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Karin Ingold , Frédéric Varone & Frans Stokman
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A social network-based approach to assess *de facto* independence of regulatory agencies

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ABSTRACT   This article uses a policy network perspective to assess the independence of regulatory agencies (RAs) in liberalized public utility sectors. We focus on the *de facto* independence of RAs from elected politicians, regulatees and other co-regulators. We go further than previous studies, which only undertook a general analysis of the *de jure* independence of RAs from political authorities. Specifically, we apply a social network analysis (SNA), which concentrates on the attributes and relational profiles of all actors involved in new regulatory arrangements. The concept of *de facto* independence is applied to the Swiss telecommunications sector in order to provide initial empirical insights. Results clearly show that SNA indicators are an appropriate tool to identify the *de facto* independence of RAs and can improve knowledge about the issues arising from the emergence of the 'regulatory State'.

KEY WORDS   Regulatory agencies; regulatory independence; regulatory state; social network analysis; telecommunications.

1.   INTRODUCTION

Different scholars have conceptualized the independence of a regulatory agency (RA) by concentrating on the formal competences delegated to RAs by elected politicians: the formal competences being based on the principles outlined in the corresponding primary legislation and secondary executive ordinances. The aim of this article is to further develop the concept of RA independence by going beyond the formal task of delegation, and instead focusing on *de facto RA independence* (see also Eckert 2011), taking into consideration influence relations and actors' empowerment in the regulated sector, and conducting a social network analysis (SNA) to operationalize structural characteristics and relational profiles. We adopt a broader view and analyse the large *network of actors* in the sector, including elected authorities, regulatees and co-regulators. We address *de facto* independence by combining relational constraints and influence with *resources* related to discretional power; discretional power referring to the room for manoeuvre that an actor has when carrying out actions.

This article addresses the following research questions: how strongly do elected authorities, regulatees and co-regulators affect an RA's not only *de jure* but also *de facto* independence, and is an SNA a suitable tool to be used to assess an RA's *de facto* independence? To gain preliminary answers to these questions, we investigated the telecommunications regulatory framework in Switzerland. The present empirical study concentrates on (1) how actors perceive influence relations and resources in the whole regulatory network; (2) how this data and these approaches indicate to what extent elected authorities, regulatees and co-regulators affect the RA and its decisions; and (3) the added-value of such a combined analysis of influence relations resources in assessing *de facto* RA independence.

This article is structured as follows. Section 2 outlines conceptual insights into how to address RA *de jure* (or formal) independence and *de facto* (or actual) independence, and identify what SNA can contribute to understanding the latter. Section 3 develops the methodological approach, while Section 4 introduces the data collection from Swiss telecommunications regulation. Section 5 analyses influence relations and resources to compare the possible differences between *de jure* and *de facto* independence approaches. In Section 6, we investigate the added-value of a broader definition of *de facto* RA independence, and draw conclusions regarding the usefulness of SNA in framing and measuring RA independence.

2. THEORETICAL FRAMEWORK

From a 'regulatory state' perspective, the empirical analysis of RA independence is a crucial issue. We therefore first introduce the issue of *de jure* independence and task delegation to regulatory agencies, before proceeding to the conceptual definition of *de facto* independence.

One of the most extensively addressed arguments in political science literature (Gilardi 2005; Hanretty and Koop 2012; Thatcher 2005; Wonka and Rittberger 2010) concerns RAs' formal *(de jure)* independence, i.e., their independence from political power, as defined by the law. Referring directly to the legal basis that established the sector-specific RAs, such an analysis focuses exclusively on the RA's formal status (without comparing it with other co-regulators), and can be criticized as empirical evidence is missing regarding its *de facto* independence (Eckert 2011; Hanretty and Koop 2012). The *de jure* independence of a RA relates both to its independence from other institutions and its regulatory power over other actors in a sector (Gilardi 2005). Eckert (2011) and Maggetti (2007, 2009) developed the concept of RA independence one step further: besides considering the formal aspects deduced from legal texts, these authors also investigated aspects of RAs' *de facto independence* by taking into account regulatory practices, an RA's self-evaluation and its independence from *regulatees*. Building on this, Cole and Banerjee (2010) differentiate between unitary regulatory and multi-entity supervision in their study of financial regulation, while explicitly integrating the role of co-regulators. However, their exploratory

analysis based on simulation modelling ignores differences that might exist among co-regulators' influence and (legal) status.

We claim that it is still too restrictive to only consider an RA's self-assessment, task delegation and relations with elected politicians and regulatees, because these studies assume equal influence and resources among co-regulators in multi-entity supervision. RAs are integrated in a large *network of actors* who have both an impact on the RA, and are also influenced by both the RA and other actors in the network (Levi-Faur 2011). Estimation of the RA's *de facto* independence from politicians, regulatees and other co-regulators requires the inclusion of the actor's whole influence network and differences in resources. Only one study, an empirical analysis of the telecoms sector in Egypt (Badran and James 2010: 13), identified tie strength between actors and dependency relationships. However, this study did not take the step that we take here, namely undertaking a full analysis of the whole social network of influence relationships.

We have thus moved one step further by exploiting all possibilities offered by SNA, and by defining *de facto* independence from a structural and relational perspective, based on the perceptions of all actors in the regulatory framework. Many scholars have used a network approach for the analysis of the relative impact of different actors on policy-making processes (Knoke 2011). Impact requires that influence and power relationships actually are *perceived*. Consequently, our approach is based on subjective and perceived constraining ties. Both actors engaged in the relation have the opportunity to confirm its existence and every influence relation ideally has to be confirmed twice. Moreover, and in line with earlier work on the decisional power of policy actors (Stokman and van den Bos 1992; Stokman and Zeggelink 1996), we assume that regulatory decisional power can only be executed if other actors perceive that the actor has sufficient resources to effectuate the influence relationship and can do that relatively autonomously. *De facto* independence of an RA is thus defined both as its independence from and its impact upon other actors. More concretely, we combine two dimensions to assess the RAs' *de facto* regulatory independence: first, by considering relations of influence from each actor to the others; and second, by considering the resources each actor has available to it in order to be viewed, in the eyes of others, as implementing its policies independently.

The adoption of a network approach allows us to understand the structural patterns outlined in the *first dimension* by concentrating on influence relations (see Table 1). This approach measures how RAs are connected and influenced when implementing their regulatory power. We argue that an RA's independence can be assessed using the relational profile it possesses within the influence network that integrates all actors involved in the respective regulatory framework.

We rely on the key concept of Freeman's (1979) centrality measures. Degree centrality identifies actors holding a strategic position in a network, based on their relational profile (Christopoulos 2008; Christopoulos and Ingold 2011; Ingold and Varone 2012). Holding central positions within the influence

Table 1 Assessing influence relations and reputational power to measure *de facto* independence

Concept		Operationalization	Measurement	Survey question
Access to influence		Influence relations	In- and out-degree centrality	'Which actors in the regulatory framework have an impact on your organization's decisions?' and 'What actors are impacted in their decisions by your organization?'
Resources		Reputation	% of how many interview partners evaluate actor as "very important"	'From the list of actors integrated in the regulatory framework, who do you consider as very important in the implementation of the XY legal act?'
Combining influence and resources	(B) Constraint	**Weighted incoming ties:** RA's in-degree centrality in influence network weighted by the reputational power of actors sending influence tie to RA (and taking RA's own reputational power into account)	Combination of degree centrality and reputational scores	
	(A) Impact	**Weighted outgoing ties:** RA's out-degree centrality in influence network weighted by the reputational power of actors receiving influence tie from RA (and taking RA's own reputational power into account)	Combination of degree centrality and reputational scores	
	Net *de facto* independence	A-B	Combination of degree centrality and reputational scores	

network provides insight into the role of the different co-regulators, and constitutes a useful proxy when investigating who impacts upon the decisions of other actors (Stokman and van den Bos 1992). Concretely, a tie going from actor i to actor j in the influence network means that i has an impact on j, and thus has had an impact on j's decisions; moreover, j is constrained by i. Degree centrality is thus the ideal measure, as it highlights the direct incoming and outgoing relations of an actor and therefore allows for a first indication of which actors perceive influence *from* and *to* many other actors. More concretely, the higher an RA's in-degree (incoming ties) from actors having a direct impact on its decisions, the greater the influence other co-regulators, elected authorities and regulatees have on the main RA and, as a consequence, it is correspondingly less independent. This effect is of course reduced if the RA, in turn, also influences the decisions taken by others actors.

The *second dimension* we address is that of *actors' resources*. Actors need to acknowledge that another actor has sufficient resources to independently operate in a sector (see Table 1). The stronger such perceptions are regarding an RA, the more independently of other actors it can act and take decisions. We thus address *de facto* independence from the point of view of the perceptions of other actors, i.e., as a cognitive concept. Such a perception of independence by the other actors requires independence, both *de jure* (legal autonomy) and *de facto*, from strong (informal) influences of others when executing legal autonomy. This is in line with Kilduff and Krackhardt's (1994) seminal work on reputation, which addresses resources in conjunction with the reputations held by other actors in the network. Expectation status theory (Berger *et al.* 1980; Berger and Zelditch 1985) has also demonstrated that, both in experiments and field studies, the ascription of status differences makes them real, and that ascription is linked with performance differences. This is the strongest argument for the use of reputation-based resource measures. Reputation is thus not represented as a relation between actors in the network, but as attribute data of every actor concerning the regulation of a specific sector. Comparing the reputation of an RA with the reputations of elected authorities, regulatees, and co-regulators is one way to assess the RA's resources, which can be used to enforce the influence relations it holds in the regulatory framework. In accordance with this, we combine the two dimensions, influence structures and reputation to assess *de facto* independence.

3. METHODS

The first empirical step consists of analysing the RA's *de jure* independence. We rely on Gilardi's index, which takes four factors into account: the appointment procedure of the RA's head and members; the source of regulator's budget (proper funding, levies from market operators or an independent budget that is voted for); the scope of their regulatory powers; and formal requirements about reporting and accountability (Gilardi 2005).

As the second empirical step, we outline the operationalization of *de facto* independence. We base our definition of *de facto* independence on the perception of actors that are integrated in the regulatory network. We thus address *de facto* independence through an SNA gathered by a survey study. We investigate two dimensions within the regulatory network, namely the structural patterns of influence relations and the actor's resources based upon other actors' perceived reputation of it (see Table 1). One added value of surveying all involved actors is that this allows for a double confirmation (from the sender and the receiver, and *vice versa*) of existing ties and perceived reputational power. Furthermore, we can differentiate between the influence and power relations the RA holds towards *or* from every actor in the regulatory network.

To measure the first dimension, we asked the actors integrated in the regulatory network which other actors influenced their decisions, and whose decisions they could influence. The incoming influence ties the RA receives from elected authorities, co-regulators and regulatees reduce its independence. The RA's outgoing ties enhance its independence, as they show how many of the other actors' decisions the RA can influence. More concretely, these in- and outgoing ties are assessed through degree centrality, which is the number of observed relations towards (in) and from (out) the RA, divided by the total possible number of relations. Degree centrality is thus the ideal measure to investigate direct perceived influence links between the RA and the other actors involved in the regulatory network: it is capable of assessing the RA's influence on other actors and the constraints placed by other actors on RA's decisions.

For the second dimension, the perceived reputation of actors is approximated by asking which actors are viewed as the most important (see Table 1). We asked survey participants to indicate the three most important actors within the network. The final reputation score of every actor is then the proportion of actors who mentioned it among the three most important. The higher the reputation of the RA when compared with the other actors within the network, the greater the resources it has available to take independent decisions and withstand pressure from others.

Figure 1 illustrates, using a small example, how influence relationships and reputation are united to form one single measure of *de facto* independence. The following four steps are undertaken:

(1) An actor-by-actor matrix is created: a 1 in a cell indicates that the row actor has an influence relation towards the column actor, a 0 indicates that this is not the case (see Figure 1a);
(2) The reputational power of every actor is given as a vector (Figure 1a);
(3) The cells in the matrix of influence relationships of Figure 1a are multiplied by the reputational power of the row actor (Figure 1b);
(4) Each cell is divided by the column sum, i.e., the sum of the reputations with influence on the column actor (Figure 1c).

Let us first consider how the existence of influence relations and reputation may reduce actor A's independence. Actor A is influenced by actors A, B, C, and E

1a. Influence matrix

Matrix **(first step)**   Reputation **(second step)**

		1	2	3	4	5	
		A	B	C	D	E	
1	A	1	1	0	1	0	RP_a = 0.8
2	B	1	1	1	1	0	RP_a = 0.6
3	C	1	0	1	1	1	RP_r = 0.5
4	D	0	1	0	1	1	RP_n = 0.4
5	E	1	1	1	0	1	RP_ε = 0.2

where $a_{AB} = 1$ denotes that actor A has an influence relation to B and $a_{AB} = 0$ denotes that actor A has no influence relation to B. RP_A denotes the fraction of other actors mentioning actor A as one of the three most influential actors in the policy domain.

1b. Influence matrix weighted by the reputational power of incoming ties (third step)

		A	B	C	D	E
1	A	0.800	0.800	0.000	0.800	0.000
2	B	0.600	0.600	0.600	0.600	0.000
3	C	0.500	0.000	0.500	0.500	0.500
4	D	0.000	0.400	0.000	0.400	0.400
5	E	0.200	0.200	0.200	0.000	0.200
Sum		2.1	2	1.3	2.3	1.1

where $RP_{AB} = RP_A * a_{AB}$.

In words: RP_{AB} is the reputational power of A operating on B. This is equal to the reputational power of A if there is an influence relationship from A to B, otherwise it is zero. R_{AA} is equal to the reputational power of A.

1c. Actors' weight matrix W, based on column normalization (fourth step)

		A	B	C	D	E
1	A	**0.380**	**0.400**	0.000	**0.350**	0.000
2	B	**0.290**	0.300	0.460	0.260	0.000
3	C	**0.240**	0.000	0.380	0.220	0.450
4	D	**0.000**	0.200	0.000	0.170	0.360
5	E	**0.100**	0.100	0.150	0.000	0.180
Sum		1	1	1	1	1

where $w_{BA} = RP_{BA}/\sum_{K \in N} RP_{KA}$.

In words: w_{BA} is the fraction of all reputational powers operating on actor A, including A's own reputational power. On this basis we define:

Relative resources of actor A:

$w_{AA} = RP_A/\sum_{K \in N} RP_{KA}$
w_{AA} = 0.38

Constraint of actor A:

$Constraint_A = \sum_{K \in N, K \neq A} w_{KA}$ =0.620
In words: The constraint of A is the relative resources of other actors with an influence relationship towards A.

Impact of actor A:

$Impact_A = \sum_{K \in N, K \neq A} w_{AK}$ =0.750
In words: The impact of A on other actors is the sum of relative resources of actor A on all other actors with an influence relationship from A.

Figure 1 Calculation of *de facto* independence based on influence relations and reputation

Notes: To reproduce and calculate the index on R, you may follow these steps and link: Reference and R Package: Leifeld, Philip (2013). polnet: Analysis of Political Networks. University of Konstanz, Germany. R Package Version 0.0.1.https://r-forge.r-project.org/projects/polnet/

As an input, the functions takes into account:

(1)   the adjacency matrix of the influence network; and

(2)   the reputation measure as (a) a vector/attribute, or (b) as an adjacency matrix where every actor seeing another actor as 'important' would send a tie.

Both data can be entered as network-objects.

(see first column of Figure 1a). The reputation (RP) of actors A, B, C, and E are respectively 0.8, 0.6, 0.5 and 0.2. The total reputation impacting A is assumed to be equal to the sum of all four reputation scores, i.e., 2.1 (see sum of the first column in Figure 1b). We assume that the reputation of actor A is relative to the sum of all the reputations influencing actor A, which indicates actor A's *relative resources* (w_{AA}). This expresses the degree to which actor A is able to follow its own policy preferences relative to those of actors B, C and E. The relative resources of actor A is 0.8 divided by 2.1 or $w_{AA} = 0.38$ (see Figure 1c).

How strongly does actor B *reduce the independence* of actor A? This is equal to the reputation of actor B, relative to the sum of all reputations impacting actor A (including actor A's reputation, as reduced independence also depends on the size of actor A's reputation), or 0.6 divided by 2.1, this equalling 0.29 (see Figure 1c; first column, second row). We denote this as A's *constraint* from B. Similarly, actor A's independence is reduced by 0.24 from actor C. The sum of the *relative resources* of actor A and the constraints from the other actors add up to 1, and can therefore be seen as fractions of the total influence operating on actor A.

Seen from the perspective of actor A (and still taking actor A's reputation into account), the influences from actors B, C, and E can be seen to reduce its independence; but from the perspective of actors B, C, and E, they indicate the *impact* that they have on A's policies. This therefore represents the possibilities available when co-determining the outcomes of actor A.

Actor A also influences actor B. Actor A's *impact* on B is A's reputation divided by the sum of the reputation of all actors having an impact on B (including B's own reputation; i.e., $0.8/2 = 0.4$). And A's impact on all actors outlined in Figure 1c is therefore 0.750. Whereas the weighted incoming ties plus the relative resources of an actor can be seen as fractions and add up to 1, the weighted outgoing ties of an actor can be much higher than 1.

An RA's independence increases in accordance with a greater reputation (relative resources), the larger the impact it has on others and the fewer constraints upon it by other actors (Table 1). If the constraint on A is 0, the RA is fully independent. None of the other actors have an impact on A. But A's impact on a third actor depends on how large its resources are in comparison to those of the third actor and those of the other actors who influence the third actor. If A has a constraint of 1, A has maximal constraint. This is only the case if A has no reputation. In that case, its impact on others will also be zero. By subtracting the constraints on an actor from its impact on others, we obtain the RA's (net) *de facto* independence based on influence relations and reputation.[1]

In the example illustrated in Figure 1, actor A's *de facto* independence thus equals $0.750-0.62 = 0.13$, meaning that A has more impact upon, and is less constrained by, other actors. If the net *de facto* independence is negative, A has large constraints from, and low impact upon, others. Note that a negative index score is likely to correspond to empirical cases where the RA is more dependent upon regulatees – who might have 'captured' the RA – and

courts (as co-regulators) if there is an increasing 'judicialization' of the regulation (Tate and Vallinder 1995).

4. CASE SELECTION AND DATA

For the empirical measurement of *de jure* and *de facto* RA independence, we rely on the Swiss telecommunications regulatory network for three reasons. First, after the telecommunications liberalization, which started in 1991, Switzerland experienced a horizontal fragmentation of the sector's regulation. This resulted in both a new power distribution and the arrival of new actors (e.g., sector-specific RA; international operators), which changed the relational patterns within the regulatory framework. Second, the new sector-specific RA – namely, the Federal Communications Commission (ComCom) – was created in 1997, and its independence was formally defined in the new Telecommunications Act. The question thus arises whether this independence can also be observed in *de facto* terms while taking into consideration the rearrangement in the regulatory actors network. Third, we focus on telecommunications regulation because this sector has clearly experienced the most rapid and major changes when compared to liberalization processes in other public utilities.

Formal organizations, rather than individuals, stand in the foreground of today's politics (Knoke *et al.* 1996: 7). Following the decisional approach, we identify actors formally involved in the telecoms implementation process as those mentioned by the national legislation. This first list was completed by actors of relevant positions within this policy field and by actors who were mentioned as powerful by interviewed experts. We had a set of 38 actors and the SNA surveys were sent to 31 actors. Of the 31 questionnaires, 25 were answered, corresponding with a response rate of 82 per cent.

Survey participants indicated the relations they shared with the other 37 actors in telecoms policy implementation. To assess the first dimension of RAs' *de facto* independence, we analysed the influence relations among the actors of the telecoms network and proceeded as follows: based on the complete list of all actors participating in the telecoms implementation process (and not only the list of survey participants), interviewees were asked the following questions: 'Which actors have an impact on the decision making processes within your own organisation in relation to the implementation of the regulatory framework, and which actors *are impacted* upon in their decision making processes by your organization?' Survey participants were asked to add further actors if they thought that someone was missing. If the actor was mentioned by at least two survey partners, and was not already included in the survey, this would have allowed us to interview them as well. However, new actors were only sporadically added to the list, and only ever by one interviewed actor.

We are aware that one of the main shortcomings of SNA is that it provides only a snapshot of the studied phenomena. As we are interested in the implementation of the telecommunications act, we conducted our analysis five years after the last amendment of this law.

5. EMPIRICAL RESULTS

This section presents the main empirical results on the impact that elected authorities, co-regulators and regulatees (Table 2) have on an RA's *de facto* independence, and illustrates how an SNA contributes to such an investigation.

5.1. *De jure* independence of ComCom

In 2005 Gilardi calculated the degree of formal independence for Switzerland's telecommunications RA (ComCom) as 0.51. As for the situation today (2010), the Gilardi index for ComCom would follow our own slightly higher evaluation of 0.54: the 2006 revisions to the Law on Telecommunications attributed more regulatory power to ComCom. The rather moderate Gilardi index for ComCom, especially when compared internationally, can be explained by the fact that the political authorities still have a large impact on the regulatory content and the appointment of the Commission. While ComCom is strongly independent regarding its financial and decisional work, it is also strongly related to the Federal Office of Communications (OFCOM).

5.2. *De facto* independence of ComCom

5.2.1. *Influence relations*
As ComCom's ego-network of influence relations (Figure 2)[2] shows, the relations among the actors surrounding ComCom are very dense. This means that influence ties exist not only between ComCom and these actors, but also amongst these actors. This strongly indicates that ComCom's *de facto* independence is not solely determined by its relations with other organizations, but that the relations among the others have to be taken into account as well. For example, the government and the parliament seem to have an impact on ComCom's decisions, but reciprocally, ComCom also influences the decisions of the Parliamentary Commissions. Concerning public administration, OFCOM and ComCom influence each other, which is not surprising when looking at their shared regulatory competences. No other public agencies seem to have an impact on the Commission's decisions. Strong relations with the other co-regulators are also confirmed here: ComCom and the competition agency (Comco) have an impact on one another, whereas the relation between Price Surveillance and ComCom is one-sided towards ComCom and not mutual. Furthermore, the Federal Administration Court has an impact on ComCom's decisions, but this relation is obviously not reciprocated.

Being the sector-specific RA, it is clear, and is confirmed here, that ComCom influences all operators. What is very interesting, however, is that four telecoms providers also seem to influence ComCom's decisions: Swisscom; Orange; Cablecom; and Openaxs. In the interview with the main regulator, these findings were qualified. Operators' market behaviour, but not their opinions, was said to influence the regulator's decisions.[3]

Table 2 RA, elected authorities, regulatees and co-regulators in Swiss telecommunications policy

	Actors	Acronym	Rep. Power	Description
RA	Federal Communications Commission	ComCom	88%	Telecoms regulatory agency since 1997
Elected authorities	Federal Council	FC	64%	Swiss Government
	Parliamentary Committee for Transport and Telecommunications of the Council of States	Parl. Com. CS	76%	Parliamentary Committee of the upper chamber
	Parliamentary Committee for Transport and Telecommunications of the National Council	Parl. Com. NC	88%	Parliamentary Committee of the lower chamber
	Federal Department for Environment, Transport, Energy and Communications	DETEC	76%	Federal Department/Ministry of Telecommunications
Regulatees	Swisscom	Swisscom	72%	Former monopolist
	Sunrise	Sunrise	52%	Operator
	Cablecom	Cablecom	36%	Operator
	Orange	Orange	36%	Operator
	Openaxs	openaxs	12%	Operator
	IG Telekom	IG Telekom	4%	Operator
Co-regulators	Federal Office of Communications	OFCOM	88%	Federal Agency; telecoms regulatory agency from 1991–1997
	Competition Commission	ComCo	28%	Independent competition authority
	Price Surveillance	Price Surv.	20%	Market and price analyst
	Ombudscom	Ombudscom	4%	Conciliation body since 2008
	Federal Supreme Court	FSC	20%	
	Federal Administration Court	FAC	16%	

If we just take into account the relationships, not the resources, our respondents perceive more outgoing influence relations from ComCom to other organizations than incoming ones. The number of ComCom's outgoing relationships indicates its influence, whilst the number of incoming relationships reflects the perceived constraints. The difference between the normalized out-degrees and normalized in-degrees[4] then indicates how large the influence is relative to the constraint. Table 3 shows that the net influence for ComCom is 0.19. We observe that ComCom's net influence with authorities and regulatees is positive, and is negative with other regulators and courts. In other words, ComCom is influenced by more co-regulators and courts than the other way around (−0.25 and −0.5 respectively; see Table 3). ComCom is notably constrained by the competition agency (ComCo). Among others, this became visible when ComCo rejected the merger of two operators (Sunrise and Orange). While ComCom was clearly in favour of this market concentration, it was not able to get its position accepted.

5.2.2. *Reputational power*

Table 2 contains the reputational powers of RAs, elected authorities, regulatees and co-regulators. ComCom and OFCOM clearly had the highest reputational power in the actors' network (with 88 per cent of the respondents listing these organizations as one of the three most important actors). Three elected authorities, namely the two parliamentary committees on transport and telecommunications (88 per cent and 76 per cent), the Ministry of telecommunications (DETEC, 76 per cent) and the Government (FC, 64 per cent), were also considered to be very important by other actors in the network, although to a lesser

Table 3 ComCom's influence relations – in- and out-degree centrality

	Overall in network	From/to authorities	From/to regulatees	From/to co-regulators	
				Other regulators	Courts
ComCom out	0.48 (18)	0.75 (3)	1 (6)	0.5 (2)	0 (0)
ComCom in	0.29 (11)	0.5 (2)	0.66 (4)	0.75 (3)	0.5 (1)
ComCom influence (%)	0.19	0.25	0.33	−0.25	−0.5

Notes: Numbers are representing the normalized degree centrality measures: normalized degree centrality indicated an actor's degree centrality in relation to the overall highest possible degree centrality (1) in the overall network or from/to the respective group of actors. In brackets, the total number of perceived outgoing and incoming ties of ComCom is given.

degree than ComCom and OFCOM. It is worth noting that legislative actors are perceived as more important (and thus potentially as more decisive for RAs' *de facto* independence) than executive actors. As a matter of fact, the parliamentary committee of the lower chamber has a reputational power score similar to ComCom and OFCOM. This rather surprising result suggests that the hypotheses about principal–agent relationships (i.e., between elected officials and RAs) should not be biased by focusing predominantly, or even exclusively, on the delegation and accountability mechanisms between RA and the government. The incumbent, Swisscom (72 per cent), and one of the new operators (Sunrise, 52 per cent) were also identified as very important, with other operators viewed as important, but to a lesser extent. Non-sector specific regulators (i.e., Comco, Price Surveillance and the Federal Administrative Court) were judged as being 'important'. In summary, OFCOM and the parliamentary committee of the lower chamber seemed to be as powerful as ComCom. The important position of OFCOM could be viewed as being the result of its role as implementer of regulatory decisions taken by ComCom, and the high reputational power of the parliament could be linked to the gradual liberalization of the Swiss telecoms market and, thus, to the successive revisions of the Telecoms Act.

5.2.3. *Constraints and impact*

To assess a RA's *net* de facto *independence* over the three actors' groups, we combine the reputational analysis with the perceived influence relations among the actors of the telecoms network, as explained in Section 3. The results are summarized in Table 4, which also shows the three components from which the net *de facto* independence is built: a RA's own relative resources, its constraints and its impact upon others.

ComCom's relative resources are 0.16. Although this seems low, ComCom has the highest resource score of all selected actors. The impact of ComCom on all three groups totals 1.38. The agency has by far the highest impact on regulatees (0.75), which is not surprising, as telecoms operators are directly affected by the regulator's decisions. Furthermore, ComCom also has a remarkable impact on authorities (0.38), and to a lesser extent on co-regulators (0.25).

If we now consider the impact the three actor groups have on ComCom, it totals 0.84. Interestingly, this *constraint* is equally divided between the three actors' groups, meaning that elected authorities, regulatees and co-regulators each have an impact of 0.28 on the Swiss regulatory agency.

If we compare these values with the constraints on ComCom from the three groups, ComCom's impact on the regulatees is considerably higher than the impact that regulatees have on ComCom. To a lesser degree this is also the case for the elected authorities, but not for the co-regulators. In summary, ComCom has a *net* de facto *independence* of 0.1 towards elected authorities, of −0.03 towards co-regulators, and of 0.47 towards regulatees. ComCom's overall net *de facto* independence is thus 0.54.

Table 4   ComCom's relative resources, constraints from and impact upon others

	ComCom's relative resources and impact on others	ComCom's constraints	ComCom's net de facto independence
Comcom's own relative resources	0.16		
Overall impact on others	1.38	0.84	0.54
RA and elected authorities	0.38	0.28	0.1
RA and regulatees	0.75	0.28	0.47
RA and co-regulators	−0.25	0.28	−0.03

Notes: Calculations based on influence relations and reputation.

5.3. Discussion

This illustrative case study shows how to empirically assess the *de facto* independence of an RA and how this can be compared with measures of *de jure* independence. To investigate whether both vary independently from one another, we would need a cross-national study of several national RAs. The aim of the present article is to show the research design and methodology for such upcoming comparative studies. Whereas indices like the Gilardi (2005) index concentrate exclusively on formulations within the legal text and on the RA–authority relationship, ours also takes into account the measurement of *de facto* independence from the constraints ComCom experiences from the three actors' groups (Table 4). We conclude that all three groups have an approximately equal impact on ComCom's decisions. Not only is the independence from elected authorities relevant, but also that the other two actors' groups, co-regulators and regulatees have a considerable influence on the RA. The analysis of influence relations (Table 3), and the measure of net *de facto* independence where influence relations and reputations are combined (last column in Table 4) show this in another way: ComCom is most independent from the telecommunications operators, and also has relatively high independence from elected authorities, but suffers larger impacts from co-regulators than it has on them. The strong independence from operators and the limited independence from elected authorities are in line with the *de jure* definitions in the legal text. The considerable impact co-regulators have on the Swiss telecommunications RA is definitely an added-value to the formal independence investigations, such as those expressed by the Gilardi (2005) index. This preliminary result has a value in itself, but, as is briefly highlighted below, additional research steps are required.

6. CONCLUSION

The independence of sector-specific RAs is an important issue in understanding the emergence, transformation and impacts of the 'regulatory state', as RAs represent the major institutional innovation that was induced by liberalization processes in the European context. To better understand RA independence, we presented a new conceptual and methodological approach and stressed four aspects. First, it is essential to conceptually distinguish between *de jure* and *de facto* independence in order to adequately identify the conditions under which RAs execute their tasks and exercise their regulatory powers. Second, such a differentiation also has strong empirical and methodological impacts, which is why we suggest an innovative approach operationalizing *de facto* independence. Third, it is worth considering the whole range of actors integrated in the network implementing the regulatory framework and, more specifically, analysing the relations between RA and elected authorities, regulatees *and* co-regulators. The last group of co-regulators was largely absent in previous studies. This was a serious failing, as most of the policy network studies point out the interdependence among public actors in general, and co-regulatory arrangements in particular (Cole and Banerjee 2010). The RA's levels of independence from the three actors' groups (i.e., authorities, regulatees and co-regulators) are equally important dimensions to take into consideration. Fourth, we also argue for a fine grain analysis of different actors within the specific category of elected officials. One noticeable result of our explorative case study is that parliamentary actors seem to play a more active role than was generally postulated by the previous (European) studies on the liberalization and re-regulation of network industries (Maggetti 2009; Majone 2001).

As illustrated by the study on the Swiss telecommunications sector, an SNA brings additional relevant insights to the study of RA independence for several reasons. First, it is an appropriate method to assess relations among actors integrated in a multi-dimensional regulatory setting: network boundaries are not limited by types of public authorities (i.e., executive, legislative versus judiciary) or levels of government (i.e., local, national or supranational). Second, by asking actors belonging to the network about their relational profile regarding the other actors, *de facto* independence – assessed here through influence relationships and actors' resources – reflects the perceived structure of the regulatory network. Third, SNA is a feasible and reproducible method for future research. For upcoming studies applying an SNA approach to assess the *de facto* independence of RAs, we suggest expanding the range of survey questions asked and, furthermore, diversifying the source of data collection (i.e., through documentary analysis or process tracing of RAs regulatory decisions). We combined our survey analysis with expert interviews and conclude that it is both worthwhile and feasible to combine SNA with other data-gathering methods. The major challenge is to reduce the bias of over- versus underestimation of actors' (own) influence.

Even if this empirical case perfectly reflects the general trend regarding the emergence of a European regulatory state, the first empirical evidence gained from the Swiss telecommunications sector cannot be generalized. The next research steps would consist of transforming our basic assumption – that *de jure* independence differs from *de facto* independence – into a causal and testable hypothesis. In such a comparative analysis, several points have to be taken into account. The empirical basis of the upcoming comparative studies has to be enlarged. The relevant research design has to combine several sectors, several countries and several points in time. Recent studies nicely highlighted that it is worth investigating independence over time and space: we could confirm that RA independence may differ over time (see Fischer *et al.* 2012) and among sector-specific RAs (Maggetti *et al.* 2013). However, a cross-country, cross-sectoral and longitudinal research strategy raises the issue of costs induced by carrying out multiple SNAs.

Furthermore, hypotheses should be developed about the causal mechanisms behind variations in *de facto* RA independence and gaps between *de jure* and *de facto* independence. In particular, it would make sense to concretely analyse if and to what extent the four causal mechanisms identified by the delegation theory (i.e., long-term commitments, expertise and information asymmetry, blame-shifting and consensus-building) determine both *de jure* and *de facto* RA independence (Thomson and Torenvlied 2010).

And finally, from both a theoretical and a normative standpoint, the crucial question to be addressed concerns the impact of high versus low *de facto* RA independence (as independent variable) on the quality of regulatory outputs (i.e., RA decisions) and outcomes (i.e., final impacts on sector development; see Belloc *et al.* [2012] and Yesilkagit [2011]).

Biographical notes: Karin Ingold is Assistant Professor at the Institute of Political Science and the Oeschger Centre for Climate Change Research at the University of Bern, and Head of the Policy Analysis and Environmental Governance Cluster at the EAWAG. Frédéric Varone is Professor within the Department of Political Science at the University of Geneva. Frans Stokman is Professor of Social Science Research Methodology at the University of Groningen.

Addresses for correspondence: Prof. Karin M. Ingold, Institute of Political Science, University of Bern, Fabrikstrasse 8, 3000 Bern, Switzerland. email: karin.ingold@ipw.unibe.ch/Frédéric Varone, Département de science politique, Université de Genève, 40 boulevard du Pont d'Arve, Genève 4, CH- 1211, Switzerand. email: Frederic.Varone@unige.ch/Prof. Frans Stokman, Department of Sociology, University of Groningen, Grote Rozenstraat 31, 9712 TG Groningen, The Netherlands. email: F.N.Stokman@rug.nl

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NOTES

1 To reproduce and calculate the index on R, you may follow these steps and link: Reference and R Package: Leifeld, Philip (2013). polnet: Analysis of Political Networks. University of Konstanz, Germany. R Package Version 0.0.1.https://r-forge. r-project.org/projects/polnet/. As an input, the functions takes into account (1) the adjacency matrix of the influence network; and (2) the reputation measure as (a) a vector/attribute, or (b) as an adjacency matrix where every actor seeing another actor as 'important' would send a tie. Both data can be entered as network objects.
2 Figure 2 is available at http://www.ipw.unibe.ch/content/professuren/policy_analyse/regulatory_policy/index_ger.html.
3 Insight gained from personal interview with the Secretary General of the Swiss telecoms regulator ComCom in December 2009.
4 Normalized measures show an actor's degree centrality as a fraction of the overall possible degree centrality in the network where all ties would exist (1).

REFERENCES

Badran, A. and James, O. (2010). 'Does formal independence matter for regulatory outcomes? Measuring regulatory independence in networks: the case of telecoms sector in Egypt', Paper presented at the *ECPR Third Biennial Conference*, 17–19 June, Dublin.
Belloc, F., Nicita, A. and Parcu, P. (2012) 'Liberalizing telecommunications in Europe: path dependency and institutional complementarities', *Journal of European Public Policy* 20(1): 1–23.
Berger, J., Rosenholz, S. and Zelditch, M. (1980) 'Status organizing processes', *Annual Review of Sociology* 6: 470–508.
Berger, J. and Zelditch, M. (1985) *Status, Rewards, and Influence*, San Francisco: Jossey-Bass.
Christopoulos, D. (2008) 'The governance of networks: heuristic or formal analysis?' *Political Studies* 54: 475–81.
Christopoulos, D. and Ingold, K. (2011) 'Distinguishing between political brokerage & political entrepreneurship', *Procedia* 10: 36–42.
Cole, B. and Banerjee, P. (2010) 'Unitary regulatory supervision or multi-entity supervision? A computational approach to a numbers problem in financial regulation', *Regulation & Governance* 4: 435–64.
Eckert, S. (2011) 'Between commitment and control: varieties of delegation in the European postal sector', *Journal of European Public Policy* 17(8): 1231–52.
Fischer, M., Ingold, K., Sciarini, P. and Varone, F. (2012) 'Impacts of market liberalization on regulatory network: a longitudinal analysis of the Swiss telecommunications sector', *Policy Studies Journal* 40(3): 435–57.

Freeman, L. (1979) 'Centrality in social networks: I. conceptual clarification', *Social Networks* 1: 215–39.

Gilardi, F. (2005) 'The institutional foundations of regulatory capitalism: the diffusion of independent regulatory agencies in Western Europe', *The Annals of the American Academy of Political and Social Science* 598: 84–101.

Hanretty, C. and Koop, C. (2012) 'Measuring regulators' statutory independence', *Journal of European Public Policy* 19(2): 198–216.

Ingold, K. and Varone, F. (2012) 'Taking policy brokers seriously: evidence from the climate policy', *Journal of Public Administration Research and Theory* 22(2): 319–42.

Kilduff, M. and Krackhardt, D. (1994) 'Bringing the individual back in: a structural analysis of the internal market for reputation in organizations', *Academy of Management Journal* 37(1): 87–108.

Knoke, D. (2011) 'Policy networks', in J. Scott and P.J. Carrington (eds), *The SAGE Handbook of Social Network Analysis*, Los Angeles: Sage, pp. 210–22.

Knoke, D., Pappi, F., Broadbent, J. and Tsujinaka, Y. (1996) *Comparing Policy Networks – Labor Politics in the US, Germany and Japan*, Cambridge: Cambridge University Press.

Levi-Faur, D. (2011) 'Regulatory networks and regulatory agencification: towards a single European regulatory state', *Journal of European Public Policy* 18(6): 810–29.

Maggetti, M. (2007) 'De facto independence after delegation: a fuzzy-set analysis', *Regulation & Governance* 1: 271–94.

Maggetti, M. (2009) 'The role of independent regulatory agencies in policy-making: a comparative analysis', *Journal of European Public Policy* 16(3): 450–70.

Maggetti, M., Ingold, K. and Varone, F. (2013) 'Having your cake and eating it too: can regulatory agencies be both independent and accountable?' *Swiss Political Science Review* 19(1): 1–25.

Majone, G. (2001) 'Nonmajoritarian institutions and the limits of democratic governance: a political transaction-cost approach', *Journal of Institutional and Theoretical Economics* 157: 57–78.

Stokman, F. and Van den Bos, J. (1992) 'A two-stage model of policy analysis with an empirical test in the US energy policy domain', in G. Moor and J. Whitt (eds), *The Political Consequences of Social Networks. Research in Politics and Society*, vol. 4, Greenwich, CT: JAI Press, pp. 219–53.

Stokman, F. and Zeggelink, E. (1996) 'Is politics power or policy driven? A comparative analysis of dynamic access models in policy networks', *Journal of Mathematical Sociology* 21: 77–111.

Tate, N. and Vallinder, T. (1995) *The Global Expansion of Judicial Power*, New York: New York University Press.

Thatcher, M. (2005) 'The third force? Independent regulatory agencies and elected politicians in Europe', *Governance* 18: 347–73.

Thomson, R. and Torenvlied, R. (2010) 'Information, commitment and consensus: a comparison of three perspectives on delegation in the European Union', *British Journal of Political Science* 41: 139–59.

Wonka, A. and Rittberger, B. (2010) 'Credibility, complexity and uncertainty: explaining the institutional independence of 29 EU agencies', *West European Politics* 33: 730–52.

Yesilkagit, K. (2011) 'Institutional compliance, European networks of regulation and the bureaucratic autonomy of national regulatory agencies', *Journal of European Public Policy* 18(7): 962–79.