate performance*

Cases situated above the diagonal are fully consistent. In the upper left quadrant are deviant cases for coverage, in the lower right quadrant are contradictory cases. Cases in the lower left quadrant are not directly relevant (Schneider and Wagemann 2012, pp. 67ff, 308).

## Online supplementary data

TABLE A *Raw data matrix*

| Canton | Performance | Number of farms to be controlled in 2010 | Resources | SM inspections | SM documentation | CM written agreements | CM biannual visits | PC frequency | PC content | CC |
|--------|-------------|------------------------------------------|-----------|----------------|------------------|-----------------------|--------------------|--------------|------------|----|
| A      | 4.81        | 434.2                                    | 1         | 1              | 2                | 2                     | 2                  | 2            | 3          | 3  |
| B      | 6.45        | 181.4                                    | 2         | 3              | 2                | 4                     | 4                  | 1            | 2          | 2  |
| C      | 8.91        | 86.4                                     | 1         | 1              | 1                | 1                     | 2                  | 1            | 1          | 1  |
| D      | 7.21        | 30.5                                     | 2         | 2              | 2                | 2                     | 3                  | 1            | 2          | 1  |
| E      | 3.26        | 386.5                                    | 4         | 4              | 3                | 4                     | 1                  | 3            | 4          | 1  |
| F      | 1.59        | 44.1                                     | 2         | 1              | 2                | 2                     | 1                  | 1            | 1          | 2  |
| G      | 8.38        | 52.5                                     | 3         | 2              | 3                | 3                     | 4                  | 3            | 3          | 2  |
| H      | 4.9         | 312                                      | 2         | 1              | 2                | 2                     | 2                  | 2            | 2          | 2  |
| I      | 7.13        | 131.9                                    | 4         | 4              | 3                | 1                     | 4                  | 3            | 1          | 3  |
| J      | 8.69        | 605.3                                    | 3         | 2              | 2                | 2                     | 2                  | 2            | 2          | 2  |
| K      | 10.38       | 89.6                                     | 1         | 2              | 1                | 4                     | 4                  | 2            | 1          | 2  |
| L      | 5.43        | 546.8                                    | 1         | 3              | 3                | 1                     | 2                  | 1            | 2          | 2  |
| M      | 5.09        | 51.1                                     | 2         | 1              | 3                | 2                     | 3                  | 2            | 1          | 2  |
| N      | 6.33        | 140.5                                    | 1         | 2              | 1                | 2                     | 3                  | 1            | 2          | 1  |
| O      | 1.6         | 444.5                                    | 4         | 3              | 2                | 2                     | 3                  | 3            | 1          | 2  |
| P      | 9.05        | 412.2                                    | 1         | 2              | 2                | 2                     | 2                  | 2            | 2          | 3  |
| Q      | 3.55        | 414.2                                    | 3         | 3              | 2                | 2                     | 3                  | 3            | 2          | 1  |
| R      | 6.13        | 257.8                                    | 2         | 3              | 3                | 1                     | 4                  | 1            | 3          | 4  |
| S      | 9.9         | 323.6                                    | 2         | 2              | 2                | 2                     | 1                  | 2            | 2          | 1  |

TABLE B *Fuzzy set scores*

| <b>Canton</b> | <b>PERF</b> | <b>PRES</b> | <b>RES</b> | <b>SM</b> | <b>CM</b> | <b>PC</b> | <b>CC</b> | <b>GAP</b> |
|---------------|-------------|-------------|------------|-----------|-----------|-----------|-----------|------------|
| A             | 0,33        | 0,94        | 0,95       | 0,14      | 0,35      | 0,61      | 0,73      | 0,05       |
| B             | 0,67        | 0,17        | 0,73       | 0,61      | 0,95      | 0,14      | 0,27      | 0,17       |
| C             | 0,97        | 0,04        | 0,95       | 0,05      | 0,14      | 0,05      | 0,05      | 0,04       |
| D             | 0,83        | 0,01        | 0,73       | 0,35      | 0,61      | 0,14      | 0,05      | 0,01       |
| E             | 0,15        | 0,87        | 0,05       | 0,89      | 0,61      | 0,89      | 0,05      | 0,87       |
| F             | 0,05        | 0,02        | 0,73       | 0,14      | 0,14      | 0,05      | 0,27      | 0,02       |
| G             | 0,95        | 0,02        | 0,27       | 0,61      | 0,89      | 0,78      | 0,27      | 0,02       |
| H             | 0,35        | 0,65        | 0,73       | 0,14      | 0,35      | 0,35      | 0,27      | 0,27       |
| I             | 0,81        | 0,08        | 0,05       | 0,89      | 0,61      | 0,35      | 0,73      | 0,08       |
| J             | 0,96        | 1,0         | 0,27       | 0,35      | 0,35      | 0,35      | 0,27      | 0,73       |
| K             | 0,99        | 0,04        | 0,95       | 0,14      | 0,95      | 0,14      | 0,27      | 0,04       |
| L             | 0,44        | 0,99        | 0,95       | 0,78      | 0,14      | 0,14      | 0,27      | 0,05       |
| M             | 0,38        | 0,02        | 0,73       | 0,35      | 0,61      | 0,14      | 0,27      | 0,02       |
| N             | 0,64        | 0,09        | 0,95       | 0,14      | 0,61      | 0,14      | 0,05      | 0,05       |
| O             | 0,05        | 0,95        | 0,05       | 0,61      | 0,61      | 0,35      | 0,27      | 0,95       |
| P             | 0,97        | 0,91        | 0,95       | 0,35      | 0,35      | 0,35      | 0,73      | 0,05       |
| Q             | 0,17        | 0,92        | 0,27       | 0,61      | 0,61      | 0,61      | 0,05      | 0,73       |
| R             | 0,59        | 0,43        | 0,73       | 0,78      | 0,61      | 0,35      | 0,95      | 0,27       |
| S             | 0,99        | 0,7         | 0,73       | 0,35      | 0,14      | 0,35      | 0,05      | 0,27       |

TABLE C *Necessary conditions for performance*

| Condition | Appropriate performance (PERF) |          | Deficient performance (perf) |          |
|-----------|--------------------------------|----------|------------------------------|----------|
|           | Consistency                    | Coverage | Consistency                  | Coverage |
| PRES      | 0.442                          | 0.562    | 0.706                        | 0.615    |
| pres      | 0.698                          | 0.777    | 0.498                        | 0.378    |
| RES       | 0.763                          | 0.732    | 0.660                        | 0.432    |
| res       | 0.408                          | 0.637    | 0.591                        | 0.630    |
| GAP       | 0.222                          | 0.535    | 0.474                        | 0.780    |
| gap       | 0.908*                         | 0.716    | 0.717                        | 0.386    |
| SM        | 0.517                          | 0.705    | 0.623                        | 0.580    |
| sm        | 0.692                          | 0.729    | 0.683                        | 0.491    |
| CM        | 0.666                          | 0.781    | 0.654                        | 0.524    |
| cm        | 0.594                          | 0.716    | 0.727                        | 0.598    |
| PC        | 0.400                          | 0.719    | 0.548                        | 0.673    |
| pc        | 0.818                          | 0.726    | 0.771                        | 0.467    |
| CC        | 0.413                          | 0.795    | 0.422                        | 0.553    |
| cc        | 0.768                          | 0.661    | 0.844                        | 0.495    |

GAP = PRES\*res. Consistency threshold  $\geq 0.9$  (Schneider and Wagemann 2012, pp. 144ff).

\* Trivial necessary condition; J is a contradictory case.

TABLE D *Truth table: Analysis of sufficiency for appropriate performance (PERF)*

| PRES | RES | SM | CM | PC | CC | PERF | Number | Consistency |
|------|-----|----|----|----|----|------|--------|-------------|
| 0    | 0   | 1  | 1  | 1  | 0  | 1    | 1      | 1.000       |
| 1    | 1   | 0  | 0  | 0  | 0  | 1    | 1      | 0.976       |
| 0    | 1   | 1  | 1  | 0  | 0  | 1    | 1      | 0.966       |
| 0    | 0   | 1  | 1  | 0  | 1  | 1    | 1      | 0.962       |
| 0    | 1   | 1  | 1  | 0  | 1  | 1    | 1      | 0.961       |
| 0    | 1   | 0  | 1  | 0  | 0  | 1    | 4      | 0.926       |
| 1    | 1   | 0  | 0  | 1  | 1  | 0    | 1      | 0.881       |
| 1    | 1   | 0  | 0  | 0  | 0  | 0    | 2      | 0.870       |
| 1    | 1   | 1  | 0  | 0  | 0  | 0    | 1      | 0.853       |
| 0    | 1   | 0  | 0  | 0  | 0  | 0    | 2      | 0.830       |
| 1    | 0   | 0  | 0  | 0  | 0  | 0    | 1      | 0.785       |
| 1    | 0   | 1  | 1  | 0  | 0  | 0    | 1      | 0.673       |
| 1    | 0   | 1  | 1  | 1  | 0  | 0    | 2      | 0.574       |

Technically, sufficient performance was assessed prior to deficient performance (the sequence does not alter the results).

Raw consistency threshold: 0.926.

Directional expectations: RES  $\rightarrow$  PERF, sm  $\rightarrow$  PERF, cm  $\rightarrow$  PERF, pc  $\rightarrow$  PERF.

Complex solution: pres\*RES\*CM\*pc\*cc + pres\*SM\*CM\*pc\*CC + pres\*res\*SM\*CM\*PC\*cc + PRES\*RES\*sm\*cm\*pc\*CC  $\rightarrow$  PERF (solution consistency 0.942, solution coverage 0.637).

Parsimonious solution: pres\*CM + pc\*CC  $\rightarrow$  PERF (solution consistency 0.891, solution coverage 0.691).

TABLE E *Truth table: Analysis of sufficiency for deficient performance (perf)*

| PRES | RES | SM | CM | PC | CC | perf | Number | Consistency |       |
|------|-----|----|----|----|----|------|--------|-------------|-------|
| 1    | 0   | 1  | 1  | 1  | 1  | 0    | 1      | 2           | 0.822 |
| 1    | 0   | 1  | 1  | 1  | 0  | 0    | 1      | 1           | 0.790 |
| 0    | 1   | 1  | 1  | 1  | 0  | 1    | 0      | 1           | 0.748 |
| 1    | 1   | 0  | 0  | 0  | 1  | 1    | 1      | 1           | 0.733 |
| 0    | 0   | 1  | 1  | 1  | 0  | 1    | 0      | 1           | 0.707 |
| 1    | 0   | 0  | 0  | 0  | 0  | 0    | 0      | 1           | 0.643 |
| 0    | 1   | 1  | 1  | 1  | 0  | 0    | 0      | 1           | 0.643 |
| 1    | 1   | 0  | 0  | 0  | 0  | 1    | 0      | 1           | 0.630 |
| 1    | 1   | 0  | 0  | 0  | 0  | 0    | 0      | 2           | 0.627 |
| 0    | 1   | 0  | 0  | 0  | 0  | 0    | 0      | 2           | 0.623 |
| 1    | 1   | 1  | 0  | 0  | 0  | 0    | 0      | 1           | 0.616 |
| 0    | 0   | 1  | 1  | 1  | 1  | 0    | 0      | 1           | 0.613 |
| 0    | 1   | 0  | 1  | 1  | 0  | 0    | 0      | 4           | 0.557 |

Raw consistency threshold: 0.733, exclusion of contradictory truth table row 3.

The data display tied logically redundant prime implicants (Schneider and Wagemann 2012, pp. 108ff). The prime implicant chosen for the solution formula is the one displaying a public service gap, which is of theoretical interest here. The alternative parsimonious and intermediate solutions are available upon request.

Untenable assumptions:  $\text{pres} * \text{CM} + \text{pc} * \text{CC} \rightarrow \text{perf}$ .

Prime implicant =  $\text{PRES} * \text{res} * \text{SM} * \text{cc}$ .

Directional expectations:  $\text{res} \rightarrow \text{perf}$ ,  $\text{SM} \rightarrow \text{perf}$ ,  $\text{CM} \rightarrow \text{perf}$ ,  $\text{PC} \rightarrow \text{perf}$ .

Complex solution:

$\text{PRES} * \text{res} * \text{SM} * \text{CM} * \text{cc} + \text{PRES} * \text{RES} * \text{sm} * \text{cm} * \text{PC} * \text{CC} \rightarrow \text{perf}$  (solution consistency 0.816, solution coverage 0.461).

Parsimonious solution (untenable assumptions excluded from minimization):

$\text{cm} * \text{PC} + \text{PRES} * \text{PC} + \text{PRES} * \text{CM} * \text{cc} + \text{PRES} * \text{res} * \text{SM} * \text{cc} \rightarrow \text{perf}$  (solution consistency 0.780, solution coverage 0.586).