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Authors' version:

Measuring multi-level regulatory governance:
Organizational proliferation, coordination and concentration of
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Measuring Multi-Level Regulatory Governance: Organizational Proliferation, Coordination and Concentration of Influence

Abstract

As regulation increasingly results from the interplay of a wide array of different actors operating at different levels, it has become crucial to focus on how these constellations of regulatory actors are operating. If this research field presents a huge potential for theoretical development, we are still lacking the measurement techniques allowing systematic comparative research. We contribute to filling this gap with four indices measuring crucial characteristics of multi-actor regulatory arrangements: (i) the scope of organizational proliferation (ii) the extent of coordination between regulatory actors (iii) the amount of influence that each individual regulatory actor has on the sector regulation and (iv) the extent to which the regulatory influence is concentrated in the hands of one or a few actors. We argue that our indices are sufficiently systematic, reliable and flexible to be applied in a variety of research contexts relating to multi-level and multi-actors regulatory governance.

Keywords: coordination, concentration, independent regulatory agencies, multi-level governance, regulatory governance

Introduction

As a result of power dispersion trends, the regulation of a given field results from the aggregation of decisions made by several regulatory actors whose interdependency often leads them to interact throughout the regulatory process. The regulation of a given field thus results from the interplay of many different actors operating at distinct governmental levels (Jordana & Sancho 2004). According to the OECD, such configurations of multi-level regulatory governance involving multiple regulatory actors may run into a series of problems such as rule duplication, overlapping and low quality regulations, uneven enforcements or complex administrative demands with negative impact on economic activity (Rodrigo *et al.* 2009). Hence, in order to understand regulatory outputs, it has become crucial to focus our attention on how decision making in these constellations of regulatory actors is organized.¹

The existing studies addressing the question of power dispersion and coordination practices can be classified in two categories, depending on their emphasis on either the complexity of regulatory regimes or operationalization and measurement techniques. On the one hand, scholars of transnational regulatory governance, transnational law or international organizations have shown interest in the spread of and interaction between regulatory actors across different lines of power dispersion as a determinant of regulatory output (Abbott *et al.* 2014, Black 2008, Eberlein *et al.* 2014, Jordana & Sancho 2004, Shaffer and Halliday 2015). However, these works have not developed the measurement tools and indices required for systematic comparative research across institutional settings. This research field,

still in its infancy, has a huge potential for theoretical development. Further advancements however depend on the development of measurement techniques allowing systematic comparative research - as we do in this article.

On the other hand, we find works that have developed indices for the comparative assessment of power dispersion and coordination. However, these works tends to be limited to one line of power dispersion. Students of federalism, EU integration and multi-level governance tend to focus on power dispersion and interaction between actors located on various governmental levels; and public administration specialists are rather interested in the proliferation of regulatory actors on one given governmental level.² Both approaches are insufficient to grasp the impact of institutional structures on regulatory output, as these multi-level relationships often cross several lines of power distribution (Aubin and Verhoest 2014, Charbit & Michalun 2009). The regulation of a given field most generally involves various governmental levels *as well as* various types of actors on a single governmental level (Aubin & Verhoest 2014) - as acknowledged in this article.

Hence, we are still lacking operationalization and measurement tools that allow systematic comparative research of regulatory regimes *and* embrace the full complexity of actors' constellations that compose them. This article contributes to this methodological step by presenting three indices measuring crucial characteristics of multi-actor regulatory arrangements. Our indices provide a standardized quantitative measure of (i) the scope of organizational proliferation in the arrangement (Organizational Proliferation Index), (ii) the extent of coordination between regulatory actors (Coordination Index) and (iii) the extent to which the

influence on the regulation of the sector is concentrated in the hands of one or a few actors (Concentration Index).

Moreover, we also present the Actor Influence Index, which gives a measurement of the amount of influence that each individual regulatory actor has on the regulation of the sector. Unlike the other three indices that apply to the regulatory arrangement as a whole, the Actor Influence Index takes individual regulatory actors as a unit of analysis. The Actor Influence Index is used as variable in the calculation of the Concentration Index. It is nonetheless presented separately from the Concentration Index in this article because it can also serve as a self-standing Index in other theoretical contexts, or be used as a variable for creating other macro-level indices, such as an EU-integration index or a decentralization index.

The method presented in this paper focusses on the formal dimension of the variables measured (organizational proliferation, coordination, concentration and actor's influence). Indeed, the data used for the calculation of the indices is based on the analysis of the legislation that prescribes procedures for making regulatory decisions. While this method does not grasp informal channels of influence, we contend that our focus on formal decision-making procedures is highly relevant to understand regulatory outputs, as formal procedures are critical to induce cooperation and harmony among regulatory actors (Koop and Lodge 2014: 1314, Dabbah 2011: 132). However, the indices can be used in future research to measure the de facto dimension of regulatory arrangements, provided the researcher builds the dataset with another type of data source, such as surveys.

Our indices can be used in different theoretical contexts. We initially designed them to measure regulatory arrangements in order to enable comparisons of the impact of the structure of multi-level and multi-actor regulatory arrangements on regulatory outputs in the EU. But we believe that the methodology described here can be applied to understand regulatory outputs in other multi-level governance contexts. In addition to regulatory outputs, the indices can also be used in studies seeking to explain regulatory arrangements' structure. Our indices can also be applied in research on national regulatory agencies (NRAs) and their independence (see e.g. Gilardi 2008; Maggetti 2007; Hanretty and Koop 2012), which it could complement by giving insights on the interdependency and relative distribution of decision making power between the NRA and the remaining regulatory actors of the arrangement. The operationalization and methodological techniques of our indices might also help assessing supranational integration or decentralization of regulatory decision-making. Our indices thus open the door to systematic comparative studies on these questions.

The article is divided in three sections. We first expose the theoretical context in which the indices are embedded. After defining the concept of regulatory arrangement, we discuss the impact of three characteristics of regulatory arrangements in terms of regulatory output based on a review of the literatures on multi-level governance, public administration and regulatory governance. These characteristics are organizational proliferation, coordination and concentration of influence. The second section of the article is dedicated to the presentation of the indices. The indices allow making standardized and quantitative measurement of the three characteristics identified in the theoretical section (organizational

proliferation, coordination, concentration of influence). We explain in detail how to collect the relevant data, how the indices are calculated, their underlying theoretical assumptions and methodological limitations. In the third section, we show the validity and the relevance of the indices by confronting the measurements obtained with qualitative data in the regulation of electricity and telecommunications in Belgium. These illustrations support both the validity of the indices as measurement techniques as well as the relevance to study the impact of multi-actor regulatory arrangements on regulatory outputs. We conclude with a brief discussion on the added value of the indices to the regulatory governance research field.

Theoretical context

The concept of regulatory arrangement

It is now widely acknowledged that a given regulatory policy is not in the hands of a single regulator only, but elaborated and implemented by a complex set of interacting organizations (Aubin & Verhoest 2014, Black 2008, p. 139, Coen & Héritier 2005, Jordana & Sancho 2004, p. 302). We use the term 'regulatory arrangement' to refer to this complex web of actors whose interventions and interactions sustain the regulatory process in a given policy field.

The involvement of all these actors in the regulatory process is related to the phenomena of power dispersion and organizational proliferation (Hooghe & Marks 2003, Jensen *et al.* 2014, Rosenau 2007). Power dispersion unfolds in various directions (Aubin & Verhoest 2014, Jensen *et al.* 2014). First, power dispersion has a vertical direction, consisting in the involvement of actors stemming from different governmental levels, as a consequence of both decentralization and

supranationalization trends (Hooghe & Marks 2003). Second, tasks can be uncoupled horizontally, following the stages of the policy cycle, such as policy-making and implementation. Third, regulatory tasks are also divided along sector-specific lines, which leads to a juxtaposition of several sector-specific regulators. Finally, a distinction can be made between sector-specific regulators and regulatory agencies enjoying a horizontal competence, cutting across many sectors, such as competition or environmental regulation.

The regulatory arrangement concept integrates all four lines of power dispersion exposed above and thus covers all actors that participate in the regulatory process, regardless their nature (public or private), their function in the regulatory process or their governmental level (supranational, national, regional or local).

Our take on the question of power dispersion and regulatory output is that regulatory arrangements matter. We think that, in order to understand what makes a consistent regulatory policy, investigating the design and decision making powers of the competent IRA or its relationship with one particular actor such as its government or interest groups does not suffice. Such micro-level approaches should be complemented with a fine-grained understanding of the dynamics unfolding at the level of the regulatory arrangement as a whole. In short, we argue for treating regulatory arrangements as a unit of analysis.

Breaking down the regulatory arrangements into variables

In order to identify the characteristics of regulatory arrangements that are likely to affect regulatory outputs, we have reviewed three branches of the public policy literature: multi-level governance, public administration and regulatory

governance. This has allowed the identification of three characteristics of regulatory arrangements that are both found central to understand regulatory outputs and compatible with the operationalization techniques that we develop in this paper. These variables are organizational proliferation, coordination, and concentration of influence.

Organizational proliferation refers to the trend towards the multiplication of actors that are involved, in one way or another, in regulatory processes. The impact of organizational proliferation on regulatory outputs is widely acknowledged – although the nature of this impact remains disputed. For instance, it was shown that organizational proliferation can have a positive effect on regulatory innovation and learning (Cole & Banerjee 2010, p. 457; Hood *et al.* 2001, p. 174-175; Kerber & Eckardt 2007), but can also sustain regulatory inconsistencies and rule confusion, leading to sub-optimal policy outcomes (Coen & Thatcher 2008, Dehousse 1997, Eberlein & Grande 2005, Jarvis 2010, p. 197).

We understand coordination as the process of mutual adjustment between regulatory actors with views to reaching a common policy objective (Verhoest and Bouckaert 2005). Our definition emphasizes coordination as a process and thus departs from the view holding coordination as an outcome that could be fostered by different means including market, network and hierarchy mechanisms (Bouckaert *et al.* 2010). Coordination is generally considered as an important factor of regulatory governance. This is mainly because coordination has the potential to foster regulatory consistency, as advanced by scholars of public administration

(Christensen & Laegreid 2007, Bouckaert et al. 2010) and multi-level governance (Dehousse 1997, Eberlein & Grande 2005, Maggetti & Gilardi 2014).

Regulatory outputs also depend on the concentration of influence. The dispersion of power among multiple actors does not imply that all of them enjoy similar levels of influence on the policy process. The concept of concentration of influence in a context of organizational proliferation refers to the existence of a central actor that would dominate the regulatory process through its own decision-making power or its influence on other actors. The literature suggests that the concentration of influence sustains the consistency of regulatory policies by providing a 'body whose role is to act as the lead interpreter of the regimes' rules or principles, for example, or to otherwise steer or co-ordinate the activities of the multiple participants' (Black 2008, p. 140). This mechanism can be found in the literatures on public administration (Kickert *et al.* 1997), on regulatory governance (Moe 1990), and multi-level governance in the EU (Egeberg 2006, Sbragia 2000).

The indices

If the extent of organizational proliferation, coordination and concentration of influence of regulatory arrangements are to affect regulatory outputs, how are we to operationalize and measure these concepts? To date, this remains a significant challenge in the literature dealing with power dispersion and coordination (Jensen *et al.* 2014). While some interesting operationalization and measurement initiatives can be reported, these tend to remain limited to one line of power dispersion. For example, for the vertical line, i.e. the spread of actors and their relationships between levels of government, one can refer to a measurement of the authority

devolved to regions (Hooghe *et al.* 2008) and to operationalizations of EU coordination mechanisms reviewed by Jensen (2014). On the horizontal line, i.e. within a given governmental level, the relationship between IRAs and their governments was approached through the measurement of IRAs' independence (Gilardi 2002, Hanretty & Koop 2012, Maggetti 2007) or governmental control mechanisms (Damonte *et al.* 2014).

However, the spread of power and the interactions between regulatory actors often cross various lines of power dispersion (Charbit & Michalun 2009). Most generally, regulatory decisions involve regulatory actors located on various governmental levels *as well as* various types of actors on a single governmental level. On each governmental level, power is divided between political and administrative actors, between regulators specialized in different areas, and between regulators with horizontal and sector-specific competences (Aubin & Verhoest 2014). Often, the regulation of a given field relies on the intervention of and interaction between all these different types of regulatory actors. The focus on one line of power dispersion only is thus insufficient to grasp the impact of multi-actor and multi-level governance arrangements on regulatory outputs. More encompassing measurement tools are needed.

While the existing indices tend to focus on one line of power dispersion only, our indices encompass all lines of power dispersion. It means that we can measure, for example, the degree of coordination among all actors composing the regulatory arrangement, regardless their governmental level or legal status. Let us assume that an NRA makes a decision, after having consulted the national competition authority

(NCA), informed the ministry, and considered a recommendation of the EU Commission. All these interactions are integrated in our measurement of coordination.

In this section, we present the series of indices that we have designed to measure the three characteristics of the regulatory arrangement identified in the former section. Each of these characteristics is matched by an index; we thus have an Organizational Proliferation Index, a Coordination Index and a Concentration Index.

Besides, we also developed the Actor Influence Index to measure the amount of influence that individual regulatory actors have in the regulatory arrangement. Unlike the other three indices, which measure characteristics of the regulatory arrangement as a whole, the Actor Influence Index takes regulatory actors, individually, as a unit of analysis. In this article we use it as a variable in the calculation of the Concentration Index. Although we only use the Actor Influence Index here as a step towards producing the Concentration Index, we present it as a separate index because it can be used differently in other research contexts. First, it can serve as a self-standing index in order to compare, for example, the regulatory influence of the different regulatory actors in a given regulatory arrangements. Second, just as we do here with the Concentration Index, the Actor Influence Index can serve as a variable in the elaboration of other macro-level indices characterizing regulatory arrangements. One can find examples of possible alternative uses of the Actor Influence Index in the conclusion.

The section first presents how the database is generated and proceeds with an explanation of how the indices are calculated.

Creating the database

The creation of the database results from the following steps: (1) definition of the regulatory field, (2) gathering the data source, (3) selecting the relevant information in the data source and (4) coding the information. We present each step in details in this subsection.

(1) The first step consists in defining the scope of the regulatory field investigated, i.e. the set of regulatory issues under study. This step is fundamental because it determines the boundaries of the regulatory arrangement, understood as the organization of decision-making power among different actors for the regulation of the regulatory field. The decision about the scope of the regulatory field is up to the researcher and depends on his or her precise research interests. For example, the regulation of the telecommunications is generally divided in three areas: economic regulation, social regulation and technical regulation. So one may, for instance, decide to study economic or technical regulation only.

(2) The key data source is the national sector-specific primary legislation that is relevant for the regulatory field selected. This is the starting point for the researcher who can, from there, move on to the following steps detailed below. Once engaged with the content of the legislation (when selecting and coding the information), the researcher may find that the national sector-specific legislation refers to other documents such as secondary legislation, inter-institutional cooperation agreements, and occasionally inter- or supranational norms. These are then included and also used as data source. Note however that most inter- or supranational norms are soft norms that are *not* referred to in countries' legislative

frameworks, so these acts are generally not taken into account for building the database.

For studies of regulatory arrangements in the European Union, given the relevance of EU legislative acts in sectoral regulation, it is useful to include EU sectoral legislation in the data source, in addition to the national sector-specific legislation. This allows a more detailed and accurate mapping of the involvement of EU-level actors.

(3) To select the relevant information, the researcher screens the legislation in order to identify those provisions that are substantively relevant to the regulatory field under study. Those provisions typically consist in the application of a decision-making procedure (DMP) on a particular regulatory issue. For example, a provision in Belgian telecommunications law stipulates that the designation of the operator responsible for providing the universal service (regulatory issue) is made by the federal Government based on the proposition of the Belgian telecommunications regulator (decision-making procedure). This third step thus consists in finding those legislative provisions that allow to list the regulatory issues composing the regulatory field under study, and to identify the DMPs that are applied to the regulation of these issues.

The delineation of what constitutes an issue follows the DMPs. For example, for the market analysis process in telecommunications, the law may require the NRA to notify its decision to the European Commission, specifying that the latter has a veto power regarding the market analysis, but only a non-binding recommendation power regarding the choice of remedies. We have here two issues with distinct

DMPs: the market analysis for which the Commission has a veto power on the decision of the NRA, and the choice of remedies for which it can only issue a non-binding recommendation to the NRA.

(4) Once the information is gathered, the researcher proceeds to the coding of the DMPs to build the database. The DMPs indicate, for each issue, which actors are involved in the making of the regulatory decision and what their role is in the adoption of the decisions. All issues have a main decision-maker or co-decision-makers. But other actors may intervene, for example when the DMP requires the main decision-maker to consult another actor or because another actor is competent for drafting the proposal on the basis of which the main decision-maker will adopt the final decision. Depending on how the DMP defines the involvement of an actor in the decision-making process, the actor shall enjoy more or less formal capacity to influence the final decision. We created a scale for the measurement of actors' influence in individual decisions that is composed of 6 values ranging from 0 (for 'not involved') to 1 (for 'main decision-maker') (see table 1).³

[Insert Table 1 here]

Coding DMPs is mostly a straightforward and objective process, as for most DMPs the legislation does not leave room for interpretation by the coder. In the rare cases where an interpretation of the coder was needed, the interpretation was discussed with the other researchers in order to come to a joint interpretation. The value 0.2 ('informed') means that the actor is simply informed about the project of making a decision and its content, but is not requested to express its views on the question. The value 0.4 ('consulted') corresponds to situations when the actor is asked to

express its views on the decision that is planned to be made; its opinion can nonetheless be freely ignored by the decision-maker. The value 0.6 ('Binding advice') is given when the actor gives an input in the decision and this input must be taken into account by the decision-maker, at least to some extent. The value 0.8 ('co-decision-maker') is attributed when there are 2 or more decision-makers who enjoy an equal influence on the decision, i.e. when each of them has the capacity to prevent the adoption of the decision in case they do not agree with it. Finally, the value 1 ('main decision-maker') is attributed to the main decision-maker, when there is no co-decision-makers.

For instance, let us assume that the Belgian telecommunications regulator adopts a decision on the analysis of the mobile telephony market. It can only do so after having notified the EU regulatory network of its project, having consulted the national competition authority and received the green light from the Commission, the latter having a veto power on the decision. Here, the national competition authority and the Commission are co-decision-maker (0.8), the regulatory network is just informed (0.2) and the NCA is consulted (0.4).

All actors that are mentioned in the DMPs are included in the database, regardless their statute, nature (public or private), governmental level or type of intervention in the adoption of the regulatory decisions. We can thus find NRAs, ministries, governments, EU Commission, transnational regulatory networks, regulated companies, subnational governments, etc. Those actors who may have an informal influence on regulatory decisions that is not spelt out in any DMP are not taken into account. Finally, since we focus on how regulatory decisions are made in the

regulatory arrangement, we exclude from the database those actors and processes that intervene after the decision is made, such as appeal courts that may be competent for judicial review of regulatory decisions.

The resulting database is a table that crosses all regulated issues with all the actors involved in the regulatory arrangements. Each combination of an issue with an actor corresponds to the level of influence of this actor in the decision about the issue and is a number comprised between 0 and 1. Table 2 provides a simplified example of how the database can look like (see table 2).

[Insert Table 2]

The Organizational Proliferation Index

Organizational proliferation refers to the trend towards the multiplication of actors that are involved, in one way or another, in regulatory processes. The design of the Organizational Proliferation Index starts with the method that consists in counting the number of regulatory agents involved in the arrangement (see for example Koop & Lodge 2014, p. 1316). We then refine this measurement by confronting it to the number of issues that make the regulatory arrangement. Looking at the number of regulatory actors without relating it to the width of the regulatory arrangement gives only a partial view of the extent of organizational proliferation. If, between two regulatory arrangements exhibiting the same number of regulatory actors, the first one is twice bigger as the other second, i.e. it involves twice as many issues to be regulated, its level of organizational proliferation shall be comparatively much lower than that of the second arrangement. In order to integrate the important nuance, the Organizational Proliferation Index was designed as a ratio between the

number of actors of the regulatory arrangement and the number of issues that define it (see table 3). Following the example provided in table 2, the Organizational Proliferation Index would be: 5 divided by 7, that is 0.71.

[Insert Table 3 here]

The Coordination Index

We understand coordination as a *process* of mutual adjustment (rather than as an *outcome*). From this perspective, coordination takes place when two or more actors interact in the process of making regulatory decisions, that is, when a DMP requires a decision-maker to consult or co-decide with other actors. There, indeed, the resulting decision is more likely to reflect and integrate, at least to some extent, the positions of these other actors.

Yet a high level of organizational proliferation does not automatically implies that the actors of the regulatory arrangement engage in coordination with each other. It all depends on the extent to which regulatory actors interact with each other when making their regulatory decisions. At the level of the regulatory issue, a high level of coordination would be found if the DMP requires the decision-makers to interact with several regulatory actors when adopting the regulatory decision. By contrast, an absence of coordination would characterize a regulatory issue when the DMP just designates a decision-maker without requesting the interaction with other actors for preparing or adopting the decision. Accordingly, two actors or more interacting in the process of making a decision qualifies as coordination. The higher the number of actors involved in the decision about a regulatory issue, the higher the degree of coordination.

The Coordination Index offers a 0-1 standardized value of the average number of regulatory actors involved in the decisions made about the regulated issues that compose the regulatory arrangement. While a Coordination score of 0 would mean that, in all issues, the DMPs indicates that only one actor is involved in the process of making the decision, a Coordination score of 1 would mean that, in all issues, the DMP requires the involvement of all actors for making the decision. An actor is considered as being involved in the decision when its influence on this decision, as coded from the analysis of the DMP, is anything but 0.

To calculate the Coordination Index in an arrangement, one first calculates the absolute coordination score by summing up the number of actors involved in the regulation of each issue. Following our example (see table 2), we sum up the numbers of the last column and come to the number 21. Then, in order to allow the comparison with other regulatory arrangements, the value obtained is standardized to be comprised between 0 and 1. The minimal value of the coordination score corresponds to a situation where all issues are decided by the main decision-maker only and therefore equate the number of issues of the arrangement (i), that is 7 in our example. Its maximal value would be reached when all actors of the arrangement are involved in the regulation of all issues, so it amounts to the number of issues multiplied by the number of actors ($i*a$), in our example 7 multiplied by 5, i.e. 35. In order to bring the coordination score between 0 and 1, it is necessary that its minimum value becomes 0 and its maximal becomes 1. To do so, one subtracts the minimal value (i) from it and divide the result by its maximum value, $a-i$, which equates $i(a-1)$ (see table 3). In our example, this consists in subtracting 7 from 21

and dividing the result by 28 (7×4). This gives the final score of 0.5 ($14/28$) (See table 2).

The Actor Influence Index

The dispersion of power does not necessarily lead all actors of the regulatory arrangement to be equally influential. Actors' influence on the regulatory fields depends on how many issues they are able to influence, and the degree of influence they can exercised on each of them. The Actor Influence Index provides a standardized measure of the amount of influence of each actor on the regulatory field. As explained above, each actor is attributed one value per issue comprised between 0 and 1, depending on the formal influence it has on the decision about the issue. The Actor Influence Index is the arithmetic mean of the influence the actor has on the different issues. It is obtained by summing up the values corresponding to the actor's involvement in each issue and dividing this sum by the total number of issues (see table 3). In the example of table 2, the influence score of the NRA is $(0.8 + 0.8 + 1 + 1 + 0.6 + 1 + 0.4) / 7$, that is 0.8 (see table 2).

The Concentration Index

In a context of organizational proliferation, concentration of influence refers to the existence of a central actor that would dominate the regulatory field. In other words, it refers to the degree of asymmetry between the influence of the most influential actor of the arrangement and the influence of the remaining actors. The Concentration Index provides a 0-1 standardized measurement of the degree of this asymmetry.

The Concentration Index is based on the summation of the differences between the Actor Influence of the most influential actor and that of the other actors (see table 3).⁴ In our example, the most influential actor of the arrangement is the NRA, so the absolute concentration score would be obtained as follows: $4 \cdot 0.8 - (0.23 + 0.29 + 0.34 + 0.17)$, that is 2.17 (see table 2). The absolute concentration score obtained is then transferred on a 0-1 scale for comparability, following a similar procedure as for the Coordination Index. The minimal value of the absolute concentration score is subtracted from it and the outcome is divided by its maximum value. The minimum value corresponds to a situation where all actors enjoy a similar influence score; there the sum would be 0. The maximum spread between the influence of the most influent actor and that of the others would be reached when the influence of the most influent actor is 1 and that of all others is 0; there, the sum would amount the total number of actors of the arrangement minus 1, that is a-1 (see table 2). In our example, the maximum value of the Concentration Index would be 4, so we need to divide the 2.17 by 4, which gives the score of 0.54.

Methodological choices and theoretical assumptions

Assumptions implied by the focus on DMPs as a data source

The method that we present in this article aims at measuring organizational proliferation, coordination and concentration of influence *formally* (note however that our indices can be used to measure the *de facto* functioning of the regulatory arrangement, see below). The measurements obtained with our method would surely differ from the *de facto* functioning of the regulatory arrangement. Despite the rather proceduralized nature of regulatory decision making, there are informal

exchanges, influences and coordination practices between, on the one hand, sectoral regulators and, on the other hand, ministers and ministries (Maggetti and Verhoest 2014), national competition authorities (Dabbah 2011), other sectoral regulators (Freeman and Rossi 2012), transnational regulatory networks (Maggetti and Gilardi 2014) and regulatees (see the literature on regulatory capture, e.g. Da Bo 2006, Carpenter and Moss 2013). As our indices focus on the formal dimension of the regulatory governance, they do not grasp these informal channels of influence and coordination practices.

Yet, many influential studies of regulatory governance focus on the formal organization of regulatory decision-making and there is substantial merit in doing so. These works generally aim at investigating how policymakers design regulatory governance (Gilardi 2008, Hanretty and Koop 2012, Jordana et al. 2011, Koop and Lodge 2014). The method we present here can be used in this research tradition, in order to assess the impact of different factors (such as policymakers' search for power vs effectiveness, the role of pre-existing institutions, interest groups politics, legislative log-rolling, etc.) on institutional design and institutional change.

We also think that a good understanding of the formal dimension of regulatory governance is crucial to understand regulatory output – even if these rules are not necessarily the product of rational design. Formalizing governance arrangements by enshrining actors' interactions into legislation creates commitments. Formal rules about coordination and the allocation of decision-making power among regulatory actors constrains their behaviour, for instance forcing cooperation in situations where self-interested behaviours would preclude voluntary coordination (Koop and

Lodge 2014: 1314), which increases the chances of achieving harmonious relationships between regulatory actors (Dabbah 2011: 132).

While formal institutions may sometimes be ceremonial and therefore lack substantive effect, we argue that this is less the case about decision-making procedures in regulatory governance, as regulatory actors have strong incentives to follow these formal procedures. First, compliance with rules and procedures determines regulatory agents' procedural reputation, about which public administrations are particularly sensitive (Carpenter and Krause 2012). Second, for regulatory actors, abiding by formal procedures is a way to protect themselves from the threat of judicial review, which regulatees do not hesitate to activate whenever they have a possibility to challenge regulatory decisions that are unfavourable to them (Mathieu and Aubin 2014).

Finally, whereas *de facto* governance arrangements are relevant to understand regulatory output, their impact is best studied in conjunction with that of formal arrangements, in order to disentangle their respective impact and understand how they interact.

Although we have focused in this article on formal governance arrangements, our indices can also be used in future research to study *de facto* dimension of organizational proliferation, coordination and concentration of influence, which is an equally relevant object of inquiry. This could be done, for example, by filling-out the database with self-assessment made by regulatory actors regarding how much influence themselves and other actors have in specific issues. Replacing the researcher-based coding of formal DMPs with self-assessment by regulatory actors

would be compatible with our indices. In fact, the indices would be a particularly adequate tool for comparing formal and de facto dimensions of regulatory arrangements, because they allow to compare the same variables obtained with different datasets.

Using DMPs as a data source implies that we focus on the procedural dimension of organizational proliferation, coordination and concentration. Yet these variables may have manifestations beyond DMPs. For example, the reporting activities of NRAs to the legislature, the hierarchical influence of the government on the ministry or the participation of an NRA to an EU regulatory network are types of coordination and influence that do not aim specifically to the adoption of regulatory decisions. In case they are not channeled in the formal procedures for making regulatory decisions, these interactions are not captured in the database. The focus on DMPs as a data source assumes that the actors are independent from each other in terms of their *internal* decision-making process, i.e. in the definition of their preferences regarding regulatory decisions. If this is largely unproblematic in most contexts, special attention should be paid on the relationship between ministry and government, because of their hierarchical relationship. Where a ministry is one of the key actors of the regulatory arrangement, the measurement of the indices may underestimate the level of coordination between the ministry and the government as well as the Actor Influence score of the government, and over-estimate that of the ministry. But when the focal regulatory authority is an IRA, the case under study is well aligned with the assumption about the independence between the regulatory actors (although also in this case informal influence by government is still possible).

Assumptions implied by the design of the indices

Standards about the design of indicators in social sciences were developed for composite indices, which aggregate multiple individual indicators in synthetic measures. Composite indices are widely used by scholars of governance and public policy scholars, for example to measure the independence of regulatory agencies (Cukierman et al., 1992; Gilardi 2002; Maggetti 2007, Edwards and Waverman 2006), the centralization of coordination mechanisms in EU countries (see Jensen 2014), or of the involvement of regions in the domestic EU policy-shaping (Tatham 2011).

Our indices are fairly simple in their design compared to composite indices that aggregate indicators of a different nature. Nevertheless, the coordination, influence and concentration indices aggregate values related to different regulated issues through unweighted summation and by calculating mean values. Although the values associated to the issues do not differ in nature, these issues may differ regarding their importance in the regulatory field. So the necessary precaution to be made regarding the weighting of items (Hanretty and Koop 2014, Hoffmann et al. 2008) is of relevance here. We chose to assign equal weighting to the different issues, in spite of their probable differential impact on the regulation of the regulatory field. In the absence of readily available empirical or theoretical information on the relative importance of the different issues, this appears as the safest choice to make (Gilardi 2002: 880; see also Hanretty and Koop 2014: 204-205). Future research can improve this aspect, for example by surveying the regulatory actors about the relative importance of the different issues.

Hanretty and Koop (2014) underline another two important points regarding response categories, which are relevant for the way we code actors' influence on individual issues. First, when response categories are ordinal, their order must either make intuitive sense, or be well justified. Our response categories (not involved, informed, consulted, binding advice, co-decision-maker, main decision-maker) do make sense intuitively, so their order is not problematic. Second, when scores are attributed to response categories, we distribute them equally along the interval [0,1] using mean value as calculation as if they were interval variables. This may however be at odds with the actual difference of impact of the corresponding situations regarding the item being measured. We nevertheless opted for assuming an equal distance between the item response categories, which is the best option in the absence of information about the differing impact of these situations. Many composite indices in political science and regulatory governance use this method (like Gilardi 2002, Jensen 2014). Future research may however overcome this limitation by questioning regulatory actors on the relative impact of actors' types of involvement in DMPs regarding their influence on the decisions made.

Validity and relevance

We now discuss the methodological validity of the indices and the relevance of studying regulatory arrangements to understand regulatory outputs based on qualitative data referring to the regulation of telecommunications and electricity in Belgium, chosen for their important exposure to power dispersion.⁵

Telecommunications and electricity belong to the utilities sectors, where three types of regulatory areas are generally distinguished: economic regulation, technical

regulation and social regulation. While economic regulation aims at creating competition through regulating issues such as prices or market entry, social regulation aims at correcting the negative externalities for society caused by market mechanisms, for example through the regulation of universal service. Finally, technical regulation relates to questions such as technical standards for interoperability or the security of the networks.

To ensure the comparability of the telecommunications and electricity regulatory arrangements, we define regulatory fields that are similar in scope in both sectors. The regulatory fields under study include, for both sectors, the three types of regulatory areas: economic, social and technical regulation. In order to build our database we have used Belgian and EU sectoral legislation as data sources, identified the provisions that related to either economic, social or technical regulatory issues and coded the involvement of regulatory actors in the regulatory issues as stipulated by the DMPs.

Validity of the indices

In this section we check whether our indices provide an accurate quantitative synthesis of complex decision making patterns in the regulatory arrangement. In order to assess the validity of the indices, we triangulate the values obtained with the indices with qualitative descriptions of the organization of regulatory decision-making in the regulatory arrangements based on interviews with stakeholders and occasionally on document analysis and insights gathered from the literature on regulatory and multi-level governance. We find that the values obtained with the

indices are consistent with the qualitative description of the organization of the regulatory arrangements.

The calculation of the indices in both regulatory arrangements reveals that, while both arrangements exhibit a similar level of organizational proliferation, they depart as regards the degree of coordination and concentration, with both indices being rather higher in telecommunications than in electricity (see table 4). We now turn to the qualitative description of both regulatory arrangements and evaluate if the similarities and differences found in the qualitative description are well reflected by the comparison between the scores obtained with the indices.

[Insert Table 4]

Organizational proliferation

The Organizational Proliferation Index, which we conceived as the number of regulatory actors involved in the arrangement, in relation with the width of the regulatory field, gives a similar measurement (0.22) for both sectors (see table 4). This indicates that the proportion between the number of actors and the number of regulated issues is similar in both sectors. In fact, the electricity sector involves more actors and more issues.

Coordination Index

The values obtained with the Coordination Index, which we see as a measurement of the extent to which regulatory actors interact to take each other's viewpoint into account when making regulatory decisions, are higher in telecommunications than in electricity (0.25 versus 0.11 in table 4).

The interviews we conducted and insights from theories of federalism allowed us to confirm an important difference between both sectors in terms of coordination and clarify its underpinning. Though telecommunications is a federal competence, the federal NRA is expected to interact with subnational broadcasting NRAs. Indeed, while telecommunications and broadcasting regulation are distinct regulatory fields, they have become quite interdependent due to the digitalization of communications and telecommunications operators being active in broadcasting. In many instances, the interdependency between both fields is so important that the Belgian Constitutional Court concluded that it was impossible to disentangle the respective responsibilities of the telecommunication and broadcasting NRAs. The Court thus mandated the federal and subnational levels to conclude a cooperation agreement. As a result, whenever an issue falls into this grey area, the telecommunications NRA can only adopt a decision after having consulted the committee of subnational broadcasting NRAs.

By contrast, in electricity, decision-making is organized in such a way that federal and subnational actors do not have to interact with each other for making their respective decisions. There, the organization of decision-making power is similar to what we find in dual federal systems, where tasks are neatly separated, each governmental level holding a set of exclusive competences, which they can exercise without interference from the other governmental level. This contrasts with interaction patterns found in cooperative federal systems, where each governmental level exercises its competences in cooperation with the other governmental level (Swenden 2006). In sum, while the organization of decision-making power is close to the cooperative federal model in telecommunications, it is

close to the dual model in electricity. There is thus more coordination in telecommunications. This matches the higher level of coordination found in the telecommunications sector with the indices.

Concentration Index

The value of the Concentration Index is substantially higher in telecommunications than in electricity (0.49 versus 0.16 in table 4). Concentration of influence refers to the extent to which the most influential actor of the regulatory arrangement concentrates the decision-making power versus a situation of relatively homogeneous distribution of power among the regulatory actors.

The Actor Influence indices, shown in table 5, reveal more details on the distribution of influence among the regulatory actors. As table 5 shows in telecommunications, the federal NRA, which has an Actor Influence Index of 0.65, is clearly the most influential actor of the regulatory arrangement, far ahead of the next key actors who are the European Commission (0.37), the Federal government (0.30) and the group of subnational broadcasting NRAs (0.25) (see table 4). The configuration is very different in electricity where the four most influential actors, the Federal Government (0.29), the European Commission (0.29), the EU agency (0.28) and the federal NRA (0.26), enjoy a very similar degree of influence on the regulatory process and the next four actors are not far behind. Thus, following these different scores of the Concentration Index, our qualitative information should point at a more leading role of the federal NRA in telecommunications, while in electricity, we should find decision-making power being more homogeneously allocated among the different actors.

[Insert Table 5]

Our interviews and the literature on regulatory governance allowed us to identify three important differences between both sectors that relate to the concentration of influence. First, regulation of energy is known for being a particularly politicized policy field, especially due to the sensitive issue of security of supply. Because of this, governments are more reluctant to give power away in this sector. Governments have indeed accepted to delegate far-reaching regulatory power to the EU and to NRAs earlier in telecommunications than in energy (Gilardi 2005, Mathieu 2014). This constitutes a first obstacle to the development of a leading role of the electricity NRAs' in the regulatory arrangement, compared to telecommunications.

Second, in the electricity sector we can observe a higher dependence on the expertise of regulated firms (Hancher 2000, Finger and Varone 2010: 99). The regulators' gap in technical expertise was such that policymakers gave the operators a determinant role in the regulatory process. Specifically, the EU-level federation of network operators was delegated the competence to write a series of crucial technical and economic regulations, to be processed and formally adopted at a later stage by the EU energy agency and the Commission. Comparatively, the process of liberalization and re-regulation of telecommunications could be driven mainly based on economic and legal expertise (Mathieu 2014: 229). The important role played by private actors in electricity constitutes the second obstacle to a clear NRA's leadership in the sector.

Third, the delegation of important regulatory competences to the regional level in electricity further dilutes the relative power of the federal entities. While

subnational broadcasting NRAs are just consulted by the federal regulator in telecommunications, in electricity however, regional NRAs enjoy full regulatory competences and are main decision-maker on a significant series of issues. Hence, the relative amount of power held by the federal NRA compared to the subnational NRAs is higher in telecommunications than in energy.

Finally, in electricity, the relative weakness of the federal regulator compared to governmental actors and regulatees is replicated on the European, federal and regional levels, where these actors are relatively more powerful than in the telecommunications sector. In such a context, neither the federal regulator nor any other actor could clearly emerge as channeling the bulk of regulatory power in the electricity sector. These qualitative insights into the differences in the governance of both sectors are consistent with our measurement of a higher concentration in telecommunications than in energy.

Relevance of the regulatory arrangement for understanding regulatory outputs

In the previous section, we showed that the organization of decision-making is accurately reflected by our indices. Based on two qualitative examples, we now illustrate the relevance of studying the organization of decision-making as a determinant of regulatory outputs. The mechanisms presented here can also serve as an inspiration for future research into the relation between regulatory arrangement and regulatory output, based on our indices.

The indices indicated that the electricity sector had a rather low level of coordination and of concentration. This means that (1) regulatory actors do not

substantially interact to take each other's viewpoint into account when making regulatory decisions (low coordination) while at the same time (2) no regulatory actor exerts sufficiently regulatory influence to serve as a leader in the regulatory arrangement (low concentration). Yet 'the more dispersed regulatory authority is, the higher coordination administrative costs become' (Bauer, 2005: 86), coordination being necessary to restore regulatory consistency (Christensen & Laegreid 2007, Bouckaert et al 2010). Since the electricity sector combines a high dispersion of regulatory authority and a low investment in coordination, the costs incurred are inconsistencies in the regulatory output. This was well illustrated with regulation of distribution tariffs: distribution system operators (DSOs) must adhere to regional rules about maintaining infrastructure, while at the same time the federal level regulated the tariffs at which the same DSOs offer their services. Consequently, deficits occurred when the tariffs set by the federal level did not fully reimburse the investments requested at the regional level.⁶

The Belgian telecommunications arrangement was characterized by higher levels of coordination and concentration as shown by our indices. It means that the federal NRA has a leading role in the regulatory arrangement and that it must take other actors' viewpoints into account, at least to a certain extent. This creates demanding coordination requirements for the NRA, which increase the likelihood for breach of procedures, allowing regulatees to have regulatory decisions cancelled by the Courts (Mathieu and Aubin 2014). The case of mobile termination rates (MTR)⁷ provides a good example of this phenomenon. In 2008, the Belgian regulator was initially planning not to follow the regulatory strategy proposed by the Commission. Unexpectedly, the regulator finally adopted a decision that was in line with the

Commission and with the European regulatory network. Indeed, the regulator finally considered that the specificities of the Belgian market did not justify departing so sharply from what was becoming a common regulatory standard at the EU level. The regulatees who were negatively affected by this change of orientation sued the regulator and the Court of Appeal cancelled the decision based on a breach of procedure: according to the Court, the regulator had misunderstood the non-binding character of the Commission's recommendation. Thus, complex coordination requirements may create confusion regarding the extent to which the NRA should favor its own policy preferences versus giving precedence to coordination with other regulatory actors.

These examples suggest that, while coordination mechanisms shall ensure a higher *substantive* inconsistency (i.e. regarding content) among the different decisions adopted in the regulatory arrangement, it may also end up triggering *procedural* inconsistencies and increase the vulnerability of regulatory outputs to judicial review. Future research can explore the link between levels of coordination and concentration, as measured by the indices, and different types of regulatory inconsistencies.

Conclusion

Regulatory governance is increasingly subject to power dispersion, which has led to the emergence of complex multi-level and multi-actor regulatory arrangements. While it is now acknowledged that the specificities of these regulatory arrangements have an impact on regulatory outputs, this research field is only in its infancy.

On the one hand, most scholars address the issues of power dispersion and actor's interaction in a partial way, by concentrating on one line of power dispersion only, for example by focusing on the involvement of actors on a single governmental levels without taking into account that there are other regulatory actors involved from other governmental levels. On the other hand, while scholars of transnational regulatory governance have addressed the issue by encompassing the whole set of regulatory actors involved in a given regulatory field, they are still lacking measurement tools to engage in systematic comparative research using standardized quantitative indices.

The indices that we present in this article aim to meet the double challenge of covering all dimensions of power dispersion and providing a quantitative and standardized measurement of three key characteristics of a regulatory arrangement: its level of organizational proliferation, coordination and concentration of influence. The indices thus provide a methodological basis for comparative and explanatory work, using quantified measures. This will allow future research comparing systematically regulatory arrangements across multiple sectors within a single country, comparing countries in the same sectors, or studying the change of a given regulatory arrangement over time. Thanks to the quantification of complex variables offered by the indices, a wide range of research questions that could only be tackled qualitatively with few case studies only can now be addressed with systematic comparisons based on a higher number of cases, including statistical analyses.

A first line of research that benefits from our indices deals with the factors affecting the design of regulatory arrangements. Future research could assess the role of country specific factors (e.g. state structure, legal and administrative culture, regulatory capture, number of veto-players in the polity), sector specific factors (e.g. market matureness, technical complexity), of exogenous factors (e.g. crises, diffusion of international norms) on the design and evolution of regulatory arrangements.

A second promising research venue relates to the impact of regulatory arrangements. This is particularly relevant for regulatory outputs: does the level of organizational proliferation, coordination and concentration of influence affect the speed of the regulatory process, the level of regulatory burden on regulatees, or the vulnerability of regulatory decisions under judicial review. Moreover, the characteristics of the regulatory arrangement is likely to trigger specific reactions of regulatory actors and regulatees. For instance, it can affect the frequency of competence conflicts between regulatory actors or venue-shopping strategies adopted by regulatees.

A further advantage of our indices is the ease with which they can be used in other research fields. While initially designed to measure multi-level regulatory arrangements, the Actor Influence and Concentration indices can also make an interesting complement to indices measuring IRAs' independence and autonomy (Gilardi 2002, Hanretty & Koop 2012). The illustration provided in the article, for example, shows that the degree to which the IRA is the central or more influential actor of a regulatory arrangement can vary greatly from one setting to the other,

even between relatively similar sectors and within the same country. Taking this as a basis for discussing the interdependency of the IRA upon other actors of the arrangement can certainly enrich our understanding of the agencification phenomenon.

Finally, the Actor Influence Index can serve as a building block for the creation of new indices adapted to other research objects, such as supranational integration or decentralization of regulatory decision-making. The Concentration Index is only one possible way to aggregate the measures obtained with the Actor Influence Index. But one could easily build a EU Integration Index, for example in the form of a ratio between the sum of the Actor Influence scores of EU-level regulatory actors divided by the sum of the Actor Influence scores of national and subnational actors. The same technique could *mutatis mutandis* be employed to measure the extent of decentralization to subnational governmental levels.

As spelt out in the article, the indices are built on some assumptions and hence have some limitations. These can however be rather easily tackled by future research. We believe that these indices open many new research opportunities.

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Endnotes

¹ This article focusses on regulatory governance at the implementation stage, not on regulatory policy-making or on the development of related legislation.

² There are some public administration scholars whose research spreads across two lines of power dispersion (e.g. Ruffing 2015). They however differ from our approach as they do not take all 4 lines

of power dispersion into account and because they study power dispersion and interactions between regulatory actors as an outcome to be explained, instead of a determinant of regulatory output.

³ Our scale was derived from a similar scale developed by Verhoest (2002). We initially checked its applicability and completeness with a preliminary analysis of DMPs in telecommunications regulation in Belgium and also in the Netherlands to ensure its applicability in other politico-administrative settings. After agreeing upon the definitive scale, we applied it systematically to code all DMPs found in the sector-specific legislation of the telecommunications and electricity regulation in Belgium. This allowed confirming the applicability of the scale beyond the telecommunications sector.

⁴ The formula used for the calculation of the Concentration Index was inspired by social network analysis (Freeman 1979).

⁵ The data was mainly collected through interviews with nearly all actors of both regulatory arrangements (18 interviews in total), including EU-level actors, subnational actors, and private operators.

⁶ Particularly problematic in the 2000s and early 2010s, this issue was solved in 2014 with a constitutional change that shifted the competence for regulating distribution tariffs to the regional level.

⁷ Mobile termination rates are the fees charged by mobile operators to other telecommunications operators for terminating calls emitted by the latter on its own network.

Tables

Table 1: Scale for the measurement of actors' influence in individual decisions

Weight	Coding	Description
0	Not involved	The actor is not involved in the decision
0.2	Informed	The actor is informed about the planned content of the decision
0.4	Consulted	The actor is consulted or gives a non-binding advice
0.6	Binding position	The actor makes a binding opinion or initiates decision proposals
0.8	Co-decision-maker	The actor is a co-decision-maker
1	Main decision-maker	The actor is the main decision-maker

Table 2: Simplified illustrative database

		A1	A2	A3	A4	A5	Number of actors involved in the issue
		NRA	NCA	Government	EU Commission	European regulatory network	
ISSUES	ACTORS						
I1	Market analysis (mobile telephony)	0,8	0,4	0	0,8	0,2	4
I2	Market analysis (public telephony)	0,8	0,4	0	0,8	0,2	4
I3	Choice of remedies (mobile telephony)	1	0,4	0	0,4	0,4	4
I4	Choice of remedies (public telephony)	1	0,4	0	0,4	0,4	4
I5	Designation universal service operator	0,6	0	1	0	0	2
I6	Management of universal service fund	1	0	0	0	0	1
I7	Operators' participation to the fund	0,4	0	1	0	0	2
Actor Influence Index		0,80	0,23	0,29	0,34	0,17	
Organizational Proliferation Index		0,71					
Coordination Index		0,50					
Concentration Index		0,54					
Number of actors (a)		a = 5					
Number of issues (i)		i = 7					

Table 3: Equations used in the calculation of the indices

Equations	Variables	Description
$OP = \frac{a}{i}$	OP	Organizational Proliferation Index
	a	Number of actors in the regulatory arrangement
	i	Number of issues in the regulatory arrangement
$Co = \frac{\sum_{j=1}^i a_j - i}{i(a - 1)}$	Co	Coordination Index
	a _j	Number of actors involved in the decision over the issue number j
$AI(A_k) = \frac{\sum_{j=1}^i AI(A_k I_j)}{i}$	AI	Actor Influence Index
	AI(A _k)	Actor Influence of Actor number k on the whole regulatory arrangement
	AI(A _k I _j)	Actor Influence of Actor number k on the issue number j
$Cc = \frac{\sum_{k=1}^a [AI(A_{max}) - AI(A_k)]}{a - 1}$	Cc	Concentration Index
	AI(A _{max})	Actor Influence of most influent actor of the regulatory arrangement

Table 4: Values of the Organizational Proliferation Index, Coordination Index, and Concentration Index in telecommunications and electricity

		Telecommunications	Electricity
Organizational Proliferation Index		0.22	0.22
Coordination Index		0.25	0.11
Concentration Index		0.49	0.16

Table 5: Values of the Actor Influence Index for all actors of the regulatory arrangement in telecommunications and electricity

	Telecommunications		Electricity	
1	Federal NRA	0.65	Federal Government	0.29
2	EU Commission	0.37	EU Commission	0.29
3	Federal Government	0.30	EU agency	0.28
4	Committee of subnational broadcasting NRAs	0.25	Federal NRA	0.26
5	NCA	0.20	EU Comitology committee	0.18
6	EU regulatory network	0.18	European network of transmission system operators	0.18
7	EU Comitology committee for telecommunications	0.08	Subnational NRA	0.15
8	EU Comitology committee for radiocommunications	0.02	Subnational Government	0.13
9	Pan-European Network of telecommunications ministries	0.01	Transmission system operators	0.08
10	State council	0.01	Local governments	0.04
11			Distribution system operators	0.03
12			Federal administration	0.02
			Federal Planning Bureau	0.01
			Financial services and markets NRA	0.01

