What Determines the Responses of Multi-Level States to Crises? A Set-Theoretical Analysis of Evidence from the Covid-19 Pandemic

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The institutionalist literature on public policy in federations cannot account for the variation in how multi-level states handled the Covid-19 pandemic. To explain these differences, this article presents a typology of policy responses and develops a framework that outlines their determinants. It argues that coordination occurs if governing actors are able and willing to coordinate their action against the functional pressure of the outbreak. This argument is examined with a fuzzy-set qualitative-comparative analysis of policy responses in thirteen countries over four time periods in 2020. The results show actors coordinated when they had access to shared rule institutions and failed to coordinate because of ideological disagreements about public health measures. But results also show these conditions are insufficient for explaining outcomes and their effects are asymmetric. This informs our understanding of the responses of multi-level states to other complex problems like mass migration and extreme weather events.

Key words: comparative federalism; comparative politics/public policy; political parties; multi-level governance.

Introduction

The Covid-19 pandemic generated a "federal dilemma" (Corry 1941) for multi-level states caught between collective and autonomous problem-solving. Governments faced some fundamental questions about the character of their responses to the emergency: should the pandemic be treated as a local problem or as a national problem? Should a national response be controlled by the central government or should regional governments play a role?

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This dilemma is inherent to policymaking in all decentralized and federal systems, including the European Union (Scharpf 1994a; Jachtenfuchs and Kasack 2017). It is present in ordinary time and in times of crises, such as the Great Recession of 2007–2009 and the Covid-19 pandemic of 2020–2021. But crises present an opportunity for investigators: because they have external origins, they constitute "quasi-natural" experiments (Dunning 2008) in which states are exposed to an equal "treatment," allowing researchers to identify the drivers of states' responses to these shocks (cf Gourevitch 1986; Bermeo and Pontusson 2012).

The puzzle about the policy responses of multi-level states to the Covid-19 crisis is that they confronted the "federal dilemma" in different ways: classic federations like Germany opted for *coordination* between their regional and central governments, but others such as Switzerland witnessed the *centralization* of authority, while in United States, state governments acted independently, in a case of *non-coordination*. This variation demands explanation: When are regional governments influential in coordinating a country's response? When does the central government take control? And why are regions left to cope with the crisis?

In answer to these questions, the literature on public policy in multi-level states has emphasized the importance of *institutional design*. Drawing on the binary distinctions between centralized vs decentralized and unitary vs federal states that has shaped research on the drivers of policymaking (Biela, Hennl, and Kaiser 2012; Biela, Kaiser, and Hennl 2013) and federal performance (Castles 2000; Wachendorfer-Schmidt 2000) in ordinary times, research on multi-level states' response to the Covid-19 crisis has privileged these differences in explaining the provision of public health policies (Shvetsova et al. 2021) and federations' handling the pandemic (Cameron 2021). The strength of inter-governmental councils and the nature of competence allocation (Schnabel and Hegele 2021) that distinguishes regional governments that have a "right to act" from those that have a "right to decide" (Braun 2000) has also been studied to explain conflict and coordination during the pandemic (e.g., Lecours et al. 2021).

Despite the universal exposure of multi-level states to Covid-19, investigations into how they coped with this shock are however dominated either by "thick" descriptions of single case studies (e.g. Peters, Grin, and Abrucio 2021; Chattopadhyay et al. 2022; Steytler 2022) or by small-N comparative studies that employ a "most similar systems" design to investigate divergent outcomes among countries sharing similar multi-level institutions (Carroll et al. 2025, 12), like the regionalized states of Spain and Italy (e.g., Mattei and Del Pino 2021), the federations like Germany and Switzerland (e.g., Hegele and Schnabel 2021).

As a result, this research cannot explain variation in outcomes based on institutional design alone: the centralizing behavior of federations like Switzerland resembled that of unitary states like France, while countries where regional governments enjoyed exclusive powers over health policy witnessed both non-

coordination (UK) and centralization (Italy). Moreover, any effort to capture the moderating effect of institutions, contingent on relevant factors in the social and political context, is hampered by the problem of indeterminacy that limits inference in small-N studies (King, Keohane, and Verba 2021). To overcome this limitation and to account for the unexplained variation in responses, this article makes three contributions.

First, it presents an original typology that specifies the three categories of policy responses to Covid-19: *coordination, centralization*, and *non-coordination*. This typology is populated with evidence from a sample of thirteen multi-level states during four time periods in 2020. This sample covers a larger set of countries with a wider array of institutional features and a longer time-period that has hitherto been analyzed. This provides unique empirical leverage for explaining policy responses.

Second, to explain these outcomes, this article develops a theoretical framework that places institutions in their sociological and political context (Weaver 2020). Grounded in the "post-functionalist" theory of multi-level governance (Hooghe and Marks 2009b), it spells out how the institutions of multi-level states interact with the presence of a territorial cleavage and the ideology of parties in office to shape the ability and the willingness of actors to coordinate their action against the pressures of Covid-19. This framework is comprehensive enough to transcend institutionalist accounts yet parsimonious enough to yield generalizable propositions about the drivers of multi-level states' policy responses to crises.

Third, we examine this framework using fuzzy-set Qualitative Comparative Analysis (fsQCA), a set-theoretic method pioneered by Charles Ragin (1987, 2000, 2008). This method is aligned with our concern for capturing how the policy responses of multi-level states to Covid-19 are shaped by the interactions between crisis, institutions, and context. Second, it offers a potent tool of analysis that is both sensitive to the historical detail of a case yet capable of handling all our observations in order to uncover the conditions that produce different outcomes. Its deployment is thus critical for elucidating the variation in responses unexplained by institutionalist accounts employing small-N comparative methods.

This analysis yields three main results. First, we find that it is the magnitude of the Covid-19 outbreak, rather than its territorial scale, drives both coordination and centralization, during the pandemic. In contrast, the absence of this pressure does not explain non-coordination. Second, we find that shared rule institutions have a significant albeit asymmetric effect. It is a necessary condition for coordination when it is contrasted with centralization at the height of the outbreak, but it does not preclude centralization. Yet, it is a feature of countries that adjust their response to the changing circumstances of the pandemic. Third, our findings confirm that institutions alone do not shape outcomes: ideological disagreements between parties in central and regional government overprotective public health

measures resulted in non-coordination. In contrast, the presence of a territorial cleavage is not the reason that countries fail to coordinate.

In the next two sections, we outline how Covid-19 generated pressure for actors to coordinate and we present our typology for classifying the responses of multi-level states to this pressure. We then elaborate our framework for explaining these variable responses. Our analysis is organized in three sections that evaluate the necessary and sufficient conditions for each outcome. In the discussion, we show how this analysis improves institutionalist accounts and can be extended to research on the response to "complex inter-governmental problems" (Paquet and Schertzer 2020), including mass migration and the extreme weather events.

Policy coordination during the Covid-19 crisis

The outbreak of the Covid-19 pathogen first intensified the horizontal policy interdependence between regional governments. Like air and water pollution or extreme weather events like floods or wildfires, a highly contagious virus that circulates among a mobile population does not recognize jurisdictional boundaries—it is a virulent case of the classical "problem without a passport." It is true that initial outbreaks were territorialized (Allain-Dupré et al. 2020), breaking out in cities like Milan or New York and could be tackled by regional governments. But the latter may not have been adequately prepared and been overwhelmed by the shock, or they may have chosen not to act for ideological reasons. Whatever the case, if the initial policy response is flawed, it generates interregional negative externalities by allowing the virus to spillover into neighboring jurisdictions.

Second, the outbreak heightened vertical policy-interdependence between regional and central governments. It exposed the reality that "exclusive competences are a chimera" (Hooghe and Marks 2021, 25) because, even in "dual" federations, competences within health policy are shared between two levels of government (Adolph, Greer, and Massard da Fonseca 2012). The regional government exercised exclusive responsibility for managing caseloads in hospitals and passing protective public health regulations. But they relied on central governments for increasing financial support to the health sector, for purchasing of special equipment and pharmaceuticals, and for passing regulatory protocols on treating respiratory diseases. In addition, containing the outbreak required making transversal decisions across "shared" policy sectors. In the domain of transport, for instance, the severity of self-isolation measures for incoming travelers decreed by the central government at international airports (Grépin et al. 2024) needed to be aligned with the stringency of measures passed by a regional government.

The nature of the Covid-19 outbreak as a transboundary and transversal crisis compelled policy coordination—a *process* in which regional and central government work together to provide specific public goods, that is, protective public

health measures (Shvetsova et al. 2021) designed to attain common horizontal objectives (Bakvis and Brown 2010), like "flattening" the contagion and fatality rate across the country. Working together meant that, at minimum, that governments avoided taking unilateral decisions that reflected their own particular interests and that forced governments to internalize the costs of these decisions. It meant instead that they made "mutual adjustments" (Lindblom 1965) by sharing information, signaling their preferences, consulting with others before taking action, and seeking to align principles, to ensure that public health policies were, if not necessarily convergent, then at least consistently applied (cf Metcalfe 1994).

Responses to the Covid-19 crisis in multi-level states

This makes policy coordination a desirable but demanding proposition. To specify how multi-level states reacted to the pressures of interdependence, we develop a typology in figure 1 below that conceptualizes and measures policy responses along two dimensions tailored to the specificity of Covid-19 (cf Collier, LaPorte, and Seawright 2012, 224–26). Regional crisis competence (RCC) assesses how much authority over protective health policies was decentralized to regional governments; shared crisis competence (SCC) assesses how much regional and central government shared power to decide protective health policies (Kleider and Toubeau 2024; see Appendix I in the Supplementary Materials for details). This yields three types of responses: *coordination*, in which regional governments have autonomy and influence in shaping a national response*; centralization*, in which the central government assumes control over the national response; *non-coordination* in which regions have the autonomy to set policy without central government influence.[1]

Next, we populate this typology by assigning a score on both parameters to the fifty-two observations in our sample and by categorizing each observation. This sample is produced by thirteen OECD countries during four time periods: Australia (AU), Austria (AT), Belgium (BE), Canada (CA), France (FR), Germany (DE), Italy (IT), Japan (JP), Norway (NO), Spain (ES), Switzerland (CH), United Kingdom (UK), United States (US). This sample is unique for encompassing the full spectrum of constitutional types—unitary states, devolved union states, regionalized states and federations—providing the breadth needed for investigating the relative effect of institutions. To maintain a minimum degree of unit homogeneity for our empirical analysis, we set some "causal scope conditions" (Goertz and Mahoney 2009, 313–14): all these countries comprise directly-elected, general-purpose regional governments that exercise authority over the policies affected by Covid-19, such as health, welfare, education.

The time period spans the year 2020, during which protective public health measures were deployed to contain the Covid-19 outbreak. This 12-month time

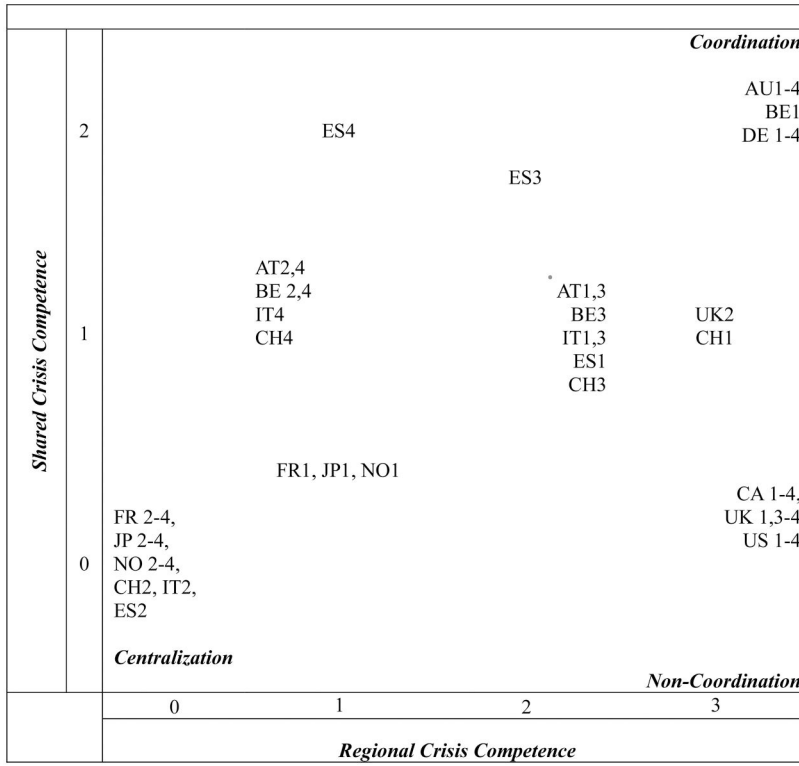

Figure 1. Typology of multi-level states' responses to Covid-19 (A modified version of this typology appears in Table 3, Kleider and Toubeau (2024:13)).

period is broken down into four phases: Phase 1, January–February 2020 (prelude); Phase 2, March–May 2020 (initial outbreak and imposition of restrictions); Phase 3, June–September 2020 (relaxation of first restrictions); Phase 4, October–December 2020 (second wave and imposition of restrictions). This temporal delineation is visible in figure 1, where the numbers adjacent to the country abbreviations refer to the phase of the pandemic.

Conditions producing policy coordination

We now elaborate a framework, grounded in the "post-functionalist" theory of multi-level governance (Hooghe and Marks 2009b), to develop expectations about the conditions that produce these outcomes. The "post-functionalist" premise is that "governance"—the participation of governments in decision-making processes that produces public goods—is the result of a "functionalist" logic that conceives coordination as the efficient way to provide public goods at a particular scale, and

a "community" logic that asserts that coordination depends on the will of self-governing communities with distinct political identities. From these two logics, we derive six conditions grouped into three factors that reflect the *need*, *ability*, and *willingness* of actors to coordinate (cf Bolleyer and Börzel 2010).

1. If the high degree of functional pressure generated by the Covid-19 outbreak generated a *need* to coordinate, then coordination depended on the magnitude and territorial scale of this pressure. This expectation is derived from the "decentralization theorem" advanced by Wallace Oates (2011) in his public choice theory of federalism, which stipulates that a policy competence should be assigned to the federal level if: the territorial scale of that policy goes beyond the jurisdictional borders of a constituent unit; the decisions of constituent units generate interregional negative externalities; the federal government possesses information and resources that offer economies of scale for tackling a nation-wide problem. As described earlier, these properties were characteristic of Covid-19: while the outbreak was initially concentrated, it ran the risk of spreading if the affected regional governments were unwilling or incapable of containing it. Only a federal government that considered this jurisdictional interdependence could help design optimal nation-wide public health measures.
2. The effect of this functional pressure is filtered by three features of the territorial structure of multi-level states that shape the *ability* of actors to coordinate. First, the territorial concentration of Covid-19 outbreaks means that regional governments that exercise a high degree of self-rule have an advantage in tackling the crisis locally. Health policy is one the most important decentralized categories of expenditure (Osterkamp and Eller 2003), meaning that regional governments are equipped with the policy tools to pass lockdown rules and manage hospital cases. To inform their decisions, regional policymakers rely on "hard" information about the number of Covid-19 cases. But they also possess the "soft" information about the characteristics of local communities that affect contagion and mortality rates, such as income levels, density of housing, patterns of mobility. Because access to this "soft" information is more accurate in decentralized systems, it will result in the deployment of more efficient policy measures (Treisman 2007, 213; Hooghe and Marks 2009a, 231–32).
   Second, policy coordination is facilitated by the presence of shared-rule institutions, namely, territorial upper chambers that give regions influence over national law-making, and formal, institutionalized channels of horizontal and vertical intergovernmental relations. The purpose of these institutions is to mitigate the "collective action" problem that hampers policy coordination. (Behnke and Mueller 2017). The high degree of intra-country territorial variation in the outbreak meant that regional governments held asymmetrical preferences regarding the design of collectively optimal protective public health

policies, and faced asymmetrical costs and benefits from participating in the decision-making process. To counteract these centrifugal tendencies, shared-rule institutions furnish the decision-making infrastructure that enables regional and central governments to address sources of interdependence while preserving their autonomy. They provide a forum for regularizing interaction, facilitating communication, and aligning divergent interest by building norms of trust and reciprocity and fostering a "problem-solving" approach. (Scharpf 1994b).

Third, whether regional and central governments achieve this depends on the presence of low transaction costs, which comprise the costs of time and personnel in analyzing and sharing information, preparing and attending meetings, resolving information differences, negotiating common principles and resolving disagreements. (Williamson 1989). Research on policy bargaining among actors in federal states (Harrison 1996) and in international regimes (Koremenos, Lipson, and Snidal 2001) propose that the scale of these costs is a function of the number of participants involved in the transactions, because the number of pairwise relations increases exponentially with the number of actors (Scharpf 1994b, 36). Thus, shared-rule institutions will serve policy coordination if the number of actors is manageable.

3. Coordination depends finally on how territorial and party-political diversity affects the *willingness* of governments to work together. The first determinant is the absence of a strong territorial cleavage that engenders social divisions between the dominant community at the center and the stateless nations at the periphery (Rokkan and Urwin 1983). This cleavage expresses the "community" logic that creates demands for asymmetric political decentralization for stateless nations (Amoretti and Bermeo 2004), and predilection for territorial policy differentiation on the basis of their divergent preferences. This is the case for policy areas fundamental to ethno-national identities, such as education and media (Erk 2003), and social policies like health and welfare that underpin national well-being (McEwen 2006; Béland and Lecours 2008). These preferences are consequential as regional communities opt for more solidaristic policies (Singh 2015). The presence a territorial cleavage hampers efforts at policy coordination because stateless nations are protective of their autonomy and reluctant to engage in compromising policy negotiations.

   The second determinant is the presence of vertical "congruence" or alignment between the ideologies of the political parties in regional and central governments. The outbreak of Covid-19 generated uncertainty about the efficacy of public health measures and incited a vigorous debate about the acceptability of restrictions on civil liberties and economic activity that these measures would entail. Parties fell back on their established ideologies to guide their policy action (cf Budge 1994; Marks and Wilson 2000): expert estimates of party positions toward the trade-off show they align with a pre-existing left–

right economic dimension (Rovny et al. 2022). The presence of vertical congruence (VC) will thus facilitate coordination, while its absence will obstruct it (Bolleyer, Swenden, and McEwen 2014), as ideological conflicts between parties transforms into conflicts between levels of governments (cf Eaton 2017).

Centralization and non-coordination

How can these conditions explain the other outcomes? Centralization is an attractive option because a central government can exploit the economies of scale in information and resources at its command to devise optimal public health measures that contains interregional negative externalities. In addition, it enjoys the power to eliminate the risk of "shirking" by regional governments (Eichenberger 1994) by enforcing compliance with the minimum policy measures. All this can be achieved with coordination, but centralization is selected because regional governments are too weak to resist central government "encroachment" (Bednar 2008). This occurs when a multi-level state lacks the "safeguards" that protect regional autonomy. One such safeguard against a central "Leviathan" are fiscal powers (Brennan and Buchanan 1980), and there is evidence that fiscally centralized states are associated with larger public sectors (Oates 1985; Rodden 2003). Encroachment also occurs if a state exhibit weak shared-rule, as hierarchy is adopted to compensate for the inadequacy of institutions meant to tackle the "collective action" problem (Peters 2018, 6–8). Two other conditions that facilitate centralization include (Braun 2011, 41–47): the absence of a territorial cleavage, since stateless nations will resist attempts of the central government to encroach onto their domain of authority; the presence of vertical congruence, as it is only when party-political conflict is articulated as a territorial conflict that central government expansion is checked.

Under non-coordination regional governments respond to the crisis without guidance from the central government. There are two reasons for this. First, if the outbreak is small or localized, the decentralization theorem stipulates it can be viewed as a local problem (Oates 2011). Second, regional and central governments are unwilling to coordinate for political and ideological reasons. This reticence can stem from the presence of a strong territorial cleavage and from ideological disagreements, if parties in regional government adopt positions that contrasts with that of the central government. But for this political diversity to impede coordination, regional governments must also be endowed with strong self-rule. This expectation is consistent with research which shows that territorial autonomy results in policy divergence (Kleider and Toubeau 2022), a trend found in social policy spending (Kleider 2018), including during fiscal crises (Toubeau and Vampa 2021).

Methods and data

We examine these expectations using fsQCA. This method is aligned with our interest in exploring the causes of substantively important outcomes, like states' responses to crises. In addition, because it is a case-oriented method that compares cases in order to identify the necessary and sufficient conditions that cause these outcomes (Mello 2021), it can shed light on the forms of "causal complexity" (Ragin 1987, Ch.2) built-in to our framework. It can detect "multi-causality" by showing how a policy response is produced by institutions working in a "configuration" with several other conditions. It can also identify "equifinality" and contribute to theory development (George and Bennett 2005) by revealing the different "configurations" that generate the same outcome. Finally, it can find "causal asymmetry" by comparing configurations that lead to different outcomes and by showing that the same institutions have different effects, depending on their context.

The first step in employing this method is "calibrating" outcomes and conditions, that is, transforming raw data into fuzzy-set values that confer information about the membership of cases to the concepts in our framework. fsQCA enables us calibrate membership in *kind* and in *degree* with three anchor points: full membership (1), non-membership (0), and the "cross-over" point (0.5). Table 1 summarizes the anchor points we for our outcomes and conditions; Table 2 presents information about the measures and data. Sections 2 and 3 of Appendix I in the Supplementary Materials contain details about the definition, measurement, and calibration of outcomes and conditions; Section 4 contains descriptive information about the raw data and fuzzy-set values.

Calibration of outcomes

Coordination is calibrated manually using as raw data the additive scores of RCC and SCC. The highest additive score (5) results in full membership (1) to the outcome. To calibrate non-membership to coordination, we juxtapose coordination with its two negations in two bilateral relations: Y1 (coordination v centralization), Y2 (coordination vs non-coordination) (Dusa 2024). These are shown in the arrows of figure 1. The anchor points we use are summarized in Table 1 below. For Y1, the anchor points are: 0 (fully-out), 2.5 (crossover), 5 (fully-in). For Y2, they are: 3 (fully-out), 3.5 (crossover), 5 (fully-in).[2]

Calibration of conditions

1. We measure the magnitude and territorial scale of the Covid-19 outbreak, with two indicators: the reproduction rate (RR) and population density (PD). The R-rate measures the weekly average number of new infections by a single

Table 1. Fuzzy-set calibration of outcomes and conditions.

Outcome	Code	Fully Out	Crossover	Fully in
Coordination (vs centralization)	Y1	0	2.5	5
Coordination (vs non-coordination)	Y2	3	3.5	5
Conditions				
Reproduction rate	RR	0	1	1.5
Population density	PD	10	150	300
Self-rule	SER	1	7.5	11
Shared-rule	SHR	0	1.7	4
Transaction costs	TC	30	14	5
Rokkan region	ROK	0.6	0.4	0
Vertical congruence	VC	2	1	0

individual; the data is provided by Arroyo-Marioli et al. (2021) and Our World in Data (OWID). The anchor points are suggested by the World Health Organization: 0 (fully out), 1 (crossover), 1.5 (fully in). Population density is the structural determinant of territorial scale (cf: Hooghe and Marks 2013): it is in countries where a high number of people live in close physical proximity that contagion is more likely and that the decisions of regional government generate the interregional negative externalities that compel coordination. The measure is the number of people per square kilometer (p/km). Data comes from OWID. The anchor points are informed by the empirical distribution of raw data: 10 (fully out), 150 (crossover), 300 (fully in). To capture the potential for interregional negative externalities we create a new condition—territorial scale (TS). Territorial scale is a conjunction of reproduction rate and population density, since a high RR and high PD are jointly necessary for producing interregional negative externalities.[3]

2. To assess the territorial structures of multi-level states we obtain data on self-rule (SER) and shared-rule (SHR) from the Regional Authority Index (Hooghe et al. 2016). We use three components of self-rule (institutional depth, policy autonomy, and fiscal autonomy) and two components of shared-rule (law-making and executive control). The anchor points for SER are: 1 (fully out), 7.5 (crossover), 11 (fully in); for SHR they are: 0 (fully out), 1.7 (crossover), 4 (fully in). Transaction costs (TC) are measured by the number of constituent units; this information is obtained from national constitutions and country factbooks. Because the condition associated with coordination is "low TC," the calibration is inverse to the raw-data: the lower number of constituent units, the higher the

Table 2. Raw data measures and data sources for calibration of conditions.

	Functional pressure of Covid-19 outbreak		Territorial structure of multi-level states			Territorial and political diversity	
Condition for fsQCA	RR	PD	SER	SHR	TC	ROK	VC
Raw data measure	Weekly average of new infections caused by a single individual in month prior to coordination measure	Number of people per square kilometer of land area (p/km^2)	Regional Authority Index (RAI) SER: institutional depth, policy autonomy, fiscal autonomy	RAI SHR index: law-making and executive control	Number of constituent units in a country	Aggregate of individual regions' score on linguistic, historical and religious distinctiveness, divided by the total number of regional governments	Country-level average of the absolute ideological distance between the CG and each RG on first dimension Covid-positioning expert survey (keeping economy open vs containing virus)
Data source	OWID, Arroyo-Marioli (2021)	OWID, World Bank Data (2023)	Hooghe et al. (2016)	Hooghe et al. (2016)	National constitutions, Handbook of Federalism	Hooghe and Marks (2016)	Rovny et al. (2022), CHES Covid-19

score. The anchor points are informed by the empirical distribution of raw values across the cases: 30 (fully out), 14 (crossover), 5 (fully-in).

3. We assess the depth of a territorial cleavage with the presence of a "Rokkan Region" (ROK) (Hooghe and Marks 2016), which considers the linguistic, historical, and religious distinctiveness of regions. Our measure divides the aggregate Rokkan scores for individual regions by the total number of regional governments to capture the importance of ROKs relative to non-ROKs. Calibration of ROK is also inverse to the raw data since it is a weak the territorial cleavage that is associated with coordination. The anchor points are 0.6 (fully out), 0.4 (crossover), 0 (fully-in). Vertical Congruence (VC) is the country-level ideological alignment between parties in the central government and regional government on how to respond to the Covid-19 pandemic. We use expert survey data from Rovny et al. (2022) complemented by the Global Party Data set (Norris 2020), on the position that parties take on the issue of whether to prioritize keeping the economy open (0) or containing the virus (10). Congruence is measured as the country average of the absolute ideological distance on this issue between the central government and each regional government; the position of a government is the weighted average position of the parties in government. Low values of ideological distance result in high VC. The anchor points are informed by the distribution of cases: 2 (fully out), 1 (crossover), 0 (fully in).

When do multi-level states coordinate against a crisis?

We begin our analysis by conducting a necessity test of coordination, to identify the conditions that must be present for coordination to occur. To do so, we use the "QCA" (Thiem and Dusa 2013; Duşa 2018) and "SetMethods" (Oana and Schneider 2018) packages in R-studio (version 2024.12.1-563). The results for outcomes Y1 and Y2 are presented in Tables 3 and 4 below, for all periods and for periods 2–4.

We do not find evidence that the reproduction rate (RR), population density (PD), and territorial scale (TS) are necessary conditions for coordination, as the consistency scores miss the conventional level (0.9). Thus, there is no support for the decentralization theorem. The consistency score for the RR does increase (from 0.616 to 0.853), when we focus on periods 2–4, but it still misses the cutoff. Moreover, its low "relevance" score suggest that it becomes a background condition encompassing all possible outcomes (Goertz 2006; Oana, Schneider, and Thomann 2021). In addition, we do not find evidence that a weak territorial cleavage and vertical congruence are necessary conditions that make actors willing to coordinate.

Table 3. Analysis of necessary conditions for coordination (Y1), for all periods/periods 2–4.

	Presence of condition			Absence of condition		
Conditions	Consistency	Coverage	Relevance	Consistency	Coverage	Relevance
RR	0.616/0.853	0.450/0.440	0.533/0.330	0.547/0.358	0.638/0.670	0.815/0.917
PD	0.610/0.598	0.524/0.456	0.657/0.620	0.577/0.586	0.544/0.504	0.706/0.694
TS	0.408/0.552	0.494/0.478	0.770/0.686	0.780/0.693	0.554/0.526	0.571/0.649
SER	0.838/0.837	0.595/0.528	0.589/0.543	0.384/0.375	0.470/0.422	0.765/0.755
SHR	0.873/**0.904**	0.747/**0.683**	0.781/**0.732**	0.316/0.286	0.299/0.249	0.6130.605
TC	0.661/0.643	0.630/0.563	0.752/0.727	0.494/0.492	0.420/0.370	0.606/0.605
ROK	0.607/0.608	0.472/0.436	0.580/0.578	0.471/0.453	0.501/0.420	0.733/0.690
VC	0.565/0.562	0.492/0.436	0.649/0.619	0.613/0.613	0.570/0.518	0.713/0.693

Table 4. Analysis of necessary conditions for coordination (Y2), all periods/periods 2–4.

	Presence of condition			Absence of condition		
Conditions	Consistency	Coverage	Relevance	Consistency	Coverage	Relevance
RR	0.577/0.789	0.468/0.467	0.599/0.373	0.429/0.211	0.438/0.395	0.691/0.839
PD	0.535/0.509	0.592/0.588	0.780/0.792	0.496/0.502	0.379/0.370	0.527/0.504
TS	0.329/0.442	0.655/0.636	0.892/0.858	0.684/0.569	0.389/0.373	0.366/0.402
SER	0.740/0.726	0.420/0.414	0.306/0.314	0.288/0.307	0.641/0.654	0.916/0.915
SHR	0.873/0.842	0.624/0.612	0.606/0.613	0.148/174	0.183/0.206	0.679/0.672
TC	0.631/0.683	0.509/0.526	0.615/0.601	0.382/0.321	0.394/0.347	0.678/0.682
ROK	0.791/0.841	0.595/0.600	0.621/0.594	0.229/0.187	0.260/0.228	0.671/0.689
VC	0.427/0.372	0.897/0.880	0.973/0.973	0.602/0.632	0.347/0.351	0.296/0.266

We do find evidence that the institutions that *enable* coordination between actors are important: if we examine all periods, self-rule (SER) and shared rule (SHR) have the highest consistency scores (0.838/0.873, 0.840/0.873, respectively), but narrowly miss the threshold. But, if we restrict the analysis to time periods 2–4 when the Covid-19 outbreak was an active concern, then shared-rule (SHR) does become a necessary condition (0.904) for coordination, when contrasted with centralization (Y1).[4] Thus, in the throes of the pandemic, for multi-level states to coordinate rather than to centralize, they must have a preestablished set of institutions that can channel the influence of regional governments into collective decision-making.

Table 5. Truth table for coordination (Y1), with RR for all time periods.

Conditions							Outcome			
RR	SER	SHR	TC	ROK	NVC	OUT	*N*	incl	PRI	Cases
0	1	1	1	1	0	1	2	0.939	0.903	**AU1, AU4**
0	1	1	1	1	1	1	1	0.924	0.867	**AT1**
0	1	1	0	0	0	1	2	0.913	0.773	**ES1, ES4**
0	1	1	0	1	1	1	1	0.875	0.814	**DE1**
1	1	1	1	1	0	1	2	0.865	0.814	**AU2, AU3**
0	1	1	1	0	1	1	2	0.845	0.702	**BE1, BE4**
1	1	1	0	1	1	1	3	0.841	0.782	**DE2, DE3, DE4**
1	1	1	1	1	1	1	3	0.767	0.635	**AT2, AT3, AT4**
0	1	0	0	0	0	0	1	0.762	0.429	IT1
1	1	1	1	0	1	0	2	0.701	0.459	BE2, BE3
1	1	1	0	0	0	0	2	0.682	0.469	ES2, ES3
1	1	1	0	0	1	0	3	0.599	0.384	CH2, CH3, CH4
0	0	0	1	1	0	0	2	0.567	0.205	FR1, FR4
0	0	0	0	1	0	0	1	0.544	0.177	JP1
1	1	0	0	0	0	0	3	0.522	0.246	IT2, IT3, IT4
1	0	0	1	1	0	0	2	0.431	0.188	FR2, FR3
0	0	0	0	1	1	0	1	0.370	0.070	NO1
1	0	0	0	1	0	0	3	0.323	0.124	JP2, JP3, JP4
1	0	0	0	1	1	0	3	0.212	0.053	NO2, NO3, NO4

The second step is to identify the combination of conditions that are sufficient for coordination, that always result in coordination. We construct two truth tables (Tables 5 and 6 below) that contain all the possible configurations of six conditions: RR or TS, SER, SHR, TC, ROK, VC.[5] We report here results for Y1 and Y2 with RR, for all time-periods. The tables present information about the rows that contain at least one case, out of the possible sixty-four rows generated by six conditions (64 = 2^6conditions); the remaining rows for which there are no cases ("logical remainders") are not shown. The cases that belong to each row are listed in the last column. The cases highlighted in bold belong to the outcome (=1) because their "consistency" score is equal or above to the threshold for sufficiency (=0.75).[6]

Next, we perform a "logical minimization" of these truth tables in order to produce a configuration of conditions that is sufficient for the outcome. But the solution term that this generates is influenced by how logical remainders are treated in this procedure. Here, we generate an *intermediate solution*, by including

Table 6. Truth table for coordination (Y2), with RR for all time periods.

Conditions						Outcome				
RR	SER	SHR	TC	ROK	NVC	OUT	*N*	incl	PRI	Cases
0	1	1	1	1	1	1	1	0.876	0.836	**AT1**
0	1	1	1	0	1	1	1	0.865	0.806	**BE1**
1	1	1	1	1	1	1	1	0.857	0.826	**AT3**
1	1	1	1	0	1	1	1	0.840	0.779	**BE3**
1	1	1	0	1	1	1	3	0.833	0.807	**DE2, DE3, DE4**
0	1	1	0	1	1	1	1	0.831	0.788	**DE1**
1	1	1	1	1	0	1	2	0.785	0.744	**AU2, AU3**
0	1	1	0	0	1	1	1	0.784	0.647	**CH1**
0	1	1	1	1	0	1	2	0.757	0.690	**AU1, AU4**
0	1	1	0	0	0	0	1	0.699	0.505	ES1
1	1	1	0	0	0	0	1	0.646	0.536	ES3
0	1	0	0	0	0	0	1	0.634	0.470	IT1
1	1	0	0	0	0	0	1	0.539	0.396	IT3
0	1	1	0	1	0	0	1	0.433	0.280	US1
1	1	0	1	0	0	0	5	0.369	0.209	CA2, CA3, CA4, UK2, UK3
1	1	1	0	1	0	0	3	0.343	0.248	US2, US3, US4
0	1	0	1	0	0	0	3	0.319	0.119	CA1, UK1, UK4

only the logical remainders that are "plausible counterfactuals" (Mello 2021, 138) that is, ones for which a positive outcome is theoretically sensible.[7] We achieve this by setting the value of "logical remainders" in a way that is consistent with our theoretical or "directional" expectations" (Ragin 2008). For policy coordination, we set all six of our conditions in a positive direction. Second, we follow the Enhanced Standard Analysis (ESA) proposed by Schneider and Wagemann (2012) and exclude two kinds of logical remainders. The first are those that contain illogical counterfactuals: we exclude rows in which SER is absent (SER = 0) but SHR is present (SHR = 1), since this combination is unlikely and nonexistent. The second are those that make "contradictory simplifying assumptions" in which the row is sufficient both for coordination and its negations. The treatment of logical remainders are reported in Tables A1 and A2 of Appendix II in the Supplementary Materials, following the Meissner and Mello (2022) template.

The results of the sufficiency test are presented in Table 7 below, which presents the five paths through which coordination is attained, when contrasted with

Table 7. Intermediate solution for Coordination (Y1 and Y2), with RR for all periods.

	Y1			Y2	
	Path 1	Path 2	Path 3	Path1	Path2
RR	⊖				
SER	●	●	●	●	●
SHR	●	●	●	●	●
TC			●		●
ROK		●	●		●
VC		●		●	
Consistency	0.902	0.819	0.874	0.922	0.859
PRI	0.837	0.738	0.827	0.900	0.834
raw coverage	0.441	0.263	0.428	0.416	0.420
unique coverage	0.162	0.033	0.095	0.226	0.230
Covered cases	**ES1, ES4**	**DE1-4**	AU1-4	**CH1**	**AU1-4**
(uniquely covered	**BE1, BE4**	AT1-4	AT1-4	**BE1,3**	AT1,3
cases in bold)	AU1, AU4			**DE1-4**	
	AT1			AT1,3	
Solution consistency		0.864		0.889	
Solution PRI		0.805		0.865	
Solution coverage		0.637		0.647	
Model		M1		M1	

centralization (Y1) and non-coordination (Y2). A black circle denotes the presence of a condition and a crossed-out blank circle denotes its absence (cf Fiss 2011).

The main result is that two conditions present in each configuration sufficient for coordination are self-rule (SER) and shared-rule (SHR).[8] These institutions however work in conjunction with other conditions that render actors *willing* to coordinate. One pathway (Path3 (Y1), Path 2(Y2)) covering the cases of Australia and Austria, includes the absence of a territorial cleavage and low transaction costs (TC). The homogeneous composition of these countries depoliticized the territorial dimension of the pandemic response, while the low number of constituent units meant actors could engage in inter-governmental bargaining at a low cost. A second pathway (Path2(Y1), Path1(Y2)), covering the cases of Germany and Austria in phases 1–4, Switzerland in phase 1 and Belgium in phases 1 and 3, is the presence of vertical congruence (VC).[9] Coordination in these federations was facilitated by the consensual culture and the similar ideological positions of parties in office toward the introduction of protective public health measures. A third pathway (Path 1(Y1)) covers the cases of Spain and Belgium in phases 1 and 4,

federal countries with shared-rule (SHR) institutions that coordinated in prelude to the outbreak, centralized when the reproduction rate (RR) was high, but restored coordination when it was on the wane in phase 4.

The effect of the functional pressure of Covid-19 depends on the indicator chosen and the time periods examined. The results show that RR is not present in any path. To check whether our results are sensitive to the scope of observations, we conduct a sensitivity analysis (Tables D1–D3, Appendix II, Supplementary Materials), restricted to time periods 2–4. The results show that the RR is now more relevant, as it features in 4 of the 6 paths.[10] This mirrors the increase in this condition's consistency of necessity score during the restricted time period.

To evaluate interregional negative externalities, we conduct another sensitivity test (Tables D4–D9, Appendix II, Supplementary Materials) that examines the effect of territorial scale (TS).[11] The results are consistent with those of Table 7: when looking at all time periods, TS is not included in any configurations. But, when looking at periods 2–4, it is included in three pathways: Path 1 (Y1) and Path 2 (Y2) cover Germany in periods 2–4, and Path 3 (Y2) covers Italy in period 3. As a densely populated countries with a high number of closely connected cities, Germany and Italy did indeed face the risk of interregional negative externalities. There are two reasons to doubt the strength this condition, however. First, Germany is also covered by paths containing the RR. Second, Australia (Path 2 (Y1), Path 1 (Y2)) also coordinated but features a sparsely populated territory. So, coordination seems prompted more by the magnitude of the outbreak than by the risk of jurisdictional spillovers.

When does the central government take control?

If multi-level states adopt a "whole-of-country" approach in countering Covid-19, then what distinguishes those cases in which the central government takes control of the response? The results of the necessity test for centralization (∼Y1) are presented in Table 8 below.

They show that there is no support for our conjecture about the centralizing effect of the magnitude and territorial scale of the crisis, as the scores are below the 0.9 threshold. The consistency score for reproduction rate (RR) increases if we focus on periods 2–4, but it still misses the threshold and becomes a background condition, irrelevant for explaining centralization per se. In addition, there is no evidence in support of our expectations about institutions that facilitate central government "encroachment", as the absence of strong self-rule (SER) and shared-rule (SHR) are not necessary conditions. Finally, our expectation that centralization is facilitated by low territorial and party-political diversity does not find support either. These results are consistent across the full and the restricted time period.

Table 8. Analysis of necessary conditions for centralization (~Y1), for all periods/periods 2–4.

	Presence of condition			Absence of condition		
Conditions	Consistency	Coverage	Relevance	Consistency	Coverage	Relevance
RR	0.747/0.880	0.669/0.669	0.654/0.454	0.386/0.263	0.552/0.724	0.781/0.929
PD	0.605/0.608	0.637/0.684	0.715/0.738	0.548/0.517	0.632/0.654	0.749/0.765
TS	0.493/0.576	0.733/0.735	0.864/0.811	0.659/0.591	0.577/0.660	0.582/0.721
SER	0.647/0.651	0.563/0.606	0.570/0.587	0.535/0.493	0.802/0.817	0.897/0.907
SHR	0.396/0.414	0.415/0.461	0.607/0.617	0.758/0.715	0.880/0.916	0.902/0.932
TC	0.444/0.431	0.575/0.556	0.699/0.724	0.683/0.661	0.712/0.732	0.756/0.762
ROK	0.618/0.575	0.501/0.608	0.639/0.664	0.445/0.466	0.581/0.637	0.766/0.781
VC	0.622/0.613	0.663/0.700	0.736/0.754	0.524/0.506	0.596/0.630	0.725/0.746

Table 9. Truth table for centralization (~Y1), with RR, for all time periods.

Conditions						Outcome				
RR	SER	SHR	TC	ROK	NVC	OUT	*N*	incl	PRI	Cases
1	0	0	0	1	1	1	3	0.956	0.947	**NO2, NO3, NO4**
0	0	0	0	1	1	1	1	0.952	0.930	**NO1**
1	0	0	0	1	0	1	3	0.904	0.876	**JP2, JP3, JP4**
0	0	0	0	1	0	1	1	0.902	0.823	**JP1**
0	0	0	1	1	0	1	2	0.888	0.795	**FR1, FR4**
1	0	0	1	1	0	1	2	0.868	0.812	**FR2, FR3**
1	1	0	0	0	0	1	3	0.844	0.754	**IT2, IT3, IT4**
0	1	0	0	0	0	0	1	0.787	0.491	**IT1**
1	1	1	0	0	1	0	3	0.731	0.587	CH2, CH3, CH4
1	1	1	0	0	0	0	2	0.720	0.531	ES2, ES3
1	1	1	1	0	1	0	2	0.709	0.474	BE2, BE3
0	1	1	0	0	0	0	2	0.702	0.227	ES1, ES4
0	1	1	1	0	1	0	2	0.634	0.298	BE1, BE4
1	1	1	1	1	1	0	3	0.596	0.365	AT2, AT3, AT4
0	1	1	1	1	1	0	1	0.503	0.133	AT1
0	1	1	0	1	1	0	1	0.452	0.186	DE1
0	1	1	1	1	0	0	2	0.432	0.097	AU1, AU4
1	1	1	0	1	1	0	3	0.428	0.218	DE2, DE3, DE4
1	1	1	1	1	0	0	2	0.409	0.186	AU2, AU3

Table 10. Intermediate solution for centralization (∼Y1), with RR for all time periods.

	∼Y1	
	Path 1	Path 2
RR		●
SER	⊖	
SHR	⊖	⊖
TC		⊖
ROK	●	⊖
VC		
Consistency	0.940	0.852
PRI	0.919	0.774
Raw coverage	0.454	0.213
Unique coverage	0.332	0.091
Covered cases (uniquely covered cases in bold)	**FR1-4, JP1-4, NO1-4**	**IT2-4**
Solution consistency	0.920	
Solution PRI	0.889	
Solution coverage	0.545	
Model	M1	

To conduct the sufficiency test for centralization, we first create a truth table (Table 9) and then perform a logical minimization procedure to generate an intermediate solution. We set "directional expectations" in line with our conjectures about the conditions that facilitate central government "encroachment": a strong functional pressure, weak self-rule and shared-rule, and low territorial and party-political diversity. We eliminate logical remainders that contain illogical counterfactuals and contradictory simplifying assumptions (listed Table B1 in Appendix II, Supplementary Materials). The results of the sufficiency test are presented in Table 10.

Path 1, covering the unitary decentralized states of France, Japan, and Norway, reveals the conditions that facilitate central government "encroachment." Regional governments exercised weak self-rule (SER): they had powers over public health, but not over taxation. Moreover, there is no shared-rule (SHR): central governments take control because an institutional vacuum prevents regional governments from exercising influence. Finally, the absence of Rokkan regions (ROK) meant there is no territorial resistance to central interference

Path 2, covering the case of Italy in periods 2–4, reveals an alternative pathway. As the first European country devastated by Covid-19, Italy was confronted with enormous pressure. It also faced the risk of inter-regional negative externalities: Italy was a decentralized country in which regional governments had significant autonomy over health policy and the presence of a territorial cleavage engendered further centrifugal tendencies. But the country lacked an established system of inter-governmental relations to forge a coordinated response, while the high number of regions generated transaction costs that would have impeded coordination. Faced with this risk, the central government opted for centralization.

A similar configuration produced centralization in Switzerland, if we consider the driving effect of territorial scale (TS). This is examined in a sensitivity test shown in Path 3 in Table E4 and Path 5 in Table E6, Appendix II, Supplementary Materials). Switzerland also faced the risk of territorial policy fragmentation: it is a highly decentralized country with a strong territorial cleavage. Moreover, it exhibited the risk of interregional negative externalities due to its high population density (PD). There are differences with Italy—in the presence of shared-rule and vertical congruence—that make Switzerland a "deviant" case, from which to develop new conjectures about the sources of centralization (George and Bennett 2005, 10). The high number of constituent units may have raised the transaction costs of coordination and justified centralization. This conjecture can be verified with a process-tracing analysis comparing the "causal mechanism" underpinning centralization in Switzerland and Italy (Schneider and Rohlfing 2013).

This path reveals that the effect of the outbreak depends on how it is assessed. Because we include all time periods, the RR features as a condition only in one of two paths (Path 2(∼Y1)) So, we conduct a sensitivity analysis (reported in Table E2, Appendix II, Supplementary Materials) that focuses on time periods 2–4. The RR now appears as a condition in two paths (Paths 1 and 2 covering France, Japan, Norway, and Italy) suggesting that the centralization of power is prompted in by the magnitude of the outbreak. Interestingly, the case of France at time period 4 (Path 3) shows that centralization exerts a residual effect on subsequent responses among countries, even after the RR decreases.

When is a crisis tackled at the regional level?

Why would multi-level states leave regional governments to tackle the Covid-19 outbreak on their own? We answer this question with a necessity test of non-coordination (Y2), the results of which are reported in Table 11 below.

The results do not support our conjecture about the absence of functional pressures, as a low reproduction rate (RR), population density (PD), territorial scale (TS) are not necessary conditions. The absence of territorial scale nearly reaches the consistency threshold (0.843), but this is reduced (to 0.793) during the

Table 11. Analysis of necessary conditions for non-coordination (∼Y2), for all periods/periods 2–4.

	Presence of condition			Absence of condition		
Conditions	Consistency	Coverage	Relevance	Consistency	Coverage	Relevance
RR	0.555/0.764	0.494/0.487	0.648/0.376	0.511/0.309	0.488/0.636	0.677/0.899
PD	0.422/0.376	0.431/0.429	0.681/0.702	0.703/0.700	0.589/0.594	0.667/0.646
TS	0.236/0.300	0.443/0.421	0.847/0.765	0.843/0.793	0.515/0.591	0.401/0.566
SER	0.885/0.881	0.523/0.551	0.372/0.389	0.248/0.230	0.518/0.504	0.880/0.876
Shared-Rule	0.515/0.493	0.379/0.388	0.490/0.504	0.605/0.593	0.746/0.753	0.868/0.867
TC	0.567/0.555	0.459/0.461	0.583/0.568	0.531/0.507	0.567/0.595	0.753/0.777
ROK	0.478/0.489	0.423/0.422	0.614/0.573	0.588/0.569	0.565/0.634	0.714/0.779
VC	0.148/0.107	0.233/0.204	0.758/0.785	**0.940/0.950**	0.613/0.620	0.518/0.474

restricted time period because of the inclusion of a densely populated UK. So, there is only partial evidence supporting the decentralization theorem.

When considering our second conjecture about the territorial and political sources of non-coordination, we do find one necessary condition: the absence of vertical congruence (VC); the presence a strong territorial cleavage, in contrast, is not a necessary condition. Thus, non-coordination is the product of ideological differences between political parties in regional and central government about the acceptability of trade-offs generated by public health containment measures.[12] Moreover, the effects of these ideological differences were felt in countries where regional governments exercised strong self-rule (SER); the consistency score for self-rule is high (0.855/0.881), although it just misses the conventional threshold.

To conduct the sufficiency test, we create a Truth Table (Table 12) and perform a logical minimization to generate an intermediate solution using ESA. We set "directional expectations" in line with the conditions that produce non-coordination: a low reproduction rate (RR), territorial scale (TS), self-rule (SER), a strong territorial cleavage (∼ROK) and low vertical congruence (VC). In addition, we exclude logical remainders that use illogical counterfactuals and contradictory simplifying assumptions, and that violate the necessity condition, that is, where vertical congruence (VC) is present. (The treatment of logical remainders is presented in Table C1 in Appendix II, Supplementary Materials). The results of the sufficiency test are presented in Table 13.

Table 13 reveals two configurations that are sufficient for non-coordination. In the first path, covering the USA, the ideological differences between the two parties in government at different levels over how to respond to Covid-19 reinforced the high degree of partisan polarization by providing it with a territorial axis. This was

Table 12. Truth table for centralization (~Y2), with RR, for all time periods.

Conditions						Outcome				
RR	SER	SHR	TC	ROK	VC	OUT	*N*	incl	PRI	Cases
0	1	0	1	0	0	0	3	0.908	0.881	**CA1, UK1, UK4**
1	1	0	1	0	0	0	5	0.805	0.755	**CA2, CA3, CA4, UK2, UK3**
1	1	1	0	1	0	0	3	0.783	0.752	**US2, US3, US4**
0	1	1	0	1	0	0	1	0.780	0.720	**US1**
1	1	0	0	0	0	0	1	0.698	0.604	IT3
0	1	1	0	0	0	0	1	0.693	0.495	ES1
0	1	0	0	0	0	0	1	0.672	0.524	IT1
1	1	1	0	0	0	0	1	0.592	0.464	ES3
0	1	1	0	0	1	0	1	0.561	0.284	CH1
0	1	1	1	1	0	0	2	0.459	0.310	AU1, AU4
0	1	1	1	0	1	0	1	0.438	0.194	BE1
1	1	1	1	0	1	0	1	0.437	0.221	BE3
1	1	1	1	1	0	0	2	0.376	0.256	AU2, AU3
0	1	1	0	1	1	0	1	0.370	0.212	DE1
0	1	1	1	1	1	0	1	0.366	0.164	AT1
1	1	1	1	1	1	0	1	0.324	0.174	AT3
1	1	1	0	1	1	0	3	0.300	0.193	DE2, DE3, DE4

enabled by the high self-rule (SER) exercised by states and the significant TC implied by the high number of state governments. In the second path, covering the UK and Canada, coordination might have worked, as the low number of constituent units would have kept transaction costs low. But it was hampered by the absence of shared-rule institutions and the presence in office of parties with divergent views about how to handle the outbreak.

The absence of reproduction rate does not feature in the configurations in Table 13, either in the full time period or in the periods 2–4. The results of this sensitivity test are shown in Table F2, Appendix II, Supplementary Materials, confirming that the absence of pressure is not the source of non-coordination. We do find that however that the absence of territorial scale is included in Path 2, covering Canada and the UK in phase 4.[13] In Canada, the vast geographical scale and low population density meant that the pressure to coordinate was never significant. In the UK, in contrast, the weak pressure was due to an abatement of the RR in the final phase of the pandemic.

Table 13. Intermediate solution for non-coordination (~Y2), with RR for all time periods.

	Path 1		Path 2
RR			
SER	●		
SHR			⊖
TC	⊖		●
ROK	●		
VC	⊖		⊖
Consistency	0.814		0.836
PRI	0.796		0.796
Raw coverage	0.518		0.518
Unique coverage	0.025		0.025
Covered cases (uniquely covered cases in bold)	**US1-4**		**CA1-4** **UK1-4**
Solution consistency		0.841	
Solution PRI		0.817	
Solution coverage		0.787	
Model		1	

Discussion

These results help us to understand the variation in multi-level states' policy responses to the Covid-19 crisis by revealing that institutions alone are insufficient for explaining responses. Instead, institutions combine with other conditions (multicausality), in different configurations (equifinality) and with different effects (causal asymmetry) across contexts.

This complexity was visible in our results about the effect of the functional pressure of the Covid-19 outbreak. First, we found that territorial scale was not a necessary condition for coordination or centralization, nor was its absence necessary for non-coordination. This suggests a need to adapt the logic and prescriptions of the decentralization theorem to the context of a sudden crisis. Second, we found that the effect of the reproduction rate was asymmetric. It was nearly necessary for coordination and centralization during the restricted time periods, although it faded into a near-constant factor present in the configurations yielding *both* outcomes. However, its absence was not necessary for non-coordination.

This causal asymmetry was also evident in our results about the necessary conditions for coordination and non-coordination. We found that shared-rule is a necessary condition for coordination, when contrasted with centralization in periods 2–4. This is consistent with institutionalist accounts of the effect of shared-

rule in shaping multi-level states' response to Covid-19 (Schnabel and Hegele 2021; Vampa 2021), as well as their fiscal policy (Braun, Bullinger, and Wälti 2002) and trade policy (Broschek 2024). But this article's method and range of cases strengthen this causal evidence by demonstrating that coordination during a crisis cannot happen without shared-rule.

We also found that the absence of vertical congruence was necessary for non-coordination. This finding resonates with scholarship on the effect of partisan polarization on intergovernmental conflict in the United States (Birkland et al. 2021). However, by studying the effect of ideology in a comparative examination of cases of non-coordination—the design required to discover necessary conditions (Most and Starr 2003)—this article provides fresh evidence of the causal asymmetry underpinning the puzzling variation in policy responses highlighted in the introduction. While coordination in a federation like Germany is created by actors' ability to coordinate, non-coordination in federations like United States is driven by their unwillingness to work together.

Our results also reveal the presence of multicausality and equifinality by showing that the necessary conditions are not sufficient, since they combine with other conditions to produce these outcomes. For instance, the effect of shared-rule on coordination depends either on center-periphery relations being depoliticized or on party political relations being consensual, as both conditions foment a willingness in actors to work together. Likewise, the effect of party ideology on non-coordination is felt in institutional settings in which regional governments either have few incentives to work together because they have exclusive competences over the crisis response, or, do not have access the institutional mechanisms required for conducting their bargaining and bridging their ideological differences. This is a case of symmetrical causal relation: if shared-rule is a necessary condition for coordination, then its absence will produce the negation of this outcome, that is, non-coordination.

The configurational method nevertheless offers three qualifiers to this deterministic reading of shared-rule. The first is that, in conjunction with different conditions, the absence of shared-rule also produces another outcome: centralization. In unitary states, it combined with a weak territorial cleavage and weak self-rule; in Italy, it combined with strong self-rule, a territorial cleavage and high transaction costs. Thus, the divergent outcomes in the UK and Italy are explained by how weak shared-rule combined with vertical incongruence in one case and the risk of territorial policy fragmentation in the other.

The second caveat pertains to the causal asymmetry of shared-rule: while its presence may be necessary for coordination, it does not preclude centralization. This was demonstrated in the case of Switzerland, an established federation with developed inter-governmental councils which nevertheless centralized during outbreak because, like Italy, of a perceived risk of territorial policy fragmentation.

This case, identified with fsQCA, is ripe for theory development about alternative pathways to centralization.

The third caveat is that shared-rule remains nevertheless central to endowing multi-level states with the ability to adapt to the changing circumstances of a crisis. By disaggregating countries into four time periods, we evaluated the effect of early policy responses on subsequent ones. We found that in federal countries that centralized in phase 1 (Belgium, Spain), shared-rule enabled coordination when reproduction rate decreased in the fourth phase. This was not possible for a unitary state like France which maintained a centralized approach despite a reduction of functional pressures.

These results bear implications for our understanding of how multi-level systems, including the European Union (cf Bojar and Kriesi 2023; Kriesi 2025), respond to other "complex inter-governmental problems" (Paquet and Schertzer 2020) brought about by exogeneous shocks like mass migration of economic migrants and asylum seekers, or the extreme weather events created by global warming. Like Covid-19, these policy problems are "complex" because they have strong transboundary and transversal effects that require coordination to be successfully solved. This article proposed three avenues for investigating whether and under what conditions this occurs.

First, the operationalization of the two dimensions underpinning our typology can be adjusted to the particular attributes of these other policy domains to offer an accurate "live" measure of policy responses across countries and over time. The RCC could include the authority to insert immigrants into labor markets, give shelter to asylum seekers, close transport and deploy rescue services in areas affected by storms and floods.

Second, our theoretical framework can be adapted—within the "functional" and "community" logics—to the conditions relevant for shaping intergovernmental relations in these domains. An alternative measure of the magnitude and scale of functional pressures generated by these shocks should be found. But the core findings of our article—that policy coordination requires shared-rule and non-coordination requires vertical (in)congruence—is something that can be externally verified in future investigations. There is already evidence accumulating (Jopson 2024; Miller, Hughes, and Grimes 2025) from cases of intergovernmental responses to floods in Valencia and wild fires in California that partisan polarization colors the quality of relations between state and federal executives in their efforts to contain these disasters and to manage blame attribution in their immediate aftermath.

Finally, the configurational method should be expanded in research on intergovernmental relations and public policy in multi-level states (for a rare example see Fischer and Jager 2020), because it offers a powerful tool for uncovering the causal combinations that produce different policy responses to

complex intergovernmental problems. Beyond that, it can also be used to measure and explain the stringency or generosity of the substantive policies deployed by governments at the national and at the subnational level (cf Giraudy, Moncada, and Snyder 2019; e.g., Freitag and Schlicht 2009) to combat theses crises, as well as to trace the effects of these policy choices on the regrettable outcomes (e.g., mortality) that the crises bring about (see Paykani and Oana 2024).

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Supplementary material

Supplementary data can be found at www.publius.oxfordjournals.org.

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Notes

1. The top-left hand quadrant is an empty category because it is logically impossible and empirically irrelevant as there are not cases of regional governments without some degree of self-rule over the management of the crisis that participate and influence national-level decision-making.
2. If the same additive score is produced by two different values on RCC and SCC, we give greater weight to the SCC parameter when calibrating Y1 and greater weight to the RCC parameter when calibrating Y2 (See Section 2b, Supplementary Appendix I).
3. Following conventional operation in set-theory, since FP is an intersection combined through logical AND, the value of FP takes on the minimum value either RR or PD.
4. The coverage and relevance scores are above 0.5, suggesting that this condition is nontrivial and that is it not a constant.
5. We examine six conditions rather than seven as this is a more manageable number for conducting a sufficiency test because it results in sixty-four (rather than 128 rows). Given our number of cases, it is easier to cluster a higher number of cases in a higher

number of rows if we limit the analysis to six conditions. We alternate RR and FP as the conditions for functional pressure to examine which of the two measures generates the highest yield.

6. In more formal terms, for the condition (X) to be sufficient for the outcome (Y), it needs to be a subset of the outcome (Y), so the value of the condition (X) < outcome (Y). For a "row" to be considered sufficient for the outcome, the fuzzy-set membership of the cases it contains (to the configuration of conditions presented in that row) must be lower than their fuzzy-set membership to the outcome. A case's degree of membership to a row is determined by that case's lowest value on an individual condition in a configuration. The case is then assigned to the row for which it shows the highest value. For example, if country B has the following fuzzy-set values to the following conditions: FP (0.6), SER(0.8), SHR(0.7), it has a membership of 0.6 to the row (FP*SER*SHR).
7. This solution presents the benefit of yielding solutions that are less complex than the *conservative solution*, which relies only on minimizing the rows for which there are cases, and that are more realistic than the *parsimonious solution*, where certain logical remainders may be set to the outcome in a way that contradicts logic or theory.
8. In the language of fsQCA, they are INUS conditions: conditions that are necessary parts of configuration of conditions that are sufficient for the outcome.
9. Path1 (Y2) offers the simpler solution, since coordination is enabled by partisan consensus, both in the heterogeneous country of Switzerland and Belgium, and the homogeneous countries of Austria and Germany
10. It is included in the configuration present in Path 2 (Y1) and Path 1 (Y2), covering Germany and Austria, in Path 3 (Y2) covering Belgium in period 3, and in Path 2(Y2) covering Australia in periods 2 and 3 (Its absence from Path 3 (Y1) is due to the fact that it extends its coverage to Australia in period 4, by which time the R-rate had reduced).
11. As an intersection, *functional pressure* takes on the lowest of value of either condition. It is only when the fuzzy-set value is high for both, that it takes on a high value. This is the formalization of the intuition that a high reproduction rate and a high PD are both necessary for functional pressures to exert influence.
12. The coverage and relevance scores are above 0.5, suggesting that this condition is non-trivial and that is it not a constant.
13. The result is shown in Table F4, in Appendix II, Supplementary Materials.

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