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Nevena Zhelyazkova

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Nevena Zhelyazkova

Governance and Regulation Chair
University Paris-Dauphine

The paper presents an overview of provisions concerning regulatory independence in European Union (EU) directives for network industries. The main conclusion is that the most recent directives are an important factor shaping institutional design in the EEA. The directives (1) require the creation of independent agencies, (2) require that member states guarantee their independence through specic rules concerning budget and stang and (3) require the cooperation between national regulators and the European Commission. Compared to the previous generation directives, this is a marked shift in terms of complexity and scope. Nevertheless, the sectors with most complex legislation (energy and telecom) are the sectors with the lowest levels of regulatory independence as measured by the Organisation for Economic Co-operation and Development (OECD). There is also a marked dierence between old and new EU member states. Tracing the time line of creation of independent regulators suggests that the EU may have followed a distinct pattern whereby the majority of the independent regulators for network industries have been set up later relative to other countries in the data set.

Regulatory Independence in the European Union A Top-Down View on the Network Industries.

Nevena Zhelyazkova *

Governance and Regulation Chair
Dauphine University, Paris, France
nevena.zhelyazkova@dauphine.fr

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Abstract

The paper presents an overview of provisions concerning regulatory independence in European Union (EU) directives for network industries. The main conclusion is that the most recent directives are an important factor shaping institutional design in the EEA. The directives (1) require the creation of independent agencies, (2) require that member states guarantee their independence through specific rules concerning budget and staffing and (3) require the cooperation between national regulators and the European Commission. Compared to the previous generation directives, this is a marked shift in terms of complexity and scope. Nevertheless, the sectors with most complex legislation (energy and telecom) are the sectors with the lowest levels of regulatory independence as measured by the Organisation for Economic Co-operation and Development (OECD). There is also a marked difference between old and new EU member states. Tracing the time line of creation of independent regulators suggests that the EU may have followed a distinct pattern whereby the majority of the independent regulators for network industries have been set up later relative to other countries in the data set.

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1 Introduction

The Independent Regulator Model, where an agency separate from the government is delegated the responsibility of regulating an industry has now become prevalent in the network industries across the world. As discussed in Levy and Spiller (1994), network industries combine three specific features: (1) economies of scale and scope, (2) highly specific non-redeployable investments, and, (3) users typically overlap with voters. These characteristics render the network industries highly vulnerable to administrative discretion or expropriation, which means that governments are seldom the agents most suited to regulate these sectors. On a related note, Majone (2001) elaborates the problem of political credibility/time-inconsistency, arguing that governments are rarely able to credibly commit to a long-term policy and thus delegation to a non-elected institution emerges as a viable alternative.

The independence of the non-elected institutions to whom regulation has been delegated has been linked to industry performance (Gutiérrez, 2003; Cubbin and Stern, 2006; Edwards and Waverman, 2006; Guasch, Laffont, and Straub, 2008; Gasmi, Noumba, and Recuero Virto, 2009; Ugur, 2009; Duso and Seldeslachts, 2010; Mohammed and Strobl, 2011; Gasmi, Maingard, Noumba, and Recuero Virto, 2013; Trillas and Montoya, 2013) and investment (Égert, 2009; Bortolotti, Cambini, Rondi, and Spiegel, 2011; Sutherland, Araújo, Égert, and Koźluk, 2011; Cambini and Rondi, 2012) across countries and sectors. It is therefore important to understand (1) what leads a country to establish an independent regulatory agency, and (2) why some countries establish more independent regulators than others.

Previous research has put forward important national level variables as factors driving the creation of independent agencies, such as the level of market openness and the existence of veto players (Gilardi, 2002); institutional endowment, the structure of interest groups and size of the incumbent (Gual and Trillas, 2003); socio-economic factors, such as the level of network penetration for the telecom industry, level of economic development and political environment (Lee and Levendis, 2006); historical and cultural factors (Yesilkagit and Christensen, 2010); administrative traditions (Bianculli, Fernández-i Marín, and Jordana, 2013). A growing stream of research has been formed around the diffusional perspective, focusing on emulation across sectors and countries Levi-Faur (2004); Jordana and Levi-Faur (2005);

Levi-Faur (2005); Levi-Faur and Jordana (2006); Jordana, Levi-Faur, and Fernández-i Marín (2009, 2011a).

The role of the EU as a driving force behind the creation of independent regulatory agencies has received relatively limited attention in the economic literature. A likely reason for the lack of attention on EU-level developments is the fact that the directives concerning the network industries in the early 2000s, were, in fact, hardly touching upon the topic of independent regulators. As observed by Coen and Thatcher (2008) the main feature of the directives prior to 2009 was separating the regulatory body from suppliers with little attention paid to independence of the regulatory body from governments or further specific requirements. On a related, albeit broader, note Levi-Faur (2004) argues that the entire processes of liberalization in network industries such as the telecom and electricity have operated through mechanisms separate from *Europeanization* and would have taken place even in the absence of the EU.

In contrast, early work by Gilardi (2005) explicitly includes EU membership in the analysis. Despite the absence of official requirements for setting up independent regulators, Gilardi (2005) does find evidence for EU influence, which he attributes to indirect channels, such as emulation between member states and through the requirements of unbundling and liberalization, which make it necessary for the member states to set up independent regulators. More recent work by Jordana et al. (2011a) includes EU membership as a control variable in the analysis. The results suggest that EU membership is a significant predictor of the probability for a country to establish an independent agency, especially in the periods from 2000 to 2007, however the exact mechanisms through which the effect operates are not discussed in detail[1]. Another recent example is Cambini and Franzi (2013), where the institutional design of regulatory agencies in South Mediterranean countries is analyzed in light of the influence of EU neighbouring policy, albeit in a qualitative perspective.

The analysis carried out in the present paper demonstrates that a qualitative change has taken place at the EU-level legislation concerning the network industries. Independent regulatory agencies are not only explicitly required,

[1]It must be noted that the empirical analysis of both Gilardi (2005) and Jordana et al. (2011a) is not focused on the network industries but refers to the creation of independent regulatory bodies in a broader set of sectors.

there are also specific provisions concerning how the member states should guarantee their independence, as well as prescriptions for their collaboration with each other and the European Commission. The empirical analysis suggests that EU membership has been especially influential for the establishment and design of regulatory agencies in the member states joining after 2004. Separating the network industries from competition and other sectors, it is possible to discern a shared time line of establishing independent regulators in EU member states. The paper is organized as follows.

- First, I provide an overview of recent developments concerning the network services within the context of the EU single market.
- Second, I analyse the texts in the most recent directives concerning regulatory independence for seven sectors: broadcasting (audio-visual), telecom, postal services, gas and electricity, airports and rail transport. The findings suggest that the most recent directives (1) explicitly require the establishment of an independent regulatory body and (2) contain specific requirements concerning how this independence should guaranteed in terms of staffing and budget. Independence is required from both service providers and the government, with the exception of airports, where independence from the government is not explicitly stated as a requirement.
- Third, I analyse the texts concerning the establishment of a regulatory body in the previous generation directives. A comparison with the current directives reveals that a substantial shift has taken place, whereby more and more complex requirements are now in place.
- Fourth, I look at the requirements concerning the cooperation between national regulatory bodies and the European Commission via regulatory networks (ERNs). As noted by other researchers (Coen and Thatcher, 2008), ERNs[2] are qualitatively different from the earlier established Independent Regulatory Networks (IRNs)[3], in that membership in these networks is compulsory for EU Member states and they have functions partly resembling those of EU-level regulators (Coen and Thatcher, 2008; Pelkmans and Luchetta, 2013).

[2]for example: the Body of European Regulators for Electronic Communications (BEREC); the Agency for the Cooperation of Energy Regulators (ACER)

[3]for example: the Energy Regulators Regional Association (ERRA); European Platform of Regulatory Authorities (EPRA)

- In the last step, I show some figures based on two recent data sets by the OECD (2016) and Jordana, Levi-Faur, and Fernández-i Marín (2011b). Comparing the levels of independence across sectors using the OECD indicator suggests that EU Member states tend to have lower levels of regulatory independence compared to other countries included in the data set. Interestingly, comparing new and old members, it also emerges that (1) regulators in the new member states have lower levels of independence than countries joining earlier and (2) the variance across sectors is very low, suggesting direct transposition of the directives rather than amending older legislation. An analysis of the time line of creating independent agencies with the data set of Jordana et al. (2011b) suggests that new member states established such agencies notably later and in the period of joining the EU. In addition, analyzing separately the time line of creating independent regulators from competition and other sectors reveals a shared pattern for EU-member states.

2 Background: What are the network services and why is the EU concerned with them?

The foundations of the EU common market have been laid in the Treaty of Rome (1958) with the idea that eliminating trade barriers and closer economic ties would bring EU countries closer together and contribute to freedom and economic prosperity within the union. Therefore, in the words of Eikeland (2008), working towards tighter market integration is a "*major raison d'être*" for the European Commission. The network industries belong to the internal market and it is therefore within the scope of the competences of the European Commission to ensure there are no barriers to provision of network services across member states or unfair practices, which could hurt competition (Pelkmans and Luchetta, 2013).

In the present analysis network services have been defined as the following seven sectors: broadcasting (audio-visual), telecom, postal services, gas and electricity, air and rail transport (Pelkmans and Luchetta, 2013). Water is often managed locally (by municipalities) and thus not within EU jurisdiction (CRIC, 2012). These seven sectors overlap with the report on Market Opening completed by Copenhagen Economics (2005a) and (2005b), and a report on market functioning by the European Commission (2014a). Most of the sectors have also been included in the recently released database on regulatory quality by the OECD 2016, which has been used for the analysis presented in the last part of this paper.

As discussed by Pelkmans and Luchetta (2013) creating a single EU market for network industries has been a challenging task requiring the balancing of multiple issues. The main priority of the European Commission has been to introduce competition and to allow free entry into the markets by national and EU-players, under the assumption that competition would improve performance regardless of whether ownership remains public or is transferred to private entities. This competition is especially difficult to ensure within the specific characteristics of the network industries where dominant incumbents hold substantial market power and thus without regulatory legislation market entry by new player is not likely to occur. Finally, the process must ensure that the sectors are able to meet their universal or public service obligations (USOs and PSOs).

The creation of a single market for network services has proceeded in different ways in the seven networks sectors, however, the following main principles can be observed:

1. Unbundling. The infrastructure must be separated from the service provision. For example, in telecom, the owner of the cable infrastructure may not be the same entity as an operator sending a signal along this infrastructure. This is to prevent companies or the government from having an unfair advantage as being service providers who also own the infrastructure.

2. Liberalization. There should be more than one operator providing the service. Even if the operators are publicly owned, there must be a fair competition and the operation should be based on market principles, i.e. it is not acceptable that the government subsidizes the (public) operators. All operators must have equal access to the infrastructure, for which the owner of the infrastructure may charge a fee.

3. Independent regulatory body. An independent regulator at the national level should be established to ensure the rules are kept and there is fair competition. The regulatory body should be an agency, which is independent of the service providers and the government. This agency

should be granted the powers to set tariffs, to regulate prices, resolve disputes and perform other actions concerning regulating the market.

4. EU-level competition. All national markets should also be opened to operators from other member states[4], however, this must be achieved without setting up EU-level regulators, which is prevented by the Meroni principle (Pelkmans and Luchetta, 2013).

5. Maintaining universal service provisions. USOs refer to guaranteeing the right of all consumers to receive a set of services and of those services to be of a certain quality[5]. Funding USOs presents clear challenges in a competitive environment and the European Commission is concerned with preventing overcompensation and cross-subsidization (Europen Commission, 2014).

3 Analysis

3.1 Regulatory independence in the most recent directives

The present analysis is focused on European directives because they contain the texts defining the requirements to create an independent regulatory agency. Directives, alongside decisions and regulations, constitute a part of the so-called secondary law in the European Union. While the broad framework for functioning of the European Union is determined by primary law (treaties), secondary law consists of binding legal acts aimed to bring about the implementation of the goals set out in the treaties (European Union, 2010b).

Among secondary law, directives are the most flexible instruments, aimed at harmonization. Directives stipulate results and objectives and require Member states to achieve them while laving them the choice on how to do so. Unlike regulations, directives only take effect at the national level after they have been adopted and transposed into national legislation (European

[4]For example refer to Regulation 714/2009 of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation 1228/2003

[5]For examples, refer to Directive 2002/22/EC for telecom, Directive 97/67/EC for postal services, and Directive 2003/54/EC for electricity.

Union, 2015). Thus, understanding the directives allows us to understand a large number of common principles, which must be integrated in the regulatory frameworks of all 28 member states, as well as Iceland, Norway and Liechtenstein and partially Switzerland[6].

To analyse the provisions concerning the independent regulatory agency, the most recent directives in the seven network industries has been examined. The directives, with their dates and numbers are listed in Table 1. While the directives cover a wide range of topics, the analysis presented here has been focused on the texts concerning the independence of the regulatory agency. At a later stage the question of cooperation between regulatory agencies and between regulatory agencies and the European Commission has been added, as it became apparent that the role of regulatory networks is becoming more pronounced at the EU level. The main questions for the analysis are listed below.

1. Is an independent regulator required?
2. Is independence required from operators or from government?
3. Are there any specific provisions on how member states should guarantee the independence of the regulator?

After the initial round of readings, two additional questions emerged, which required the systematic search for additional information in documents outside the mentioned directives:

4. Is there a European Regulatory Network in the sector and is the regulator required to participate?
5. Has there been a focus on independence in the transposition evaluations of the directives?

[6] Iceland, Norway and Liechtenstein are not members of the EU, however, they re members of the European Economic Area (EEA); Switzerland has signed a set of bilateral agreements with the EU. Overall gaining access to the EU single market requires implementing EU rules into national legislation, therefore the directives for network industries are fully applicable in the EEA and to a large extent in Switzerland.

Table 1: Most recent EU directives concerning network services regulation.

Sector	Directive	Date	Broader Framework
Electricity	2009/72/EC	13/07/2009	Third energy package
Gas	2009/73/EC	13/07/2009	Third energy package
Telecom	2009/140/EC	25/11/2009	Regulatory framework for electronic communications
Postal services	2008/6/EC	20/02/2008	EU postal policy
Audio-visual	2010/13/EU	10/03/2010	Digital single market, Media policies
Airports	2009/12/EC	11/03/2009	A common framework for airport charges
Rail	2012/34/EU	21/11/2012	First railway package

3.1.1 Provisions concerning regulatory independence

The results from the analysis of the legal texts concerning regulatory independence are summarized in Table 2. The analysis of the most recent directive texts has demonstrated that establishing a regulatory agency is required in all but one sectors. All directives, except Directive 2009/12/EC of 11 March 2009 concerning airport charges specifically require that a regulatory agency is established and it must be independent from both operators and government. Directive 2009/12/EC of 11 March 2009 stipulates only that the regulatory agency must be independent of "of any airport managing body and air carrier" (Article 11).

There is a variation in terms of how detailed the provision is concerning *how* member states should guarantee the independence of the regulatory body. The most detailed provisions are found in the directives concerning energy (electricity and gas) and telecom. The directives concerning other

Table 2: Summary of findings. Provisions concerning independent regulatory agencies in the most recent EU directives for network industries.

Sector	Independent Regulator	Specific Provisions for Independence	Network
Electricity	Required	Budget; staffing; fixed-term appointment of head	Agency for the Cooperation of Energy Regulators (ACER)
Gas	Required	Budget; staffing; fixed-term appointment of head	Agency for the Cooperation of Energy Regulators (ACER)
Telecom	Required	Budget; staff; dismissal of head	Body of European Regulators for Electronic Communications (BEREC)
Postal services	Required	Staff; budget	European Regulators Group for Postal Services (ERGP)
Audio-visual	Required	No	No
Airports	Required (not from government)	No	No
Rail	Required	Appointment of staff; financing	European Network of Rail Regulatory Bodies (ENRRB)

sectors are less detailed[7]. A summary of the results is provided in Table 2, while the specific provisions are listed in Table 3. The specific provisions concerning how the member states should guarantee the independence of the regulatory agencies concern the issues of appointment to the head or board of the agency as well as to provisions requiring member states that ensure that the agency has enough budget and staff to be able to exercise its duties independently.

The specific provisions listed in the directives concerning how member states are supposed to guarantee regulatory independence are on par with recent research findings concerning measurement of regulatory independence. Over the last two decades it has been acknowledged that separating an agency from the government by a legal statute does not necessarily result in a fully independent agency. A number of authors have proposed how regulatory independence could be measured using a composite index (Gilardi, 2002; Gutiérrez, 2003; Edwards and Waverman, 2006; Waverman and Koutroumpis, 2011; Koske, Naru, Beiter, and Wanner, 2016) and overviews of recent approaches are available in Gilardi (2010) and Martin and Jayakar (2013)[8].

Although the indices propose different items, the two items which are present across all of them refer to the questions concerning the appointment/dismissal of the agency head and budget of the agency. On a related note, the responses to a survey carried out by the European Platform of Regulatory Authorities (EPRA) amongst its member agencies presented by Ćulahović (2014) show that the majority of responses to the open-ended questionnaire indicated that management of financial and human resources (appointment or dismissal of management) are key prerequisites for independence.

[7]It must be noted that the European Commission (2013) has acknowledged the limitations of Article 30 in Directive 2010/13/EU of 10 March 2010a concerning the audio-visual sector. The document *Public Consultation on the Independence of Audiovisual Regulatory Bodies* 2013 explains that while the directive requires member states to establish an independent regulatory agency if such does not already exist, there are no specific provisions obliging Member States to guarantee the independence of the regulator. The document then further lists four other sources, which have also raised similar concerns on the limitations of Article 30 and conclude that there is a need to "to either strengthen the continuous monitoring of the independence of regulatory bodies or to consider a revision of Article 30 AVMSD" (European Commission, 2013, p.4).

[8]More recently it has been acknowledged that a separation must be made between formal (*de jure*) and informal (*de facto*) independence of agencies. For more information see Maggetti (2007); Trillas and Montoya (2008); Gilardi (2010); Trillas (2010); Fernández-i Marín, Jordana, and Bianculli (2015)

Table 3: Specific provisions in the most recent EU directives for regulatory independence in network industries.

Sector	Leadership	Budget	Staffing
Electricity	"the members of the board of the regulatory authority or, in the absence of a board, the regulatory authority's top management are appointed for a fixed term of five up to seven years, renewable once."	"the regulatory authority [...] has separate annual budget allocations, with autonomy in the implementation of the allocated budget, and adequate human and financial resources to carry out its duties"	
Gas	"the members of the board of the regulatory authority or, in the absence of a board, the regulatory authority's top management are appointed for a fixed term of five up to seven years, renewable once."	"the regulatory authority [...] has separate annual budget allocations, with autonomy in the implementation of the allocated budget, and adequate human and financial resources to carry out its duties"	
Telecom	"rules should be laid down at the outset regarding the grounds for the dismissal of the head of the national regulatory authority in order to remove any reasonable doubt as to the neutrality of that body and its imperviousness to external factors."	"national regulatory authorities responsible for ex-ante market regulation should have their own budget allowing them, in particular, to recruit a sufficient number of qualified staff"	
Postal services	—	"National regulatory authorities should be provided with all necessary resources, in terms of staffing, expertise and financial means, for the performance of their tasks."	
Audio-visual	—	—	—
Airports	—	—	—
Rail	"Appropriate procedures for appointing staff should contribute to guaranteeing the independence of the regulatory body, ensuring in particular that the appointment of persons in charge of decisions is made by a public authority which does not directly exert ownership rights over regulated undertakings."	"The financing of the regulatory body should guarantee its independence and should come either from the State budget or from contributions of the sector levied in a compulsory way, while respecting the principles of fairness, transparency, non-discrimination and proportionality."	—

3.1.2 Comparisons with the previous generation directives

In the course of this analysis it has emerged that such detailed regulations concerning regulatory independence are relatively recent developments. Table 4 presents the texts concerning independence of the regulatory body in the directives preceding the ones in Table 1. The general tendency is that older texts refer to independence of the regulators from the operators and not from the government. The texts are also framed very generally and there are no requirements that the member states should guarantee the independence of the regulators from the governments, nor any prescriptions of means to do so.

The results support the observation regarding the previous status of regulators in EC directives prior to 2009 is made by Coen and Thatcher (2008):

> "However, EU regulation has said relatively little about the institutional framework for the implementation of regulation within member states. It has not insisted that NRAs be IRAs and hence independent of government, nor has it laid down rules for the institutional form or powers of NRAs. Instead, it has confined itself to insisting that regulatory organisations be separate from suppliers, that they follow certain decision-making principles such as 'fairness' and transparency and that they have adequate resources to fulfil their EU-created legal duties" (p. 54)

Comparing the older and newer directives suggests that there has been a qualitative change: the newer texts (1) specifically require independence from the government (except for airports), (2) contain specific details on *how* the governments are to guarantee the independence and (3) are generally longer and more detailed. This development is in line with the argument presented in Nicolaides (2004) who traces the EU-level rules concerning establishment and collaboration between national regulatory agencies. One of the main ideas put forward in his analysis is that there has been a variation in the level of implementation of integration-related measures and the European Commission has reacted by making the rules more detailed and more comprehensive.

Table 4: Texts concerning regulatory independence in earlier EU directives for network industries.

Sector	Directive (Date)	Texts concerning the independence of the regulatory authority
Electricity	2003/54/EC (26-Jun-03)	*Article 23:* "Member States shall designate one or more competent bodies with the function of regulatory authorities. These authorities shall be wholly independent from the interests of the electricity industry. They shall, through the application of this Article, at least be responsible for ensuring non-discrimination, effective competition and the efficient functioning of the market, monitoring in particular[...]"
Gas	2003/55/EC (26-Jun-03)	*Article 25:* "Member States shall designate one or more competent bodies with the function of regulatory authorities. These authorities shall be wholly independent of the interests of the gas industry. They shall, through the application of this Article, at least be responsible for ensuring non-discrimination, effective competition and the efficient functioning of the market, monitoring in particular [...]"
Telecom	2002/21/EC (7-Mar-02)	*Article 3:* " (2) Member States shall guarantee the independence of national regulatory authorities by ensuring that they are legally distinct from and functionally independent of all organisations providing electronic communications networks, equipment or services. Member States that retain ownership or control of undertakings providing electronic communications networks and/or services shall ensure effective structural separation of the regulatory function from activities associated with ownership or control."
Posts	2002/39/EC (10-Jun-02)	"Directive 97/67/EC established that Member States are to designate one or more national regulatory authorities for the postal sector that are legally separate from, and operationally independent of, the postal operators. In view of the dynamics of the European Postal markets, the important role national regulatory authorities play should be acknowledged and furthered, in particular concerning the task of ensuring that the reserved services are respected, except in Member States where there are no reserved services. Article 9 of Directive 97/67/EC allows Member States to go beyond the objectives of that Directive."
Audio-visual	89/552/EEC (3-Oct-89)	—
Airports	—	—
Rail	2001/14/EC (26-Feb-01)	*Article 30:* "Without prejudice to Article 21(6), Member States shall establish a regulatory body. This body, which can be the Ministry responsible for transport matters or any other body, shall be independent in its organisation, funding decisions, legal structure and decision-making from any infrastructure manager, charging body, allocation body or applicant. The body shall function according to the principles outlined in this Article whereby appeal and regulatory functions may be attributed to separate bodies."

3.2 European regulatory networks (ERNs)

Another pattern, which has emerged from this analysis is the persistence of regulatory networks across the analyzed sectors. Although, not all European Regulatory Networks (ERNs) are mentioned in the directives, most directives explicitly require that regulators of member states collaborate with each other and the European Commission. In that respect, it is important to note that these are networks of *independent* regulators but not necessarily *independent networks*. This analysis has found that an European regulatory network has been set in all sectors considers except for airports and for audio-visual regulators (some of which are also responsible for telecom and thus members of BEREC).

According to Pelkmans and Luchetta (2013), the existence of ERNs such as BEREC and ACER is a consequence of "a slowly emerging awareness at EU level that an EU regulator is indispensable"(p. 19). A similar idea is put forward in Coen and Thatcher (2008) who suggest that the establishment of ERNs took place only after the idea of European-level regulators has been rejected. Concerning the reasons why a EU-level regulator is not feasible, the consensus in the literature is that this is prevented by the Meroni doctrine, according to which such agencies cannot be established due to the absence of a legal basis on the treaty establishing the single market (Pelkmans and Luchetta, 2013; Coen and Thatcher, 2008).

With respect to the powers and responsibilities delegated to the networks, Coen and Thatcher (2008) use the term "double delegation" to describe the process in which on the one hand the member states delegate regulatory responsibilities to the regulators, while on the other hand the European Commission delegates them the responsibility of implementing the directives and ensuring the single market. An important concern is raised in Pelkmans and Luchetta (2013) who argue that regulators are prone to act nationally despite their common EU-origin.

With reference to independence, European regulatory networks may further strengthen the independence of national regulators. Danielsen and Yesilkagit (2014) argue that membership in ERNs may have an independence-enhancing effect on national regulatory authorities as ERNs are involved not only with monitoring the implementation of directives, but also with rule elaboration and amendment. From this point of view participation in

ERNs may increase the regulatory capacity of national authorities vis-a-vis elected institutions. On the other hand, it must be noted that some concerns have been raised concerning the supervision of the European Commission of these networks (Danielsen and Yesilkagit, 2014; Coen and Thatcher, 2008; Eberlein and Newman, 2008; PostEurop, 2010).

3.3 The independence of regulators in evaluations on implementation of the directives

Although it has not been possible to locate evaluations of the implementation of all directives included in the present analysis, regulatory independence does appear to be present in the publicly available evaluations. Notably, the independence of national regulators has been discussed in evaluations on the energy sector (European Commission, 2014b), the audiovisual sector (European Commission, 2013), postal services (Dieke, Campbell Jr., Angenendt, and Müller, 2009) and airport charges (Steer Davies Gleave, 2013).

For the telecom sector, the European Commission has carried out a comprehensive review on telecom rule in the fall of 2015. As a result of the review, the European Commission has proposed that national regulators could be strengthened through the introduction of a set of minimum competence across the Union. There appears to be an interesting shift of focus from the independence of national regulators to the alignment between them and the respective ERN for the telecom, whereby it is suggested that BEREC's competencies could be enhanced including the possibility that this may include the capacity to issue legally-binding decisions (European Commission, 2016) .

4 Towards converging levels of independence? Insights from a recent OECD data set

It is an interesting question whether the observed shift towards more detailed independence requirements for the design of regulatory institutions in the network industries has resulted in actually increasing the independence of regulatory bodies in the EU. An empirical strategy to answer this question would consist of choosing a valid measure of regulatory independence, collecting data on the levels of independence under the old and the new directives and comparing them whereby ruling out possible alternative explanations for any observed differences. Unfortunately with the limited data available, such an analysis is well beyond the scope of what is feasible for the present study. Nevertheless, a data set recently made available by the Organization for Economic Cooperation OECD (Koske et al., 2016) allows for some explorative analysis, which can offer interesting insights into current developments in the independence of regulatory bodies in the EU, albeit admittedly in a descriptive rather than explanatory perspective.

4.1 Data description

The data set used for the analysis is called *Sector Regulators* (OECD, 2016) and contains information about the regulatory management practices in six network sectors: electricity, gas, telecom, railroad transport infrastructure, airports and ports. The OECD provides the indicators and the underlying data sets used for their calculation for 45 number of countries of which all 28 EU members states are included, as well as three of the four EFTA members: Iceland, Norway and Switzerland. Although the data are only available as a cross-section for 2014, the data are a rich and valuable source of information allowing comparisons between EU and non-EU Member states as well as comparisons within the EU itself. To the best of my knowledge this is the only available data sets allowing cross-country and cross-sector comparisons on regulatory independence where all Eastern European Member States are included.

Although the paper is focused on EU legislation, the empirical analysis groups Iceland, Norway and Switzerland with EU member states because as participants in the single market these countries must also apply the abovementioned directives. As EEA members Iceland and Norway[9] are legally bound to implement the directives pertaining to the Single market, including the ones pertaining to the network services. Switzerland is somewhat of a special case, as its access to the Single market is governed by bilateral agreements, therefore following the directives is not automatic. Yet, given

[9]The same applies to Liechtenstein as well but it is not included in the OECD data set.

the long history of negotiation between Switzerland and the EU, as well as its geographic location in the heart of the EU, for the purposes of this analysis, it seems more reasonable to group Switzerland with the rest of the EEA states than the other ones in the OECD data set.

The *Sector Regulators* data set is based on experts' answers to questions concerning the institutional design of regulatory bodies. As noted by Rajabiun and Middleton (2015) using a measure based on "objective" features of the regulators has an important advantage over perception-based alternatives, as "perceptions-based indicators of regulatory quality tend to rank Western/Northern European countries relatively higher than Southern/Eastern members" (p.241). On the other hand, the OECD indicator captures primarily *de jure* aspects of regulatory independence, thus joining a number of previously developed indicators, such as the ones proposed by (Gilardi, 2002; Gutiérrez, 2003; Edwards and Waverman, 2006; Waverman and Koutroumpis, 2011). It is important to note that there exist also *de facto* aspects of independence, which are not easily captured by measures assessing regulatory design and may need complementary approaches for their study (Maggetti, 2007; Trillas and Montoya, 2008; Gilardi, 2010; Trillas, 2010).

4.2 Comparison I: EEA and Non-EEA States

Figure 1 and Table 5 present descriptive statistics on the indicator values measuring the independence of regulatory agencies by sector presented by the OECD (2016). It becomes immediately apparent that the independence scores of non-EEA countries are markedly higher than the ones of EEA Member states. Interestingly, however, the shape of the two distributions is roughly the same, with the least independent agencies being the ones in sectors closest to consumers: Telecom, Electricity and Gas, while the transport sectors, namely: Roads, Rail and Airports tend to have higher scores. Interestingly, in the EEA there seem to be a large number of outliers at the lower end of the distribution, i.e. the regulatory agencies tend to be notably less independent than average. An interesting example is Germany, where the agencies regulating both energy and telecom come up as outliers in the analysis. Another country with exceptionally low scores in more than one sector is Denmark, which is an outlier in the transport sectors Air and Ports. Lithuania, Italy, Hungary and Greece have very low scores in

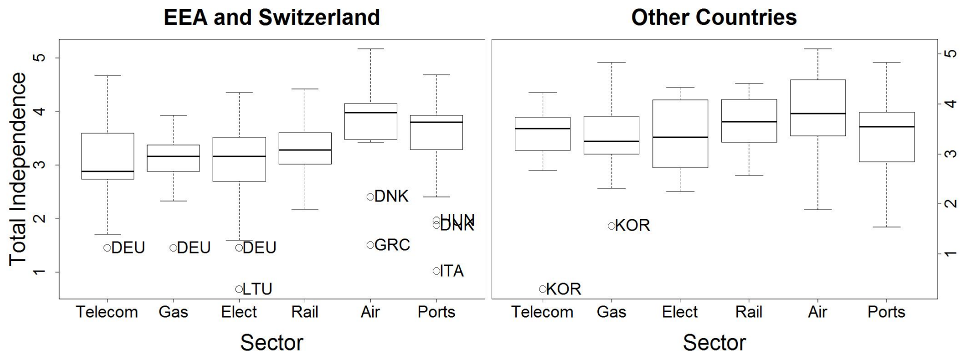

Figure 1: Comparison of the independence indicator values for agencies by sector in EU and Non-EU countries
Source: OECD

one sector each. In comparison, there are fewer outliers in the non-EEA countries in the analysis, where only Korea appears more than once. Again the extreme values are on the left of the median, with Korea scoring low on Telecom and Gas.

4.3 Comparison II: New and Old Member States

Table 6 shows the descriptive statistics concerning the independence scores of new and old member states in the EEA. The same information is summarized visually in the box-plots presented in Figure 2. Some immediate observations are (1) that the new member states have less independent regulators on average for all areas and (2) that there is much less variability relative to the older members. One possible reason for the lower variance of the independence scores is the fact that such institutions have been created largely due to EU influence and did not exist beforehand. Therefore, rather than incorporating EU requirements in already existing legislation, the new member states have directly copied large parts of the EU legislation. Further support for this ideas comes from observing that the sectors with most detailed EU-level legislation concerning the independence of the regulatory agencies (electricity, gas, telecom) are also the ones where the variance is the lowest among new member states.

Table 5: Descriptive statistics comparing the independence indicator values for agencies by sector in EEA and Non-EEA countries.

	EEA and Switzerland						Other countries					
Sector	N	Median	Min	Max	Mean	SD	N	Median	Min	Max	Mean	SD
Telecom	30	2.88	1.45	4.67	3.04	0.65	13	3.51	0.29	4.23	3.24	1.02
Gas	29	3.16	1.45	3.93	3.08	0.53	13	3.25	1.56	4.83	3.28	0.86
Electricity	31	3.16	0.68	4.36	3.03	0.78	12	3.33	2.25	4.33	3.35	0.74
Rail	27	3.28	2.18	4.42	3.28	0.46	8	3.64	2.57	4.41	3.61	0.61
Air	22	3.80	1.02	4.69	3.47	0.92	12	3.54	1.54	4.83	3.33	0.85
Ports	16	3.98	1.50	5.17	3.72	0.83	12	3.81	1.88	5.10	3.77	0.94

Source: OECD
Included EEA countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom
Included Non-EEA countries: Australia, Brazil, Canada, Chile, China, India, Israel, Japan, Korea, Mexico, New Zealand, Russia, South Africa, Turkey

Table 6: Table comparing the independence of agencies by sector in old and new member states of the EU.

	EU-15, Iceland, Norway & Switzerland						EU Members after 2004					
Sector	N	Median	Min	Max	Mean	SD	N	Median	Min	Max	Mean	SD
Telecom	17	2.94	1.45	4.67	3.14	0.83	13	3	2.43	3.60	2.92	0.30
Gas	16	3.34	1.45	3.93	3.20	0.62	13	3	2.33	3.45	2.92	0.36
Electricity	18	3.35	1.45	4.36	3.20	0.78	13	3	0.68	3.74	2.79	0.75
Rail	16	3.38	2.18	4.42	3.33	0.52	11	3	2.67	3.89	3.20	0.36
Air	16	3.82	1.02	4.69	3.53	0.92	6	4	1.96	4.50	3.31	0.96
Ports	9	3.98	1.50	4.10	3.46	0.91	7	4	3.45	5.17	4.06	0.63

Source: OECD
EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
EU Members after 2004: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, Slovenia.

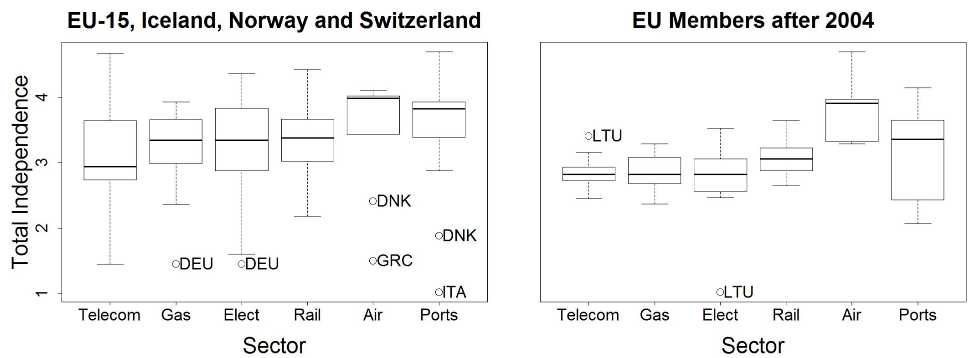

Figure 2: Independence scores of agencies by sector in old and new member states of the EU/EEA.
Source: OECD

5 A shared time line? Tracking the establishments of independent regulatory agencies in the EU and across the globe

In the last section of this paper, I trace the establishment of independent regulatory agencies using the data set of Jordana et al. (2011b) available on the *GlobalReg* website[10]. The data set is a rich source of information covering 48 countries and 15 sectors for the period 1966 - 2007. From the network industry sectors, which are the scope of this analysis, only telecom, energy (gas and electricity) and postal services are covered. Another limitation is that not all EU/EEA Member states are included. More specifically, from the countries joining after 2004, only four are included: Poland, the Czech Republic, Slovakia and Hungary.

Nevertheless, the data set is a rich and valuable source of information, which allows one to trace the time line for establishing independent regulatory agencies. As explained in Jordana et al. (2011a), the data set records the year of establishing an agency with regulatory functions, which is "a separate organizational identity from a ministry"(p.1351). The other sectors covered by the data set, which have been grouped as *Other* for this analysis include Environment, Financial Services, Food Safety, Health Services,

[10]http://www.globalreg-project.net/

Table 7: Proportion of countries establishing an independent regulatory agency in each time interval. Percentages sum to 100 across each row.

Sector		<1989	1991-1995	1996-2000	2001-2005	2006-2007	N/A	*N*
Telecom	EEA & Switzerland	0.23	0.23	0.55	0.00	0.00	0.00	22
	OECD	0.33	0.33	0.11	0.22	0.00	0.00	9
	Other	0.12	0.47	0.29	0.06	0.00	0.06	17
Electricity	EEA & Switzerland	0.09	0.23	0.50	0.14	0.05	0.00	22
	OECD	0.56	0.11	0.11	0.22	0.00	0.00	9
	Other	0.06	0.29	0.53	0.00	0.00	0.12	17
Gas	EEA & Switzerland	0.09	0.09	0.36	0.36	0.00	0.09	22
	OECD	0.44	0.22	0.11	0.11	0.00	0.11	9
	Other	0.00	0.24	0.24	0.12	0.00	0.41	17
Post	EEA & Switzerland	0.00	0.18	0.36	0.27	0.05	0.14	22
	OECD	0.22	0.00	0.00	0.00	0.00	0.78	9
	Other	0.00	0.12	0.06	0.06	0.00	0.76	17
Competition	EEA & Switzerland	0.45	0.27	0.09	0.09	0.05	0.05	22
	OECD	0.78	0.22	0.00	0.00	0.00	0.00	9
	Other	0.12	0.24	0.06	0.18	0.12	0.29	17
Other	EEA & Switzerland	0.38	0.13	0.12	0.12	0.03	0.22	220
	OECD	0.43	0.07	0.13	0.06	0.00	0.31	90
	Other	0.21	0.16	0.15	0.06	0.00	0.42	170

Source: Jordana et al. (2011b)
Sectors in included in *Other*: Environment, Financial Services, Food Safety, Health Services, Insurance, Pensions, Pharmaceutics, Security and Exchange, Water, Work safety.
N/A: An agency has not been established as of 2007.
Included countries in EEA: Belgium, Germany, France, Italy, Luxembourg, the Netherlands, Denmark, Great Britain, Ireland, Greece, Spain, Portugal, Austria, Finland, Sweden, the Czech Republic, Hungary, Poland, Slovakia, Iceland, Norway.
Included OECD countries: Canada, Turkey, the USA, Japan, Australia, New Zealand, Mexico, Korea, Chile.
Included other countries: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Honduras, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay, Venezuela.

Insurance, Pensions, Pharmaceutics, Security and Exchange, Water, Work safety. Notably the data set also includes the establishment of independent competition agencies, which have also been examined separately.

Table 7 presents the proportions of countries from the data set of Jordana et al. (2011b), which have established an independent regulator per sector and per time period. In all network industries included in the data set, EEA member states have established the majority of independent agencies in the years after 1996. To the contrary, the majority of included countries, which are OECD member states, but not in the EEA have established such agencies earlier. For example, in electricity, half of the OECD (non-EU) members have established an IRA in the period before 1989, compared to only 5% of the EEA member states, for whom more than half establish such agencies in the period 1996-2000. A similar pattern can be observed in the Gas and Telecom sector. Interestingly, most EEA Member states have established na IRA for the postal services until 2007, while among non-EEA member states, the majority (2/3) do not have such an agency by the end of the observation period. In competition and in other sectors, however, the patterns are not the same and there are more similarities between EEA and non-EEA Members in the rates of establishing IRAs.

Table 7 suggests that in the EEA network industries regulations and the establishment of independent regulators follows a shared time line, and, it is possible to speculate that this time line reflects a top-down influence by the EU. As of 2007, when the data set was collected, only seven of the 31 member states of the EEA were not members of the OECD (Bulgaria, Cyprus, Croatia, Lithuania, Latvia[11], Malta, Romania) and none of these countries is in the data set of Jordana et al. (2011b). Therefore, the top-down influence could be hypothesized to stem from the EU and not from the OECD, as all of the EU states in the data set have been members of both the EU and the OECD, with most of them joining the OECD in 1961 and 1969.

Another interesting trend emerging from the data set of Jordana et al. (2011b) is that the four new member states for which data are available seem to have established their independent agencies only after the 1990s, possibly as part of their EU application process. The only exception is Poland, which has established an independent regulator for the environment in 1980 and for work safety in 1981. The independent regulatory agencies for the network industries, however, are established exclusively after the 1990s.

6 Discussion and implications for research

This paper has provided an overview of the provisions in the most recent European directives concerning the establishment of regulatory agencies in the network industries and guaranteeing their independence. The first conclusion is that presently EU legislation not only specifically requires the establishment of independent agencies to regulate the network industry, but it also has specific provisions concerning institutional design (i.e. budget

[11] Latvia is a member of the OECD as of July 1, 2016.

and staffing), which explicitly require governments to guarantee the independence of these agencies. Second, the present state of the directives appears to be qualitative shift relative to the previous generation directives, which only stipulated that an agency must be set up to regulate the sector and did not even specify that it must be independent from the government. Third, the regulators in most network sectors are required to participate in ERNs, and as such these networks begin to assume some of the functions of EU-level regulators, although their scope of action is rather limited.

A descriptive analysis of the data provided by the OECD (2016) has shown that countries in the EEA and Switzerland tend to have, on average, less independent regulators than the other countries in the analysis for all the six sectors under investigation. In addition, there appears to be an interesting distinction between older and newer EU members: the regulators of the member states joining after the enlargement in 2004 are less independent on average and, interestingly there is very little variance in the indicators, which may suggest a high level of convergence in the legislative texts for these countries. Interestingly, for both EEA and non-EEA countries the OECD indicators suggest that the regulators for the sectors energy and telecom tend to have the lowest levels of independence relative to the other sectors in the analysis.

Concerning the time line for establishing independent agencies, the analysis of the data shared by Jordana et al. (2011b) has revealed that network industries may have followed a somewhat distinct pattern among other sectors in the EU. Notably, EEA countries have established independent agencies on average later than only-OECD members in these sectors. Although only four countries from the member states joining after 2004 have been included, they clearly share a pattern of establishing agencies only post-starting the negotiations.

Concerning further research, some interesting research questions could be addressed when appropriate data become available. To begin with, it would be interesting to measure the extent to which there is any evidence for convergence or divergence over time concerning regulatory design in the EEA. Second, it would be interesting to explore why and how, although the first wave of directives (in the early 2000s) did not specifically demand for the establishment of independent regulators, the majority of EEA countries directly adopted the independent regulator model.

Some of the findings of this paper also have important applications for empirical analysis. To begin with, the analysis has highlighted that most EU-level directives where regulatory independence is mentioned are part of broader packages. This means that the establishment of an independent regulator and/or changing its design to conform to the new rules is rarely an isolated change in the sector. Thus the task of empirical researchers is specifically hard in these sectors, as it would be important to distinguish the effect of the changes concerning the regulatory body from the broader-level reform ensuing from the entire package. Furthermore, researchers including EEA and non-EEA member states should be careful to control to EEA membership and/or the potential influence of specific directives.

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Fondation Paris-Dauphine

Chaire Gouvernance et Régulation
Fondation Paris-Dauphine
Place du Maréchal de Lattre de Tassigny - 75116 Paris (France)
http://chairgovreg.fondation-dauphine.fr