Having Your Cake and Eating It, Too: Can Regulatory Agencies Be Both Independent and Accountable?

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Abstract: *Independent regulatory agencies (IRAs) were created in various sectors and on different governmental levels to implement liberalization policies. This paper investigates the link between IRAs' independence, which is said to promote regulatory credibility and the use of technical expertise, and their accountability, which is related to the need for controlling and legitimizing independent regulators. The literature on the regulatory state anticipates a positive relation between the independence and accountability of IRAs, but systematic empirical evidence is still lacking. To tackle this question, this paper measures and compares the independence and the accountability of IRAs in three differentially liberalized sectors in Switzerland (telecommunications, electricity and railways). With the application of Social Network Analysis, this piece of research shows that IRAs can be de facto independent and accountable at the same time, but the two features do not necessarily co-evolve in the same direction.*

Introduction

Policy makers established independent regulatory agencies (IRAs) in Western Europe (Henisz, Zelner and Guillen 2005; Jordana, Levi-Faur and Fernandez 2007) to correct market failures and to promote the use of specialised knowledge in the policy process (Majone 1994b, 1996, 2001b, 2001c). The delegation of regulatory tasks to sector-specific agencies that are independent from elected politicians, from regulatees and from co-regulators (i.e. public administrations, competition agencies and judicial courts) is indeed considered crucial for securing credible policy commitments after regulatory reforms such as liberalization, privatization and re-regulation (Gilardi 2002, 2008; Majone 1996, 2001c). Cumulative evidence confirms the cross-national and cross-sectoral effectiveness of regulatory independence, both in formal (Gilardi 2002, 2008) and in real (Maggetti 2007) terms. To be precise, formal (or de jure) independence appears to be higher for IRAs in economic sectors than for IRAs in social domains, and it seems negatively influenced by the existence of institutionalized veto points, while actual (or de facto) independence varies according to some institutional and organizational conditions such as agenciy age, the presence of several veto players in the political system, and their participation in regulatory networks (Gilardi and Maggetti 2011). Overall, it appears that the majority of West European agencies benefits from considerable independence.

This situation raises a number of important questions about the consequences of regulatory independence, especially because elected politicians can entrust regulatory agencies

with several competencies but cannot transfer their democratic legitimacy, because these agencies are constitutionally isolated from democratic institutions (Majone 2001b, 2001c). In this context, the notion of accountability is frequently invoked to solve the "democratic deficit" resulting from the delegation of regulatory competencies to IRAs (Majone 1994a; Scott 2000; Lodge 2004). Accountability, in its most general formulation, means that an actor who is in a position of responsibility in relation to the interests of another actor is required to give an account of the conduct of his duties, while the second actor can either reward or sanction the former (Castiglione 2006). It has been observed that the accountability arrangements that are pertinent for regulatory agencies are those control mechanisms that function "after the fact", thus excluding ex-ante and ongoing controls (Busuioc 2009). These accountability mechanisms are considered suitable for agencies, as they compose a "multi-pronged" system of controls, which should not interfere with the independence of regulators. It should be recognized that this form of "diffuse" accountability might be opaque, incoherent, selective and technocratic (Papadopoulos 2003, 2007). Therefore, it cannot directly secure the democratic legitimacy of actors involved in these "new governance" structures. These ex-post accountability mechanisms deserve, however, special attention as an insufficient but necessary condition for the legitimacy of independent regulators.

Empirical research has shown that accountability mechanisms are widespread in the regulatory state (Scott 2000; Lodge 2004), that they tend to be positively related to the political salience of regulatory issues (Koop 2011), and that they can undermine regulatory performance when they are poorly designed (May 2007). However, their compatibility with de facto independence – which corresponds to IRAs' main *raison d'être* – rarely has been addressed in an explicit and systematic way. The goal of the present study is to propose a method for assessing empirically whether these accountability mechanisms, when applied to IRAs in practice, do actually coexist with de facto independence. We conceptualize independence and accountability as social relationships between the IRA and other actors integrated in the regulatory framework and operationalize this through a formal social network analysis comparing three case studies of liberalized utility sectors in Switzerland.

The paper is structured as follows. In the next section, we present our conceptualisation of independence and accountability, and discuss the foundations of our theoretical expectations. To this aim, we propose a parsimonious way of assessing and comparing the independence and accountability of agencies, using a relational approach, which could also be applied to other areas of research. Then we present a first application of this approach by proceeding to an exploratory test of our hypotheses with empirical illustrations drawn from newly-created Swiss agencies in three differentially liberalized utility sectors (i.e. telecommunications, electricity and railways). This allows us to grasp the mediating effect of liberalization while keeping political-administrative variables constant (Levi-Faur 2006). We conclude with a discussion of the coexistence of independence and accountability based on our empirical results and with a theoretical examination of the dilemma of reinforcing these two properties of IRAs at the same time.

Agencies' independence and accountability

As a consequence of privatization, liberalization and re-regulation processes, IRAs were established on various governmental levels to implement the new rules of the game regarding the regulation of competition that replaced public monopoly, the provision of universal services, third-party access to industrial networks, fair access pricing, etc. IRAs are "structurally disaggregated" public sector organizations, whose members are neither elected by

the citizens nor directed by elected politicians (Verhoest et al. 2004; Verschuere et al. 2006). They constitute a particularly relevant type of "non-majoritarian institution", that is, public sector organizations that are by design separated from democratic policy-making and have powers of market regulation through formal delegation by public authorities (Coen and Thatcher 2005). As anticipated above, this situation raises the question of making them accountable while preserving their independence. The interplay of independence on one side and accountability on the other, is thus the major issue addressed here.

Independence of agencies

Why did elected politicians decide to restrain their policy-making competencies by delegating regulatory powers to agencies they do not directly control? Three main functional reasons could be identified to explain this phenomenon (Gilardi 2008; Varone and Ingold 2011). First, IRAs should ensure *the long-term predictability* of public regulation in order to guarantee that the rules of the game do not change due to partisan interference (e.g. in case of elections). Long-term commitments are indeed essential for market players that need reliable regulations as crucial incentives for investing in the regulated industries (e.g. in telecommunications infrastructure) (Majone 1997a, 1997b). Second, IRAs should produce *sector-specific expertise*, that is, the technical, economic and legal knowledge that is vital to regulate the liberalized sector efficiently. Independent expertise provided by skilled staff is expected to reduce the information asymmetry between the regulatees (i.e. the operators) and the regulator (Coen and Thatcher 2005). Moreover, perceptions of regulatory quality tend to be higher when agencies are more independent (Bertelli and Whitford 2009). Third, by delegating regulatory competences to IRAs, politicians try to *shift the blame* for unpopular decisions and unexpected implementation problems, which may entail electoral sanctions (Fiorina 1982).

When studying the functioning of IRAs, two elements deserve a special attention. On the one hand, the question arises, whether the de jure independence of agencies corresponds to their de facto independence. This is a pertinent question for two reasons. On the one hand, policy implementation gaps frequently occur (Börzel and Risse 2010) due to the fact that legislation (1) leaves some discretionary power to implementers; (2) is not sufficiently clear and needs interpretation to be implemented; or (3) is contested by some actors (Torenvlied 1996, 2000). On the other hand, one should consider that IRAs are integrated into a multi-level and trans-sectoral actors' network and have to interact with the pre-existing administrative units, the competition regulator, and other agencies and courts, all of which represent the co-regulators of the liberalized sector. If *de jure* independence thus grasps almost exclusively the relationship between IRA and political authorities as defined by the law, *de facto* independence can be conceived as the self-determination of agencies' preferences combined with the autonomy of their activity of regulation in front of elected politicians *and* regulatees (Maggetti 2007). Previous research has shown that de facto independence is neither necessary nor sufficient for explaining formal independence (Maggetti 2007; Gilardi and Maggetti 2011). What is more, independence should be considered in the context of the multi-level and trans-sectoral fragmentation of liberalized sectors, where the sector-specific IRA shares relations with other co-regulators. In sum, in contrast to *de jure* independence, we conceive here *de facto* independence as the ability of IRAs to execute regulatory tasks and decisional power independently from actors (authorities, regulatees/operators and co-regulators) that are also integrated in the respective regulatory arrangement and have the capacity to influence or constrain IRAs' decisions (see Ingold, Varone and Stokman, forthcoming).

Accountability of agencies

The question of making independent agencies accountable is a major concern for the scholars of regulatory governance (Hood and Scott 2000; Flinders 2004; Black 2008). To begin with, accountability presupposes the existence of an *external scrutiny* to account for one's actions (Mulgan 2000, 2003; Castiglione 2006). Following Bovens, accountability should be conceived as a social relationship between an actor and its *accountability forum*, which can be another individual or collective actor (Bovens 2007). As anticipated above, the control mechanisms, which are theoretically appropriate for IRAs, relate to existing ex-post accountability arrangements, implying the disclosure of information towards external actors and the verification of the extent to which agencies comply with their mandated obligations (Bertelli 2006; Busuioc 2009). Examples are reporting duties, hearings by parliamentary committees, and various types of information exchange between the agency, the political trustor, peer agencies, and the stakeholders. It is worth noting that, from a conceptual point of view, the disclosure of information and compliance with agencies' statutory obligations is unrelated to their independence. Agencies can theoretically enjoy independence and yet disclose information and comply with their official mandate, or they can be captured while being irremediably opaque, or critically deviating from their statutory prescriptions. At the same time, the empirical distinction between the procedures for implementing independence and accountability is far from trivial and unproblematic. The two properties might occasionally overlap and thus conflict in practice. Therefore, the effective co-occurrence of independence and accountability mechanisms constitutes the main empirical question that will be examined in the rest of this paper.

Hypotheses

According to a seminal argument developed by Majone, the independence and accountability of IRAs must go together, because an extensive delegation of powers to unelected bodies raises problems of democratic legitimacy that should be tackled by reinforcing their accountability structure (Majone 1996, 1999). Following the principal-agent theory, the general problem of delegation is to avoid inefficient delegation and "bureaucratic drift and slippage" (Epstein and O'Halloran 1999). This means that the principal should be able to retain some formal and informal controls on agencies' behaviour (Calvert, McCubbins and Weingast 1989; Bendor, Glazer and Hammond 2001) to minimise any possibility of agencies' "shirking of duties" (Pollack 2003).

However, the Majone's argument goes, greater accountability should not contradict the very *raison d'être* of the agencies, i.e. their independence (Majone 2001a; Busuioc 2009). Therefore, traditional means of bureaucratic control cannot be applied to "non-majoritarian institutions," such as IRAs (Majone 2001c). The fiduciary theory in particular argues that a necessary condition required to guarantee credible commitments and to solve time-inconsistency problems is a broad delegation of powers. The key issue is to ensure a substantial differentiation between the "trustor's" and the "trustee's" preferences and behaviour (Majone 2001c; De Visscher, Maiscocq and Varone 2007). This implies the transfer of political property rights –i.e., specific policy competences– to independent regulators, while the key problems of agency theory –hidden action and hidden information– are no longer central here (Majone 2001c).

Consequently, regulatory independence is conflicting with "*ex-ante* controls", which consists of proactive mechanisms (e.g. budgetary constraints, prescriptions defining the powers

of and the zone of discretion of the agency, and selection mechanisms such as appointments, nominations, etc.), and with "*ongoing* controls" as well (e.g. informal types of direct control and interference exercised by a "principal" vis-a -vis the "agent" in which the agent's actions are steered and/or predetermined by the principal, resulting in a decrease in the original mandated discretion) (Busuioc 2009).

On the contrary, regulatory independence is considered theoretically compatible, and even possibly mutually reinforcing, with *ex-post* controls. This way, accountability is expected to constitute a crucial component of a "multi-pronged system of controls", which, when working properly, could lead to a virtuous situation where no one controls an independent agency, yet the agency is "under control" (Moe 1985; Majone 1996). Indeed, following the fiduciary principle mentioned above, the assessment of efficiency gains expected from independent regulation requires higher accountability, while at the same time appropriate accountability mechanisms provide additional legitimacy to the increased political independence of regulators (Majone 2001c).

In sum, the first hypothesis is as follows: *There exist instances of Independent Regulatory Agencies displaying high de facto independence and high ex post accountability (Hypothesis 1)*.

However, it is important to consider the effective compatibility of de facto independence and ex-post accountability as an open empirical question. The "null hypothesis" to be refuted is that the enactment of accountability arrangements, through procedural requirements involving a tighter relation between the agency and external actors, could result in effective control on IRAs' actions and reduced independence. Similarly, factually independent regulators may try to protect or even extend their room for manoeuvre by minimizing their active use of accountability mechanisms.

An additional argument can be advanced to qualify the first hypothesis, concerning the conditions under which de facto independence and ex-post accountability of IRAs are (more) compatible. The timing and the extent of liberalization of former public monopolies vary considerably across countries and sectors (Levi-Faur 2006), but, all else being equal, the extent of sectoral liberalization should be positively related to the compatibility between the independence and the accountability of regulators.

On the one hand, the process of market opening should directly increase the independence of regulators, because liberalization theoretically requires higher credibility of regulators, and therefore greater independence, especially in the case of utilities (Gilardi 2002). What is more, agencies' de facto independence is expected to grow as far as markets are being opened. With the unbundling of the incumbent operator, third party access to the network, access pricing, the delivery of public services obligations, etc., agencies obtain more decisional competencies and more resources that may enhance their independence. Over time, they can also become more active, gain partners and allies to protect their independence, build their reputation through networking, and reinforce their output-legitimacy with the use of their expertise in the policy process (Wilks and Bartle 2002; Maggetti 2007, 2009; Gilardi and Maggetti 2011).

On the other hand, accountability is expected to co-evolve with independence, because regulatory reforms typically provide additional mechanisms of accountability, increased participation of stakeholders and higher transparency requirements (Reiss 2009). As time goes by, regulators can also develop exogenous accountability linkages with their environment through their day-to-day interaction with government, courts and co-regulators, and business (Coen 2005). At the same time, they learn how to legitimize their organizational existence through the activation of existing accountability mechanisms (Maggetti 2007).

Thus our second research hypothesis stipulates that: *There exist instances of IRAs displaying high de facto independence and high ex post accountability especially in highly liberalized sectors (Hypothesis 2).*

A relational approach

When executing their regulatory tasks, IRAs are integrated into large networks and share relations with public authorities (e.g. government, specific ministries and administrative units, parliamentary committees, etc.), the regulatees (e.g. incumbent operators and new competitors) and other stakeholders representing economic interest groups (e.g. business associations, trade unions), and civil society (e.g. consumers associations). Given this pervasive interconnectedness, we address the issue of IRAs' independence and accountability by adopting a relational perspective: accountability and independence are considered as social relationships, which entail the analysis of the "ties" between agencies and elected politicians (Majone 2001b; Gilardi 2005), the regulated industry (Stigler 1971; Pelzman, Levine and Noll 1989; Maggetti 2007), and other regulatory actors such as general co-regulators (Ingold, Varone and Stokman forthcoming). Each IRA can thus be conceived as the centre of a triangle of actors, possibly sharing ties with elected authorities, regulatees and co-regulators that might, in turn, affect its independence and accountability. This relational approach is in contrast to a *de jure* approach that would exclusively investigate the relationship between IRAs and political authorities based on legal texts.

In order to operationalize independence and accountability as social relationships we follow three steps. First, we will consider the *reciprocal* dyadic relationship between the IRA and each one of the external actors belonging to one of the three relevant actors' groups (authorities, regulatees/operators, and co-regulators), with the help of social network analysis. Second, we will evaluate the overall independence and accountability of agencies within this triangle of external actors populating the regulatory space. Finally, we will examine empirically the *interplay* between independence and accountability, with the help of an explanatory typology.

The possible outcomes

Table 1 presents a typology of the four possible outcomes of the interplay between de facto independence and ex-post accountability. Cases in cell A will support the first hypothesis, that is, the compatibility between independence and accountability, comprised of regulators that are truly independent and yet under control, as hoped by Majone. In

Table 1: Four possible outcomes

		Independence	
		High	Low
Accountability	High	A	B
	Low	C	D

A: regulatory agencies "à la Majone"
B: "execution" agencies
C: "entrusted" agencies
D: "captured" agencies

addition, the relative position of regulators across and within the cells (namely within cell A) allows us to examine the second hypothesis, according to which compatibility is greater in highly liberalized sectors. Cases in B and C are instead in line with the "null hypothesis" about the incompatibility of independence and accountability. Cell B represents typical executive agencies that are not independent while being under the control of the government (or, less frequently, of other external actors). Cell C consists of autonomous agencies, entrusted with "political property rights", that are potentially able to reorient their regulatory action according to their organisational logic and to develop their own strategies without external control. Finally, agencies in cell D are negative, irrelevant cases (that is, "0,0" cases), which neither confirm nor reject our expectations, representing occurrences of regulators that are not independent but that are also unaccountable (usually because they are captured by the regulated industries).

Methodology and case selection

A "Network Analysis" of independence and accountability

Formal "Social Network Analysis" (SNA) provides an useful toolbox when it comes to addressing actors' coordination and individual actors' positions within a wider arrangement of stakeholders in a policy process (see Christopoulos 2008; Ingold, Varone and Stokman forthcoming). We concentrate here on the position of a single actor, the IRA, within the policy network of regulation and, more concretely, within the defined set of actors belonging to the three groups of authorities, regulatees and co-regulators. Nodes of the network are thus defined as aggregate actors or organizations such as regulators and the other external actors belonging to this triangle; ties are the social relations among those actors providing opportunities or constraints for individual actions of the IRA (see Wasserman and Faust 1994: 4; and also the operationalization of accountability and independence below). We thus assess the IRA's ego-network where the links between ego (IRA) and *alteri* (the other actors of the triangle) as well as the links among *alteri* are of interest (Wolf 2004: 245). To get robust data on this ego-network, we not only take the IRA's self-determination into account, but also the links perceived by the other actors in the network. This approach allows for a reciprocal appreciation of every tie present or absent within the regulatory network. This is a major advantage of the data gathering approach applied here: every relation (between *i* and *j)* can potentially be affirmed twice, once by actor *i*, and once by actor *j*. But we are aware that one of the main shortcomings of SNA is that it provides only a snapshot of the studied phenomena; a longitudinal network analysis would depict the dynamics within one sector[1].

A prominent concept for addressing actors' inclusion within a structural setting is network embeddedness (Granovetter 1983; Wassermann and Faust 1994; Hanneman and Riddle 2005). Network embeddedness is defined as a situation of very intense interrelationship that influences social actions, creates opportunities and constraints on actors' behaviour. Network scholars have started to develop the concept of network embeddedness further to point out the importance of structures of social relations when it comes to explaining social and economic actions (Granovetter 1985). One way to investigate single actors' em-

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[1] In a another study however (see Fischer et al. 2012), a longitudinal SNA was conducted about the evolution of Swiss telecoms liberalization taking into account the first (1997) and the second (2006) liberalization phase in Swiss telecoms, as well as the here presented most recent implementation phase (as in 2010).

beddedness through different institutional and societal scales is by analysing the degree of centrality, concentrating on the number of ties an actor sends and receives (Ansell 2003; Grewal, Lilien and Mallapragada 2006). If sending (out-degrees) ties can be expressed as network outreach, influence, activity or impact, incoming ties (in-degrees) can be classified as popularity effects, reduced freedom, or constraints (see Freeman 1979; Granovetter 1985; Wassermann and Faust 1994). Based on these conceptual developments of in- and out-degree centrality, we will outline below the concrete operationalization of network independence and accountability based on different relational types.

The operationalization of independence

As anticipated, IRAs' de facto independence can be conceived as the self-determination of agencies' preferences combined with the autonomy of their activity of regulation (Maggetti 2007). Following this approach, we can obtain a simplified measure of independence by aggregating two observable dimensions (and taking its reverse image): on the one hand, the frequency of incoming contacts between agencies and external actors, which is a simplified proxy of the day-to-day self-determination of IRA's preferences, and, on the other hand, the perceived impact of external actors on the decision-making process within the IRA. The result is a parsimonious measure of independence that allows us to improve the cross-case comparability of agencies. In this context, the independence of agencies is calculated as the combined reverse effect of the incoming "contacts" ties sent to IRAs from external actors and of the "impact" ties with external actors as regards regulatory decision-making. This abridged conceptualization probably does not capture all the existing facets of independence, but it will allow us to draw a relational picture of the level of IRAs' independence, which is adequate for our research goals.

- Independence = self-determination AND autonomous activity = 1 – (in-degrees_contacts*in-degrees impact)

Then, in order to operationalize this conceptualization of independence, we adopt a strength-of-ties approach (Marsden and Campbell 1984; Brown and Reingen 1987; Nelson 1989; Krackhardt 1992). The strength of a dyad is defined here as the frequency or number of ties being present between the IRA and the respective actor group. For each dyad (that is, each relation that exists between the agency and the three actor groups, e.g., [1] agency – elected politicians; [2] agency – co-regulators; [3] agency – regulatees), we can calculate:

- Independence =
  1 – (strength of the ties of the dyad) =
  1 – (normalized value of the strength of the tie according to the matrix "in-degrees_contacts" aggregated with the normalized value of the strength of the tie according to the matrix "impact")

The principle for aggregation is the multiplication of the two values, normalized between 0 and 1.

The operationalization of accountability

Similarly, we assume that the relevant features of IRAs' ex-post accountability can be assessed through the criteria of information exchange, reporting and hearings, summarized as directed out-going "contacts". This indicator refers to the information flow, involving

disclosure, transparency and justification of agencies' actions, vis-à-vis external actors (Schedler 1999), and not to direct sanctioning instruments, which are inappropriate control devices for IRAs (Majone 1994a; Majone 2001b). When agencies' behaviour is accountable to external actors' broad goals, but not constrained by them – that is, when they can select the appropriate means to pursue their goals – then IRAs can be considered independent but under control (Moe 1984; Bendor, Glazer and Hammond 2001; Majone 2001c). Therefore, we argue that accountability can be conceived and measured as the agencies' outgoing "contact" ties to the external actors that may act as domestic accountability fora: the government/parliament, the regulatees, and other national agencies.

- Accountability = information disclosure, etc. = out-degrees_contacts

This indicator can be measured as follows, using the same procedure as above:

- Accountability =
(strength of the ties of the dyad) =
(normalized value of the strength of the tie according to the matrix out-degrees_contacts)

In that way, we will obtain two measures for each dyad, comprising the investigated agency and each external (collective) actor, which can be compared to check whether there is a direct relation between independence and accountability, an inverse relation, or no relation at all. Afterwards, for each case, we can arrange the three relationships (agency-political authorities; agency-regulatees/operators; and agency-co-regulators) in the regulatory space defined by the two axes of independence and accountability. We can also identify the coordinates of the geometrical centre of this triangle, which represents the overall independence and, respectively, accountability of the investigated agency in the network, according to a relational perspective.

The selected cases

The question of whether independence and accountability of sector-specific regulators can go hand-in-hand will undergo an exploratory test through a comparative formal network analysis of the agencies regulating the telecommunication sector (i.e. Communication Commission, ComCom), the electricity sector (i.e. Electricity Commission, ElCom), and the railways sector (Railways Arbitration Commission, RACO) in Switzerland.

These three empirical cases are similar in many regards. First of all, they belong to the same political system, a choice that allows us to control for the variation of political and administrative factors that might have an impact on agencies' independence and accountability (such as the implementation of the same competition law in all liberalized sectors). Second, the policy sectors under investigation are highly comparable, insofar as they relate to network-based utilities that experienced a similar unbundling of the network's infrastructure and provision of services, the access to the network for new competitors, the definition of public service obligations and, last but not least, the installation of a sector-specific regulatory agency.

However, the sectors clearly differ in their level of liberalization, measured by the market segments that are legally open to competition (e.g. eligible customers who may change their service providers, such as the users of mobile phones, big electricity consumers or private firms sending freight by rail) as well as the effective market shares of the incumbent (i.e. Swisscom in the telecommunication sector) and its new competitors (i.e. Sunrise, Orange, Cablecom, etc.). The liberalization process is most advanced in the case of

telecommunications, moderate but accelerating in the electricity sector, and still quite modest as regards railways. This dimension of variation is crucial to examine the interplay of independence and accountability along different stages of the liberalization process. According to our second hypothesis, we expect that the compatibility of the regulatory agency's independence and accountability is high in the telecommunication sector, medium in the electricity sector and low in the railways sector.

It is worth noting that this limited number of empirical cases is chosen because we do not seek to fully generalize our results or develop law-like propositions at this stage. We rather aim to undergo an in-depth exploration of our two hypotheses by studying cases that represent idealtypical regulatory agencies regulating differentially liberalized sectors in the same country. In other words, regulators are selected according to the criterion of *consilience*, which aims to validate hypotheses with cases that represent different "classes of facts" (Levi-Faur 2006), and not of testing them in the largest possible number of cases. Concretely, this procedure consists of examining whether empirical evidence matches the expectations based on exploratory hypotheses, as systematized in the explanatory typology developed above (Elman 2005).

The ongoing liberalization processes within the European Union are key factors for explaining market opening in Switzerland, despite the fact that Switzerland is not a Member State of the EU, but follows a process of "autonomous adaptation" (Sciarini et al. 2004, Maggetti et al. 2011). Thus, the Swiss case is not too specific or isolated from what could be observed in EU Member States, while presenting the analytical advantage of reduced direct interferences on the variables under examination. Hereafter, every utility sector will be briefly presented, along with an outline of the liberalization and re-regulation processes, and the most important actors. Appendix 1 offers a complete list of the actors involved in every sector that were included in this project.

The liberalization of the Swiss *telecommunications* sector took place in three important steps. First, in 1987 the European Commission issued a green book on the liberalization of the telecommunications market. At that time, the issue was already on the Swiss political agenda under pressure of the Swiss export-oriented sector (Häusermann et al. 2004). A first draft of a telecommunications reform was published in 1983 by the direction of the PTT (i.e. "Post, Telephone, Telegraph" a monopolistic public enterprise) itself; but the Swiss Federation of Commerce and Industry criticized this project for preserving the status quo and obtained the creation of an expert committee, which was independent of the PTT. A new legislative draft was written by this committee, submitted to the classical pre-parliamentary consultation and then presented to the Parliament in December 1987. Major modifications of the draft between 1988 and 1991 concerned the creation of the *Federal Office of Communications (OFCOM)* as a new federal public administration endorsing the role of sector-specific IRA with limited regulatory tasks and power (Häusermann et al. 2004). In 1991, finally, the new law on telecommunications was adopted and followed in large part the first package of European directives. The monopoly of the PTT in the field of voice telephony was sustained. However, other parts of the market, such as added-value services and large segments of the equipment market for end users were liberalized (Fischer 2008). In 1997, a second and major reform led to a partial liberalization of the sector and to a partial privatization of the incumbent monopolist (i. e. Swisscom SA). This provided the legal basis for the interconnection between different suppliers of telecommunications services and established the Communication Commission (ComCom) as the new independent IRA of the policy domain. Third, in 2006, a minor reform liberalized the so-called last mile, i.e.the connection between the local centre and

households. The unbundling of the last mile took place shortly after judicial disputes that have demonstrated the necessity of clarifying the legal basis of the competences of the ComCom, and to force Swisscom to share access to the last mile with its competitors (Fischer 2005, 2008).

The liberalization of the *electricity* sector was also a step-wise and conflictual process in Switzerland. A first law for the electricity market was adopted by the Parliament, but without defining a clear regulatory framework. The trade unions and the Socialist party thus launched on optional referendum against this legislative act, which was eventually rejected in the ballot box in 2002. A new legislative proposal to gradually open the electricity market (for big consumers first, then for all consumers, with the possibility of blocking this full liberalization through an optional referendum) was accepted in 2007. Since then, the *Electricity Commission (ElCom)* is the sector-specific IRA responsible for implementing the Swiss Federal Electricity Act and the Swiss Federal Energy Act. In particular, it enacts regulations regarding electricity prices and resolves disputes relating to network access (e.g. the transmission network managed by Swissgrid since 2005) and payment of cost-covering feed-in of electricity produced from renewable energy. Last but not least, it regulates issues relating to international electricity transmission and trading. It is worth noting that the electricity market is very fragmented, with three main electricity producers (namely Alpiq, Axpo and FMB) and more than a thousand distributors operating at the municipal level.

In sharp contrast to the situation characterizing the electricity sector, the *railways* sector is dominated by the historical incumbent (i.e. Swiss federal railways - CFF) and two smaller regional companies (i.e. BLS and SOB). The three main operators created a new entity called Swiss Train Paths (STP) to monitor access to the rail network and path allocation. STP is a company owned by SBB, BLS AG, SOB and Verband Oeffentlicher Verkehr, and is supposed to allocate "impartially" (and in accordance with EU Directive 20901/14) to the aforementioned railway companies the train paths in the annual timetable of the standard gauge networks. When capacity constraints arise, it develops feasible short-term to medium-term solutions. As the impartiality of the STP's decisions is far from guaranteed, the *Railways Arbitration Commission (RACO)* was created in 2000 as independent regulator of the sector. Its mission consists in solving conflicts between operators competing for network access. RACO is thus identified here as the agency regulating the Swiss railway sector (although RACO is administratively part of the federal Office of Transports).

In sum, the following regulators are retained for the empirical analysis: ComCom for telecommunications; ElCom for electricity; and RACO for railways.

Methods for data collection

To define the network boundaries and identify the key actors participating in the implementation of regulatory policies in each sector, we relied on a combination of positional, decisional and reputational approaches (e.g. Knoke 1990; Knoke *et al.* 1996). Following the decisional approach, actors participating actively in the new regulatory regime are identified. This first draft is then enhanced by including the actors holding a strategic position. Finally, with the help of expert interviews, the actors who have considerable power in the respective network are added. Besides the three crucial actors' groups presented above (elected authorities, regulatees/operators, and co-regulators), the network analysis carried out in this paper concerns the whole range of actors participating in the respective network (e.g. consumer protection associations; lobbyists; research institutes; and trade unions).

Data were gathered through a postal survey sent out to the most relevant actors identified in each network. In the telecommunications sector, for example, 38 actors were identified and the questionnaire sent out to 31 in winter 2009/2010. The response rate was considerable, reaching 82%. The other surveys in the other liberalized sectors were realized in spring 2010. The response rate ranged from 63% (for railways) to 78% (for electricity). Note that all questionnaires were designed in the same way. Two questions were specifically relevant for portraying the relations to which the empirical analysis presented here applies: the frequency of contacts among actors and the impact of actors in the implementation of the respective legal acts. Concretely, each actor received a list with all the identified stakeholders in the regulated sector and was asked to indicate with whom contact relations were frequent, which organizations were influenced by herself/himself, and which organization had an influence on his/her own decisions. One advantage of this data-gathering approach is that every tie can ideally be tested twice, as both actors engaged in the relation have the opportunity to confirm its existence.

Empirical analysis

The analysis consists of a cross tabulation of (de facto) independence and (ex-post) accountability to fit each case in our typology (Elman 2005), followed by a discussion of the position of each agency within the regulatory space. A congruence of empirical evidence with cell A, related to the presence of regulatory agencies "à la Majone", will corroborate the first hypothesis about the compatibility between independence and accountability. If agencies are mostly situated in cells B or C, the null hypothesis is instead supported. Finally, the second hypothesis will be confirmed if the prevalence of regulatory agencies "à la Majone" will increase with the level of sectoral liberalization across and within the cells. The occurrence of D will lead to inconsistent results. It is worth reminding the reader that the measurement of independence is based on the combination of contact and impact relations, while accountability relies upon the single out-degree of contact relations. The major questions to be addressed are whether agencies with relatively few incoming contacts might have much impact on others,and if agencies might be in contact with others without being influenced by them. Before comparing the results forthe three cases, in the following section we will discuss the analytical procedure and the results related to the telecommunications sector more in detail to give step-by-step guidelines on how to assess independence and accountability following our relational approach.

Results from the Swiss telecommunications sector

The first analytical step consists in the identification of all the participating actors in the respective relevant groups: besides the sector-specific IRA, all elected authorities, regulatees/operators and co-regulators are listed and counted. As outlined in appendix 2, we count 4 elected authorities, 6 operators and 4 co-regulators in Swiss telecommunications policy. Then, the relevant pieces of information for the analysis are the normalized measures of contact and impact ties. More concretely, when six operators are observed, but only three of them have (contact or impact) ties, then the normalized value related to this case would be 0.5 (or 50%). We first proceed with the operationalization of independence. Note that we calculate this value for each group of external actors (authorities, regulatees and co-regulators). The observed, normalized measures for contact and impact in-degrees of the Swiss telecommunications agency are outlined in table B, appendix 2. According to

Table 2: Measures of the independence and accountability of the IRAs

	Telecommunications		Electricity		Railways	
	ind.	acc.	ind.	acc.	ind.	acc.
Authorities	1	1	0.88	0.8	1	0
Operators	0.66	1	0.84	1	1	0.38
Co-reg.	0.44	1	0.5	1	0.81	0.66

[0 = high; 1 = low].

our procedure, normalized values of contact and normalized values of impact are multiplied to obtain the independence index. Assuming that 1 constitutes the maximum level of independence and that contact as well as impact affects this maximum independence of the IRA, the product of contact and impact is then subtracted from 1 to obtain the independence of the investigated regulator from the respective group. Again, results are displayed in table B, appendix 2 for the telecommunications agency.

The measure of accountability is more straightforward and consists of the simple, normalized out-degree measure within the contact network. Concretely, as displayed in table C, appendix 2, the IRA in charge of the regulation of telecoms shares out-degree contacts with all actors in the network, therefore its accountability to all three actor groups is maximal (equal to 1).

The last step of the analytical procedure is to calculate the coordinates of the geometrical centre of the triangle defined by three external actors, which correspond to the crossing point of the mean values of the three dyadic measures. This point portrays the overall independence and accountability of the investigated agencies, according to a relational approach, and permits the situatuation of each agency in the regulatory space defined by the external actors (table 3).

How can we interpret these findings? The Swiss IRA ComCom seems very independent from elected authorities (independence is 1); less independent from operators (0.66); and the impact of co-regulators seems considerable, reducing its room for manoeuvre in this direction (0.44). These findings confirm previous studies suggesting that ComCom is part of a "regulatory cluster" where non-sector specific co-regulators such as the Competition Commission (ComCo) and the Price Surveillance play an important role in the implementation of telecommunications policy (Ingold and Varone forthcoming): interviewed operators confirmed the existence of such a "regulatory cluster" and mentioned that ComCom/ComCo on one side, Price Surveillance on the other, use different methodologies of price calculations, which results in some regulatory incoherence. This strong involvement of non-sector specific regulators in telecommunications policy implementation can explain the rather reduced independence of ComCom towards this group. What is more, the

Table 3: Coordinates of the geometrical centre of the IRAs

	Telecommunications		Electricity		Railways	
	ind.	acc.	ind.	acc.	ind.	acc.
Coordinat.	0.7	1	0.74	0.93	0.94	0.35
Quadrant	A (N)		A (N)		C (N/W)	

[0 = high; 1 = low].

accountability of ComCom is simultaneously well-balanced and extensive to all three groups of actors, reaching the maximal score of 1. We learn from this case that there is no inherent trade-off between independence and accountability: independence can be very high even though accountability is maximal as shown by the examination of the relationship between the ComCom and elected authorities. On the other hand, IRA's accountability can also go hand-in-hand with higher constraints, as it is the case pertaining to the relationship between the ComCom and co-regulators in the regulation of Swiss telecommunications. The comparative analysis of the three sectors is presented in the next section.

Comparing results across the three liberalized sectors

As outlined in detail above, in the case of *telecoms regulation*, the relatable IRA (ComCom) is very independent and at the same time very accountable to elected authorities. Hence it fits cell A, configuring a regulatory agency à la Majone (figure 1). Its relation with operators is very similar, even if now the ComCom is slightly less independent from regulatees/operators. This could be a consequence of permanent negotiations among regulators and operators that are institutionalized through working groups and round tables. As regards co-regulators, the ComCom is located instead in cell B, and can be seen as an "executive" agency, which is accountable but not very independent, a finding which is in line with the previously mentioned "cluster of co-regulators" and which is also perceived by interviewed operators (Ingold and Varone forthcoming). Lastly, the overall measure permits one to locate the geometrical centre of this agency in the upper-right part of quadrant A, meaning that, on the whole, the ComCom is fully accountable but not completely independent from other actors populating the regulatory space.

As regards *electricity regulation*, the agency in charge, Elcom, follows a more intricate pattern. It enjoys a high level of independence from public authorities, which goes together with a similar level of accountability. It is also considerably independent from operators and fully accountable in that respect. Elcom has indeed proven to be quite active. For instance, Elcom judged the transportation rates set by Swissgrid for 2012 as too high and unjustified. After investigations, the agency forced this company to set prices back at the same levels as in 2011. Pertaining to independence from co-regulators, this agency is thus located between quadrant A (regulatory agency à la Majone) and quadrant B (execution agency). Nonetheless, it appears also fully accountable to co-regulators, that is, in particular to the Competition Commission, which pushed for more competition in the electricity market and still maintains important competencies in this regulatory regime.

The *Railways Arbitration Commission (RACO)* is the agency that displays a larger area of the triangle defined by the three points in the regulatory space (figure 4), illustrating an imbalance between independence and accountability. Whilst the independence of the RACO from all three actors' groups is considerable and reaches the maximum of 1 twice, its level of accountability towards elected authorities is null, and this parameter is also remarkably low level in front of operators. Conversely, independence and accountability in front of co-regulators are both quite high. Overall, these results place RACO in quadrant C, which corresponds to the case of an "entrusted regulator", which works autonomously from external actors but is scarcely accountable. This finding is consistent with the fact that the offices in charge in the federal administration and the Control Committee of the National Council urged the government to increase its steering capacity and improve the transparency of the Swiss Federal Railways regulation.
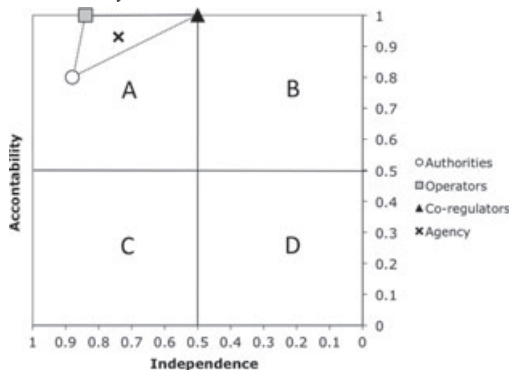
Figure 1–4: Mapping of the IRAs
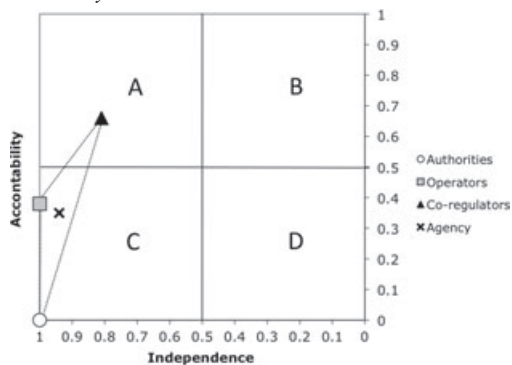
1. The geometrical centre

2. Telecommunications
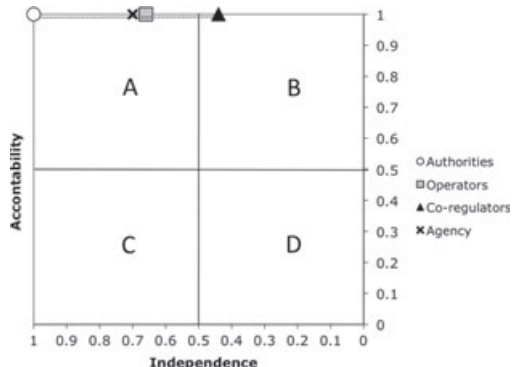
3. Electricity

4. Railways

In sum, when we compare the geometrical centres of the three agencies, we find remarkable variation. ComCom is situated in the extreme northern region of quadrant A and Elcom is the central-northern part of the same quadrant. RACO is situated in the northwestern part of quadrant C. In general, it seems that independence and accountability can be compatible (quadrant A), but they are not necessarily self-reinforcing. Furthermore, and as shown by the case of railways, there exist as well regulators with a high level of de facto independence, but displaying low accountability, a situation that qualifies them as "entrusted" agencies, that is, autonomous agencies that are potentially able to reorient their regulatory action according to their organisational logic and to develop their own strategies without much external control.

Discussion

When we look at the dyadic relations between agencies and the three external actors, that is, elected politicians, market operators (regulatees), and co-regulators, we find considerable support for the two hypotheses, while the null hypothesis is refuted. Our exploratory results show that most agencies have relatively few incoming ties that would threaten their independence, but several out-going ties towards different types of external actors. In other words, empirical evidence corroborates the expectation that IRAs can be independent and

at the same time accountable, and that the compatibility between these two properties tends to increase with the level of sectoral liberalization. This finding is in line with Majone and Moe's expectations as regards the ideal type of regulatory agencies.

However, these results also require some qualifications. In fact, the empirical analysis shows that high independence from public authorities can go together with high accountability, but there is no direct symmetric relationship between the two properties of regulators ("the more independence, the more accountability – the less independence, the less accountability"). A similar pattern is found as regards the relationships between IRAs and regulatees. Instead, there are no occurrences for which both independence from and accountability to co-regulators are simultaneously high. This result might corroborate the argument about the distinctiveness of the double relationship between the agency, the elected politicians and the regulated industries, where the agency shall mediate the (conflicting) interests of elected politicians and regulatees, by developing a "functional antagonism" to keep the two external actors equally distant (Braun 1993; Maggetti 2007). This position would configure for an IRA the ideal situation to properly carry out its work, as it appears to be specifically the case of electricity market regulation in Switzerland. Instead, the horizontal relation with co-regulators and other actors in the regulatory space seems qualitatively different, as they do not have a priori different interests in regulation, but they are expected to collaborate with the IRA in charge. Therefore, their reciprocal independence and accountability relationships could be relaxed.

If we now turn to the overall values of independence and accountability, we observe that most IRAs are located in quadrant A, supporting again the first hypothesis. Some interesting variations, however, are observed, which reinforce and at the same time qualify the pertinence of the second hypothesis that states that in highly liberalized sectors, such as telecommunications, IRAs should display a higher compatibility between de facto independence and accountability. The first dimension of variation pertains to the area of the triangle. The size of the area ranges from a very small one, as for telecoms, to a larger one, as in the case of railways and electricity. This suggests that another type of heterogeneity exists regarding the type of room for manœuvre: a small triangle area indicates a balanced agency's discretion vis-à-vis each external actor in the regulatory space, while a large one means that the investigated agency is developing very different ties in working "at arm's length" with the other actors, in terms of the mixture of independence and accountability characterizing each relationship. Most importantly, in the sector where liberalization is the most accomplished (telecommunications), the behaviour of the regulator is again closer to the ideal type of agency "à la Majone". These results are in line with another study investigating the Swiss telecommunications sector over time (see Fischer et al. 2012): the more advanced the liberalization process, the more powerful and interrelated new actors such as the IRA became within the regulatory arrangement.

The second dimension of variation concerns the configuration of the three points, which is asymmetrical across cases. In particular, it is worth noting that the regulator of the telecommunications sector is weakly independent from co-regulators, while the regulatory agency of the railways sector is ambiguously situated in quadrant A. This suggests that the relation between independence and accountability is not only co-determined by the level of liberalization but also shaped by sector-specific patterns that depend on the relative power of existing actors' coalitions.

The third dimension of variation is with respect to the location of the geometrical centre, representing the overall level of independence and accountability of IRAs in the

regulatory space. In the case of railways, the centre is located within quadrant C, indicating the existence of an entrusted agency. The two other cases are centred in the northern region of quadrant A, showing that there is more heterogeneity in accountability than in independence. This indicates that the two properties do not necessarily co-evolve and, to be precise, that accountability arrangements appear to be more sparse, complex, resilient and difficult to enact than independence. It is thus possible to qualify further our expectations, showing that de facto independence and ex-post accountability can go together, but they do not necessarily do so: IRAs can also be very independent and at the same time unaccountable, corroborating thus some existing concerns about their effectiveness and legitimacy (Maggetti 2010), which appear to be particularly relevant when the liberalization process is imperfect or incomplete.

Conclusion

Independent regulatory agencies were created in various network industries and on different governmental levels to implement and supervise the liberalization, privatization and re-regulation of the concerned sectors. This paper explored expectations as regards the interplay of the key features of regulatory agencies: the first hypothesis predicted a positive relation between the independence of agencies and their accountability, while following the null hypothesis we would expect a trade-off. A second hypothesis aimed at qualifying these predictions postulates that the compatibility between independence and accountability will increase with the level of sectoral liberalization. This contribution provided a preliminary examination of these hypotheses with three illustrative Swiss cases. Of course, our exploratory test could be prospectively complemented with a more systematic investigation of the independence and accountability of additional IRAs in EU Member States, in order to enhance the analytical leverage of the empirical analysis and the generalizability of results. So far, the comparison of three liberalized sectors in Switzerland has shown that, overall, IRAs' independence and accountability can co-exist. There is, however, no evidence for a self-reinforcement of the two properties, for two main reasons: on the one hand, the level of independence and accountability can vary considerably across sectors and also as regards the different relations that agencies develop with the external actors populating the regulatory space within the same sector (IRA-elected authorities, IRA-regulatees/operators, IRA-co-regulators). On the other hand, as illustrated by the regulation of railways, agencies can also enjoy quite high independence while being scarcely accountable, namely when the sector is still imperfectly liberalized.

We can draw two main conclusions from these findings. The first relates to the empirical approach applied in this piece of research, whereas the second concerns the overall assessment of independence and accountability of IRAs in liberalized sectors. We first argue that our methodological contribution to measuring IRAs' independence and accountability could be important for further empirical research. We developed a relational approach to address de facto independence and ex-post accountability. The starting point is the consideration that IRAs are integrated in a multi-level framework, including a variety of actors that, on the one hand, will affect their independence, but with whom they share relations that, on the other hand, can enhance their accountability. For the assessment of independence, we developed a parsimonious measure based on the aggregation of contact and impact relationships. In that way, we combined the two defining attributes of independence: first, the frequency of contacts between IRAs and external actors that might predetermine and constrain the execution of their regulatory tasks; and second, the influence

that other actors have on agencies' decisions. This twofold approach allowed us to identify the relational profiles that define IRAs' independence, as already shown in previous empirical applications (Maggetti 2007).

Our empirical approach to assess accountability was even more straightforward, that is, by considering IRAs' out-degrees in the contact network. This way, we identified the channels through which the investigated agencies may send the required information and maintain frequent exchanges to assure their accountability. This approach was justified from a conceptual point of view, but we acknowledge that it entails some limitations. In particular, the measurement of accountability, being based on a single relation, and thus on the presence or absence of a particular tie, might create a situation where non-answers from survey inquiries and low response rates will have a considerable impact on results and data interpretation (although this was not the case in the present study). Furthermore, a relational approach to independence and accountability does not account explicitly for the identification of formal and ex ante control mechanisms as defined by the existing legislation.

This last point raises relevant and more general questions for the assessment of the link between independence and accountability in liberalized sectors. While independence seems rather effective, accountability is not necessarily so. How to ensure the accountability of de facto independent agencies? Which kind of control mechanisms are appropriate for IRAs, which institutional settings can be put in place, and which responsible actors should intervene to keep IRAs under control? Future research shall investigate in-depth the nature and procedures for developing and maintaining new accountability mechanisms in re-regulated sectors. This issue is even more interesting as the decision to liberalize and to assign regulatory powers to an actor (i.e. the IRA) placed outside the democratic chain of delegation seems to indicate, more or less implicitly, the political tendency to accept that independence may overwhelm accountability in the new regulatory order, as long as the IRA is able to guarantee an efficient market regulation and a sustainable sector development. Such a perspective would also require analyzing in greater depth the causal links between the level of independency of an IRA, on one hand, and the quality and the impact of its regulatory decisions, on the other.

Acknowledgements

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Appendix

Appendix 1: Actors list of the five Swiss utility sectors.

Actor type	Actor	Acronym
Telecommunications		
IRA	Federal Communications Commission	ComCom
Political authorities	Federal Council - Government	FC
	Parliamentary Committee for Transport and Telecommunications of the Council of States	P. Com. CS
	Parliamentary Committee for Transport and Telecommunications of the National Council	P. Com. NC
	Federal Department for Environment, Transport, Energy and Communications	DETEC
Regulatees	Swisscom (incumbent)	Swisscom
	Sunrise	Sunrise
	Cablecom	Cablecom
	Orange	Orange
	Openaxs	openaxs
	IG Telekom	IG Telekom
Co-regulators	Federal Office of Communications	OFCOM
	Competition Commission	ComCo
	Price Surveillance	Price Surv.
	Ombudscom	Ombudscom

Appendix 1: Continued

Actor type	Actor	Acronym
Electricity		
IRA	Electricity Commission	ElCom
Political authorities	Federal Council – Government	CF
	Parliamentary Committee for Transport and Telecommunications of the National Council	P. Com NC
	Swiss Federal Office of Energy	SFOE
	Conference of cantonal governments	CCA
	City representatives	CR
Regulatees	Swissgrid	Swissgrid
	Alpic	Alpic
	Axpo	Axpo
	Bernische Kraftwerke	BKW
	Rätia	Rätia
	Energiewerke Zürich	EWZ
	GR E	GR E
	Services industriels de Genève	SIG
	Romande E	Romande E
	Swiss power	Swiss power
	Swiss Electric	Swiss E
Co-regulators	Competition Commission	ComCo
	Price Surveillance	Price Surv.
Railways		
IRA	Railways Arbitration Commission	RACO
Political authorities	Federal Council – Government	CF
	Parliament – Representative of the Council of States	P - CS
	Conference of cantonal governments	CCA
	Federal Department for Environment, Transport, Energy and Communications	DETEC
Regulatees	Swiss Federal Railways	CFF
	Bern-Lötschberg-Simplon-Bahn	BLS
	Südostbahn	SOB
	CrossRail	Cross
	Rail4Chem (Veolia)	Rail
	Deutsche Bahn (German Railways)	DB
	Hupac	Hupac
Co-regulators	Competition Commission	ComCo
	Price Surveillance	Price Surv.
	Swiss Train Path (Sillon Suisse)	STP
	Federal Office of Transport	FOT

Appendix 2: Independence and accountability measures of Swiss telecommunications agency ComCom.

Table A: IRA, authorities, regulatees and co-regulators in Swiss telecommunications sector

IRA	Level	Authorities	Regulatees	Co-regulators
ComCom	*National level*	Parl. Com. NC	Swisscom	OFCOM
		Parl. Com CS	Sunrise	Comco
		DETEC	Cablecom	Price Surv
		FC	Orange	Ombudscom
			openaxs	
			IG Telekom	
			Swisscom	

Table B: Calculation of the independence index

Measure	Actor	Max	Observed measure	Normalized measure
Contact (in-degree)	Authorities	4	0	0
	Operators	6	3	0.5
	Co-regulators	4	3	0.75
Impact (in-degree)	Authorities	4	2	0.5
	Operators	6	4	0.66
	Co-regulators	4	3	0.75
Indep. Index	Authorities		**1- (0*0.5)**	**1**
	Operators		**1- (0.5*0.66)**	**0.66**
	Co-regulators		**1- (0.75*0.75)**	**0.44**

Table C: Calculation of the accountability index

Measure	Measure	Max	Observed measure	Normalized measure
Contact (out-degree)	Authorities	4	4	1
	Operators	6	6	1
	Co-regulators	4	4	1

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