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# Explaining regulatory autonomy in EU network sectors: Varieties of utility regulation?

## ABSTRACT

This article explains variation in the autonomy in the range of activities that European regulators perform. By focusing on 102 regulators of four network sectors (electricity, gas, telecom and railways), we test for functional and institutional explanations. The findings indicate that the inclusion of institutional factors matters for our understanding of recent changes in the governance of European network sectors. Reforms towards the independent agency form of governance and the range of competencies granted to sector regulators seem to be shaped not only by international functional pressures but also by domestic institutional factors. Beyond the credibility hypothesis, we find that national governments grant less regulatory autonomy to utility regulators the more coordinated an economy is and the more veto players are present. On the contrary, common law countries are associated with higher levels of regulatory autonomy.

## 1 Introduction

In their introduction to this special issue, Guidi, Guardiancich and Levi-Faur (2018) observe that although processes of globalization and diffusion resulted in a general application of policy scripts based on privatization, liberalization and the establishment of independent regulatory agencies (IRAs) (Majone 1994; Gilardi 2005b; Levi-Faur 2005), there is still variation across regulatory regimes (see also Levi-Faur 2006). In this article we analyze an institutional dimension of regulatory authorities that has been so far rather neglected in the literature: the degree of regulatory autonomy, which is defined here as the set of rulemaking, adjudicatory and enforcement functions granted to regulators, and the decision-making independence in applying granted competencies. Without corresponding regulatory competencies and decision-making independence an otherwise highly independent regulator can only hardly contribute to the effective governance of the economy (Brown, Stern, and Tenenbaum 2006).

In Europe, the markets for telecommunications, electricity, gas and rail transportation have been (partially) privatized and opened up for competition. Most regulatory and market supervision functions have been delegated to IRAs operating at arm's length from the central government bureaucracy. Within the European Union (EU) single market, a sequence of reforms successively required member states to ensure the separation of regulatory from operational activities, the vertical separation of the incumbent and, more recently, the political independence of the regulator, preferably by the establishment of IRAs (Daßler and Parker 2004; Trillas 2010; Mathieu 2016). Although member states are not legally required to establish IRAs, a general level of formal political independence is strongly encouraged. The exact institutional model to be chosen is, however, left to the discretion of national governments, especially in setting the specific functions and competencies to be performed by sector regulators. Figure 1 shows that there is extensive variation concerning what activities national regulators can perform in autonomy in order to supervise market operators in electricity, gas, railways, and telecommunication.

*Figure 1: Regulatory autonomy of European utility regulators*

\*\*\*\*\*PLEASE INSERT FIGURE 1 HERE\*\*\*\*\*

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Note: Regulatory autonomy is measured by the variable *scope of action* of the Organisation for Economic Co-operation and Development's dataset on regulatory management practices (Koske et al. 2016, see Table A1 in the Appendix). The coding has been reversed: higher values indicate *more* regulatory autonomy. The maximum value for each sector is six. The figure displays 26 EU member states that appear in decreasing order according to the sum of regulatory autonomy in electricity, gas, rail, and telecommunication.

How to explain the observed variation in regulatory autonomy across European network sectors? The credible commitment hypothesis is probably the most prominent explanation for the institutional innovation of IRAs and the granting of high levels of regulatory autonomy (Gilardi 2002, 2005a, 2008; Elgie and McMenamin 2005; Bertelli and Whitford 2009; Wonka and Rittberger 2010). In view of the credible commitment hypothesis, politically independent regulators serve the purpose of ensuring investors of a stable regulatory environment in previously privatized markets (Majone 1996). By delegating regulatory functions to independent regulators, governments can credibly signal their long-term commitment to market-conform reforms and regulation.

Furthermore, delegation patterns in the regulatory state may be embedded within and related to broader country-level institutional settings and 'national path dependencies' (Maggetti and Verhoest 2014). The number of veto players, for example, has been found in several empirical studies to affect the delegation process (Gilardi 2002, 2005a, 2008). Other scholars have set the privatization and delegation process into relation with administrative and legal traditions and institutions (Bortolotti, Fantini, and Siniscalco 2003; Bianculli, Fernández-i-Marín, and Jordana 2013). The legal and administrative tradition of a country may not only affect procedural issues but also substantially impact on the level of regulatory autonomy granted to sector regulators. In particular, in some countries, constitutional provisions may place constraints on the privatization of public utility services and the re-structuring of public administration by the delegation of regulatory functions to independent regulators. Moreover, different 'varieties of capitalism' (Hall and Soskice 2001) may be expected to develop complementary institutions in the regulatory domain (Thatcher 2007). With few exceptions (Guidi 2014, 2016; Guardiancich and Guidi 2016), the political-economic institutional structure has been so far neglected in the comparative public policy literature on bureaucratic

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autonomy and the regulatory state.

In this article we attempt to explain variation in the level of regulatory autonomy granted to European public utility regulators. More specifically, we investigate the extent to which international functional pressures to signal credible commitment are mediated by the domestic political-economic institutional environment. The level of autonomy granted to regulators is a crucial dimension of their governance (Brown, Stern, and Tenenbaum 2006). In order to fully comprehend the level and nature of regulation and delegation in the economy it is necessary to examine the competencies granted to regulators and their decision-making independence in applying granted competencies. The remaining sections of the article proceed as follows. The next section reviews the literature on different concepts and measures of the formal independence of regulatory authorities and argues for the necessity to focus on the autonomy to perform regulatory functions. Section 3 presents the main hypotheses for explaining the observed variation in the level of regulatory autonomy granted to utility regulators. Section 4 illustrates the data and the operationalization of hypotheses. In sections 5 and 6 we summarize and discuss the empirical findings. Finally, the article ends with some concluding remarks.

## 2 Conceptualization and measures of regulatory independence

In Europe, the rise of regulatory governance corresponded to the institutional innovation of IRAs (Gilardi 2005b). The privatization of the network industries (electricity, gas, railways, and telecommunications) was accompanied by the establishment of independent regulators to supervise and monitor those markets until effective competition can be achieved. Initially expected to be a temporary solution for utility markets characterized by imperfect competition, sector-specific IRAs are now a global norm of economic governance (Jordana, Levi-Faur, and Fernández i Marin 2011). We maintain that regulatory autonomy (or ‘functional independence’ Lavrijssen and Ottow 2012, 428) – that is, the set of competencies formally granted to regulators (and specified in regulatory agencies’ mandates, Koske et al., 2016) and the decision-making independence in applying granted competencies – has been so far not fully explored by the regulatory governance literature.

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The autonomy or independence of regulatory authorities is a multi-dimensional concept (Verhoest et al. 2004). While accounts differ regarding the number of dimensions to be distinguished, we may identify four sub-dimensions that seem to appear in most conceptualizations.<sup>1</sup> First, the formal or legal status of the regulatory authority crucially determines whether the regulator is a separated legal entity or formally remains part of a ministry. Second, the relationship between the regulatory authority and the government and the parliament prescribes the extent to which political actors may *ex ante* influence the regulator (for example, through the appointment process, the determination of the organizational structure, or the issuing of guidelines and instructions) or *ex post* overrule decisions and hold the regulator to account. Here, a longer term of office, particularly one that does not coincide with the electoral cycle, and the absence of dismissals for political reasons are usually operationalized as indicating a higher political independence. A third dimension that is often distinguished is the organizational and financial autonomy of regulatory authorities. For example, the more staff and financial resources a regulator has at its disposal the more the regulator may be assumed to be able to fulfil its mandate without being dependent on external sources and advice. Furthermore, stability in the organization's source of income and internal autonomy in its financial and personnel management are usually seen as increasing the regulator's organizational autonomy. Finally, regulatory autonomy, or functional independence, can be thought of as a dimension of regulators' autonomy that captures the level of independence in applying granted competencies. The regulator, for example, may have been formally granted a broad set of competencies that can be applied autonomously, or the regulator may have been mandated to apply only a very limited set of regulatory functions that must be exercised in close consultation with the competent ministry. Without significant regulatory competencies and decision-making independence, an otherwise highly independent regulator may only take a marginal role in the actual regulation and governance of a particular sector.

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<sup>1</sup> We focus in the following on the conceptual discussion and measurement of the formal political independence of regulators which can be contrasted with the *de facto* independence and the independence from the regulated industries (Gilardi and Maggetti 2011). This section does not attempt to provide a comprehensive conceptual discussion of the autonomy or independence, terms that are used here synonymously, of regulatory authorities but rather a brief schedule of some key concepts and measures used in the existing literature.

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The measurement of IRAs' formal independence has been crucially advanced by Gilardi (2002, 2005a, 2008), who applied and adjusted a measure of central bank independence (Cukierman, Webb, and Neyapti 1992) to regulatory authorities more broadly. Composed of five dimensions (status of agency head, status of the members of the management board, relationship with government and parliament, financial and organizational autonomy, and regulatory competencies), his continuous scale of formal independence became a model for the collection of further indexes that are either based on the manual coding of statutory provisions (Elgie and McMenamin 2005; Wonka and Rittberger 2010; Koop and Hanretty 2018; Mediano 2018) or the use of surveys sent to regulatory authorities (Johannsen 2003; Hanretty and Koop 2012; Guidi 2014, 2016). While existing indexes of formal independence usually include a dimension related to the competencies of regulatory authorities, they either focus only on a very limited number of regulatory functions performed by regulators or cover only single economic sectors. In Gilardi's original study, for example, it is only assessed whether existing competencies are the sole responsibility of the regulator or exercised in consultation with other actors without specifying the range of competencies maintained. Johannsen (2003) specifies the range of regulatory competencies (e.g., approval of tariffs, network access, licenses, and dispute settlement) and the extent to which granted competencies are exercised exclusively by the regulatory authority or shared with other actors, but only for energy regulators in eight European countries. Similarly, Eckert's (2010) formal independence index includes several items on regulatory competencies granted to postal regulators in France, Germany, and the United Kingdom.

This methodological gap has been reduced by the Organisation for Economic Co-operation and Development (OECD) (Koske et al. 2016). Based on a 2013 survey, the OECD measures the 'scope of action' of regulators supervising utility networks. The international organization investigates the autonomy and range of activities that utility regulators perform. As Table A1 in the Appendix shows, the scope of action index captures the set of competencies granted to regulators and the extent of decision-making independence in deploying granted competencies. The OECD data set allows us to combine the extent of formal decision-making independence with the breadth of regulatory functions and competencies. Specifically, the index qualifies whether a regulator can set codes of conduct, service standards, and tariff

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levels and structures; ensure the enforcement of compliance through sanctions and penalties; and mediate and adjudicate disputes between market operators. For each of these regulatory functions, the index also assesses whether a regulator acts independently or with other governmental agencies or bodies. Thus, the measure captures a dimension of formal independence that resembles the concept of regulatory autonomy (Andres et al. 2007, 10) or functional independence (Lavrijssen and Ottow 2012, 428).

In view of existing measures, it is important to note that the OECD's index includes institutionally separated IRAs as well as regulators that formally remain integrated into their line ministry.<sup>2</sup> Furthermore, the OECD's index is sectoral, so that the same regulatory authority – such as Germany's Federal Network Agency, which has responsibility for all four sectors – can have different levels of competencies and decision-making independence across sectors. Based on a political economy framework, the next section turns to the discussion of the main hypotheses for explaining variation in the level of regulatory autonomy granted to sector regulators.

### 3 Explaining variations in regulatory autonomy: International credibility and the political-economic institutional environment

Following the theoretical framework laid down by Guidi, Guardiancich and Levi-Faur (2018), we focus on the effect of a set of institutional and economic environment variables on the level of regulatory autonomy granted to European network regulators. More specifically, we investigate the extent to which international functional pressures to signal credible commitment are mediated by a set of domestic political-economic and legal institutional environment variables (veto players, varieties of capitalism, legal origin).

According to the credible commitment hypothesis, governments establish IRAs to ensure consistency in the governance of the economy over time and to avoid regulatory policies being

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<sup>2</sup> In the sample of 102 European regulators included in this study there are, however, only five regulators that are designated as ministerial regulators or non-independent agencies by the OECD. While, at the time of writing, all European countries have established IRAs for the four sectors this was not the case in 2013 when the OECD's survey was conducted.

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captured by partisan politics or subordinated to the goals of re-election seeking politicians. Originally, the argument was developed in the study of central banks (Kydlund and Prescott 1977; Barro and Gordon 1983; Rogoff 1985) and, later on, applied to regulatory agencies more broadly (Majone 1996). In utilities, regulation may be used by politicians for short-term electoral gains, for example, by lowering prices or tariffs, broadening access, or even pursuing the re-nationalization of industries. Thus, private actors may hesitate to enter those markets and to invest in long-term infrastructure projects (Stern and Trillas 2003; Levine, Stern, and Trillas 2005). The delegation of competencies to regulatory agencies reduces potential political influence and provides market actors with rules rather than discretion, thereby solving the credible commitment problem. The need to signal credible commitment to market actors can be expected to be higher the more the economy is opened to international trade and investment. Inversely, the higher a country's barriers to international trade and investment, the less the need to provide a stable regulatory framework to attract private investment and market entry.

*Hypothesis 1: The more a country facilitates international trade and investment, the higher the need to signal credible commitment and, thus, the higher the level of regulatory autonomy of sector regulators.*

The work of Tsebelis (1995, 1999, 2000, 2002) has been crucial in developing the concept of veto players. Veto players are individual or collective actors whose agreement is required for a change in the *status quo* of policies. A similar concept has been brought forward by Henisz (2000a), who finds in successive studies that the higher level of stability in policies resulting from many veto players is conducive to private investment in infrastructure and investment decisions by multinationals (Henisz 2000b, 2002). On the basis of a negative relationship between the number of veto players and formal independence, Gilardi (2002, 2005a, 2008) concludes that veto players may serve as a sort of 'functional equivalent' to delegation. By inducing policy stability, a higher number of veto players may reduce the need to signal credible commitment to attract investment in previously privatized industries. We expect a negative relationship between the number of veto players and the level of regulatory autonomy granted to European network regulators. In addition to the functional reasoning as elaborated by Gilardi, a higher number of veto players may also hamper institutional reform towards more

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regulatory autonomy for political reasons. The higher the number of actors whose agreement is needed for implementing controversial institutional reform towards higher levels of regulatory autonomy, the more difficult it can be to find agreement.

*Hypothesis 2: The higher the number of veto players within a country, the lower the level of regulatory autonomy granted to sector regulators.*

Furthermore, different varieties of capitalism (Hall and Soskice 2001) can be expected to develop complementary sets of institutions in the regulatory domain (Thatcher 2007). Based on a rather dynamic reading of the Varieties of Capitalism (VoC) approach, it can be expected that different types of capitalism respond differently to reforms towards new modes of economic governance and that institutional innovations are adjusted to and affected by the existing political-economic institutional environment (Eckert 2010). A number of studies have started to assess more systematically the extent to which the type of capitalism affects regulators' formal independence (Guidi 2014, 2016; Guardiancich and Guidi 2016). We expect the degree of coordination in an economy to impact also on the level of regulatory autonomy granted to European sector regulators. In particular, coordinated market economies (CMEs) can be expected to be less in need of regulators equipped with high levels of regulatory autonomy. In CMEs, dense settings of networks between stakeholders, corporatist structures, and close coordination between employer and employee associations already provide solutions for 'regulatory problems' such as the setting of standards, the provision of universal services at affordable prices, or the inclusion of regional development and service provision objectives. On the contrary, the lack of any 'coordinative capacity' in liberal market economies (LMEs) increases the need for independent regulators with high levels of autonomy in applying granted competencies that can coordinate between market actors, safeguard public interest objectives, and enforce competition.

*Hypothesis 3: The more coordinated an economy, the lower the level of regulatory autonomy granted to network sector regulators.*

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Finally, we investigate possible relationships between the tradition of a country's legal system and the level of regulatory autonomy granted to network regulators. The type of legal system has been set into relation with the laws governing the protection of shareholders and creditors (La Porta et al. 1998, 2002) and government regulation of entry by new firms, judicial procedures in courts, and labor markets (Djankov et al. 2002, 2003; Botero et al. 2004). Common law institutions are generally more autonomous and insulated from state power, fitting a market-centered political economy (Reitz 2009). In contrast, constitutional provisions of substantially state-centered modes of economic governance may, for example, condition the privatization and regulation process (Graham and Prosser 2003; Caranta, Andenas, and Fairgrieve 2004). Some constitutions stipulate the *public* provision of basic services and, thus, put constraints on their privatization, which may reduce the need for high levels in regulatory autonomy. But here it is important to note that autonomous or semi-autonomous regulators are an alternative to traditional concentration of regulatory power within central ministries, typical of civil law systems (Reitz 2009). Being associated with reforms towards so-called new public management and the decentralization of public administration (James and Manning 1996), it can be expected that common law countries grant more regulatory autonomy to sector regulators than civil law countries. In this sense, common law countries might not refrain from regulating those sectors but more heavily than other countries ensure the insulation of sector regulators from the political sphere by granting high levels of autonomy in regulation.

*Hypothesis 4: Network regulators in common law countries are associated with higher levels of regulatory autonomy.*

## 4 Data and operationalization

The dependent variable, regulatory autonomy, is operationalized by an index on the *scope of action* of sector regulators of the OECD's data set on regulatory management practices (Koske et al. 2016). The index is based on a recent survey of national regulatory authorities displaying data for the year 2013. The index varies between 0 and 6, with lower values indicating higher scope of action. As Table A1 in the Appendix shows, the OECD's scope of action index captures the extent of independence of regulators in deploying their granted competencies.

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The index includes rather ‘hard’ competencies such as licenses, the setting and managing of prices and price controls, or the issuing of sanctions and penalties, as well as rather ‘soft’ competencies such as the collection of information, research, mediation between market actors, the issuing of industry and consumer standards or guidelines, and codes of conduct. It also captures the extent to which those functions are the sole responsibility of the regulator, i.e. exercised independently, or whether they are shared with other regulators or governmental bodies. The overall indicator on regulators’ scope of action is the simple average of 13 response items with each item being weighted equally. For the empirical analysis the coding has been reversed so that higher values indicate more regulatory autonomy. As the index is based on a survey of national officials, respondents may have incentives to report rather ‘positive’ answers. However, as we are mainly interested in cross-country variation these incentives can be assumed to be similar across countries. The sample size consists of 102 sector regulators. From the 28 EU member countries, Luxembourg and Malta are dropped due to missing data availability of our veto players measure. Furthermore, there are no data on regulatory autonomy for the rail sectors of Cyprus and Ireland.<sup>3</sup>

The credible commitment hypothesis is operationalized by an index on *barriers to trade and investment* with values for the year 2013, which is taken from the OECD’s product market regulation (PMR) indicator series (Koske et al. 2015). The barriers to trade and investment measure is a sub-level indicator of the OECD’s economy-wide PMR indicator. It is based on a survey sent to government officials asking for the formal *de-jure* situation and practices in countries. Overall, the index ranges between 0 and 6, with higher values indicating more barriers to trade and investment in place. In comparison to measures that operationalize the credible commitment hypothesis by focusing on actual trade and investment flows or the economic openness of countries (e.g., Gilardi 2002), the OECD’s index on barriers to trade and investment better captures the extent to which countries try to attract current and future trade and investment by providing a conducive regulatory environment and reducing barriers.

The number of veto players is measured by the *e\_h\_polcon5* index on political constraints from

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<sup>3</sup> The complete data set and replication code for the empirical analysis can be accessed at: <https://doi.org/10.15129/74af0e08-ea84-467c-89cf-73f12ae44221>.

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the Varieties of Democracy (V-Dem) project's data version 7 (Coppedge et al. 2017). The operationalization is based on Henisz (2000a). The index theoretically ranges between 0 and 1, with higher values indicating more political constraints on policy change. We use data for 2012 to account for a one-year time lag on the dependent variable. In order to proxy the degree of economic coordination we rely on employer density from the Data Base on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS) (Visser 2016). The same variable has been used by Guidi (2014) in a similar study. The variable captures the organization density of employers as a proportion of employees in employment and, thus, a crucial dimension of countries' coordination capacity. The variable theoretically can take on values between 6 and 100, with higher values indicating a higher employer density. We calculated ten years averages for the 2003–2013 period preceding the measurement of the dependent variable. Other commonly used measures to capture the degree of coordination of different types of capitalism are indexes on the coordination of labor relations and in the sphere of corporate governance, or the averages thereof, devised by Hall and Gingerich (2004, 2009). These measures have been used, for instance, by Maggetti (2007), Hanretty and Koop (2013), and Guardiancich and Guidi (2016).<sup>4</sup> The advantage of the data on employer density from the ICTWSS data set is that they are available for all EU member countries. The origin of a country's legal system is measured by a dummy variable coded 1 for countries characterized by an *English common law* tradition and 0 otherwise. The classification of countries is based on La Porta et al. (1999). This is a commonly used operationalization in the literature that assesses possible effects of legal systems (e.g., Patrikios and De Francesco 2018). The dependent variable, regulatory autonomy, and two of the independent variables, barriers to trade and investment and the degree of employer density, have been normalized to range between 0 and 1 to facilitate the interpretation of the regression coefficients.<sup>5</sup>

As control variables we include the World Governance Indicators (WGI) rule of law measure with values for the year 2012 and the length of a country's EU membership, as the level of regulatory autonomy may be a function of the general quality of the legal environment or the

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<sup>4</sup> The latter use updated data for some dimensions and construct new coordination indexes by running confirmatory factor analysis following the methodology of Hall and Gingerich.

<sup>5</sup> The variables have been normalized using the min-max method.

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timing and length of a country's EU membership. Furthermore, we include a number of economic and political system control variables in the empirical analysis. In order to control for the economic resources and size of countries, we include GDP per capita at constant 2010 US dollars and the total population with data taken from the World Bank's World Development Indicators for the year 2013. Both variables are log transformed to account for decreasing marginal effects. In principle, the higher the GDP per capita of a country the more resources are available to afford the maintenance of a highly specialized bureaucracy. Furthermore, small states, due to their smaller economies, may be less in need of specialized regulators to supervise complex sectors and, if so, are likely to equip them with less regulatory autonomy. As controls for the political system we include the variables *system* and *houseys* from the Database of Political Institutions (Beck et al. 2001; Cruz, Keefer, and Scartascini 2016) with values for the year 2012 as measures of parliamentarism and the electoral system respectively. The former is recoded into a dummy variable taking the value of 1 for parliamentary systems and 0 otherwise. The latter is a dummy variable that captures the electoral rule for the majority of house seats, coded 1 for plurality and 0 for proportional seat allocation. Those measures serve as proxies for the consensual nature of politics. The descriptive statistics of the variables are summarized in Table 1 below.

PLEASE INSERT TABLE 1 HERE

## 5 Empirical findings

The hypotheses are tested using an ordinary least squares (OLS) linear regression model with robust standard errors clustered by countries. Table 2 reports the main regression results with seven model specifications. We report the statistical results for each of the four main independent variables tested separately (models 1 to 4), which are tested together in Model 5, explaining around 27 per cent of variation in the sample. Previous research has observed national and sectoral patterns in the diffusion of regulatory agencies (Jordana and Levi-Faur 2005; Jordana, Levi-Faur, and Fernández i Marin 2011). As it might be possible that regulators of the same sector are also designed similarly in terms of regulatory autonomy across countries, we added sector-fixed effects in models 6 and 7. Finally, Model 7 includes further controls for the rule of law and length of EU membership, economic resources (GDP per

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capita) and size of countries (population) as well as other characteristics of the political system that might impact upon the level of regulatory autonomy granted, such as parliamentarism and the electoral system.<sup>6</sup> The studentized and unstudentized versions of the Breusch-Pagan test indicate some patterns of heteroskedasticity in models 6 and 7 and there is reason to suspect country-level patterns (Yesilkagit and Christensen 2010) in the level of regulatory autonomy across sectors. Therefore, we have used robust standard errors clustered by countries throughout the different model specifications.<sup>7</sup>

PLEASE INSERT TABLE 2 HERE

The three sector dummy variables included in models 6 and 7 have to be interpreted in terms of the rail sector as reference category. We find support for all four independent variables in the hypothesized directions. The measure of barriers to trade and investment is significant at the 0.05 level when regressed individually and at the 0.01 level in the sector-fixed effects and control models. The higher a country's barriers to trade and investment, the lower the level of regulatory autonomy granted to sector regulators tends to be. Put differently, countries with lower barriers to international trade and investment are characterized by more autonomous regulators in applying granted competencies. This pattern sheds support on the credible commitment hypothesis, as countries that tend to open up their markets for international investors and trade also seem to provide more of a regulatory framework in accordance with international norms and expectations by equipping regulators with higher levels of regulatory autonomy. In comparison to measures that focus on actual trade and investment flows, the advantage of this measure is that it captures the variation in European governments' willingness to attract current and future investments.

The English legal origin and veto players measures are constantly significant at the 0.01 level and at the 0.05 level (veto players) in the model that includes the control variables. Countries characterized by an English common law tradition tend to equip utility regulators with higher

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<sup>6</sup> In the online Appendix we further control for administrative traditions (Painter and Peters 2010; Kuhlmann and Wollmann 2014). While Anglo-American administrative tradition is statistically significant when regressed individually it is not significant in the model including the control variables.

<sup>7</sup> The Bonferonni outlier test only identifies a critical outlier in Model 5 with the Slovenian rail sector. The dropping of this observation does, however, not substantially affect the regression results.

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levels of regulatory autonomy.<sup>8</sup> As can be seen in Model 2, the level of regulatory autonomy is, on average, 0.252 units higher among regulators in countries characterized by an English legal tradition than in other countries. Conversely, the more veto players are present in a political system the lower the level of regulatory autonomy granted. The veto players variable is somehow the strongest effect we detect. In Model 6, a hypothetical move from a country without any veto player to a country with full political constraints on policy change is associated with a 0.663-unit decrease (on a zero to one scale) in regulatory autonomy. Thus, our findings confirm Gilardi's (2002, 2005a, 2008) notion of veto players' role as a functional equivalent to delegation, although some recent research indicates that this relationship may be reversed in economically less developed countries (Mediano 2018). At least for European countries, the number of veto players seems to reduce the need not only for formal independence but also for the sub-dimension of regulatory autonomy.

The degree of economic coordination is statistically significant at the 0.1 level when regressed individually and at the 0.01 when removing the sector-fixed effects (Model 6). The more coordinated an economy the lower the level of regulatory autonomy granted to network regulators. The results confirm the findings of a previous study (Guardiancich and Guidi 2016) that reports lower levels of formal independence in CMEs than in LMEs for the dimension of regulatory autonomy. Compared to the findings by Guardiancich and Guidi (2016) we find, however, a *linear* negative instead of a U-form shaped relationship. Eventually, there are different mechanisms and dynamics at work when looking at different dimensions of agency endowments and institutional design. As the four key independent variables are statistically significant when regressed individually and when pooled together with the sector dummy variables in the sector-fixed effects and control models, we feel confident in interpreting the results as relatively robust.<sup>9</sup> The cross-sectional sector-fixed effects model

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<sup>8</sup> It has to be mentioned, however, that the sample of 26 European countries only includes three English legal origin countries adding up to ten observations (four sectors by country minus the rail sector of Cyprus and Ireland). The three English legal origin countries are: Cyprus, Ireland, and the United Kingdom.

<sup>9</sup> In the online Appendix we report further robustness checks for legal origin and VoC. For legal origin, we find that other legal traditions do not show any statistically significant relationship with regulatory autonomy. For VoC, the results are confirmed also when using Hall and Gingerich's (2009) coordination indexes (though resulting in a smaller sample size). We also test for dummy variables for LMEs, CMEs, mixed market economies (MMEs) (Molina and Rhodes 2007), and dependent market economies (DMEs) (Nölke and Vliegenthart 2009), of which only the LME dummy is significant in the expected direction.

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(Model 6) indicates that, when removing the sector-fixed effects, the explanatory power of most variables, especially economic coordination, is enhanced. The reduced standard errors and increased R square in Model 6 as compared to the same model without sector-fixed effects (Model 5) suggests an improved model fit. The level of regulatory autonomy is, on average, highest in telecommunications and lowest in the rail sector with the two energy sectors taking an intermediate position (see Table A2 in the Appendix). At this point we can only speculate about the underlying sector-specific factors, but a dynamic and competitively organized sector such as telecommunications may, for example, require higher levels of regulatory autonomy than the energy and rail transportation sectors.

Other indexes of the formal independence of regulatory authorities have been criticized for conflating two dimensions that should be separated for analytical purposes: the formal political independence and the set of competencies granted (Hanretty and Koop 2012). Similarly, the OECD's scope of action index on which we rely for measuring regulatory autonomy can be criticized for conflating the set of regulatory competencies granted and the decision-making independence with which granted competencies can be applied by regulators. In order to disentangle those two dimensions, and to investigate on which dimension the independent variables are mainly related to, we created two separated indexes using the core data of the OECD's scope of action index. The first index only captures the set of competencies granted to sector regulators. The second captures the level of decision-making independence among granted competencies. Both range between 0 and 1, with higher values indicating a higher number of competencies and higher levels of decision-making independence respectively.<sup>10</sup>

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<sup>10</sup> The re-coding of the OECD's scope of action index was as follows. Set of regulatory competencies index: All competencies that are exercised solely by the regulator or by the regulator together with other agencies or governmental bodies and the courts are coded 1. All competencies not exercised by the regulator are coded 0. Decision-making independence index: The competencies not exercised are coded as not available. The competencies that are exercised independently by the regulator or by the regulator together with courts or under the sole responsibility of the courts are coded 1. The competencies exercised by the regulator together with other agencies or governmental bodies are coded 0. The aggregate scores of the two indexes are the simple averages of the items. The Pearson correlation between the two new indexes is 0.066 and, thus, pretty low, indicating that the two variables measure different dimensions of the endowments of regulatory authorities and that regulators with high levels of competencies are not necessarily granted high levels of decision-making independence and vice versa.

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In the full models, we find that only English legal origin and the veto players measure are related to both dimensions (see Table A3 in the Appendix). English legal origin countries not only equip regulators with higher levels of decision-making independence but also grant more regulatory powers to regulators than other countries. Conversely, the higher the number of veto players the lower the set of regulatory competencies granted to regulators and the lower the decision-making independence in applying granted competencies. Generally, it can be assumed that those competencies not granted to sector regulators are maintained by the competent ministries. However, in some cases it might be also the case that the respective regulatory task is not exercised at all or maintained through other mechanisms and actors such as industry self-regulation. For barriers to trade and investment and the degree of economic coordination, the results indicate that the statistical significance is mainly rooted in the set of regulatory competencies granted to regulators. The higher barriers to trade and investment and the degree of economic coordination of a country, the lower the number of competencies maintained by sector regulators.

## 6 Discussion of Results

In this article we focused on explaining the level of regulatory autonomy granted to EU network regulators. Following the privatization and market openings in European network sectors that have been fostered particularly from the 1980s and 1990s onwards, countries increasingly delegate regulatory functions to IRAs that are equipped with relatively high levels of regulatory autonomy. Although in few cases the regulator remains within a ministry, usually some form of autonomy is ensured. The level of regulatory autonomy granted to utility regulators is, however, not the same across countries and sectors. Regulators maintain different sets of competencies and functions and can exercise them with different degrees of autonomy.

The observed variation in the level of regulatory autonomy is explained by sector-specific requirements and the broader political-economic institutional environment. The delegation of regulatory functions to IRAs may, for example, conflict with constitutional notions of the separation of powers and the accountability of the executive (Caranta, Andenas, and Fairgrieve 2004). For the case of Germany, the reluctance to move towards the independent agency model has been viewed in the context of its constitutional principle of democracy (Van

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Aaken 2004). Although initially having been rather a laggard in the establishment of IRAs in the public utility sectors (Eberlein 2001; Döhler 2002), Germany has surprised many observers with the establishment of a relatively independent Federal Network Agency (Bundesnetzagentur – BNetzA) (Ruffing 2014). When looking at the set of competencies and decision-making independence granted to the BNetzA we find, however, that the level of regulatory autonomy in electricity and gas is rather low, at least when compared to corresponding sector regulators in countries such as the United Kingdom (UK). Indeed, the OECD's index shows us that the BNetzA, except for telecommunications, only has a few competencies but that those regulatory competencies that are maintained by the BNetzA are exercised with high levels of independence in decision-making. In this sense, the BNetzA is highly independent, but only regarding a very limited range of competencies maintained by the regulator. In contrast, the sector regulators in less coordinated market economies such as the UK and Ireland are granted above-average levels of regulatory autonomy across the four sectors.<sup>11</sup> The UK's Office of Gas and Electricity Markets (Ofgem) and Office of Communications (Ofcom) are granted the full set of competencies and independence in decision-making. While CMEs have moved towards the independent agency form of governance, sector regulators are characterized by lower levels of regulatory autonomy in supervising and controlling markets than their counterparts in LMEs. Besides political opposition, in industry- and state-led modes of coordination, there may be less of a functional need for independent regulators to set prices and standards, monitor markets and safeguard public interest objectives.

## 7 Conclusion

This article is a first attempt to study in more detail the set of competencies and decision-making independence granted to regulatory authorities responsible for the supervision of European network industries. While the establishment of IRAs and their formal political independence have received relatively broad attention (Gilardi 2002, 2005a, 2008; Elgie and McMennamin 2005; Wonka and Rittberger 2010; Hanretty and Koop 2012; Guidi 2014, 2016; Guardiancich and Guidi 2016; Mediano 2018), we know surprisingly little about the set of

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<sup>11</sup> Although data on Ireland's rail regulator are missing.

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competencies exercised by network regulators and the degree of decision-making independence with which granted competencies are applied in practice. More recently, the literature has mainly focused on the relationship between formal independence and accountability or aspects of agencies' *de facto* independence during the post-delegation phase (Maggetti 2007, 2012; Hanretty and Koop 2013). The set of regulatory functions and the allocation of autonomy to IRAs' competencies have, however, received far less attention. To fully understand the extent and nature of delegation and the factors contributing to sectoral governance it is, however, necessary to comprehend the regulatory functions maintained by regulators and other actors within the regulatory space.

This article has relied on the political-economic factors explaining variation in the level of regulatory autonomy granted to European network sector regulators by making use of the OECD's data on regulatory management practices in the networked industries. Instead of a simple diffusion of the British model of utility regulation (cf. Burton 1997; Stern 2014), we find that reforms in the governance of European network sectors rather led to the adoption of different 'varieties of utility regulation', where new modes of governance are aligned to and embedded within sector-specific requirements, historical trajectories, and existing institutional complementarities. Future research might continue investigating the set of competencies and decision-making independence maintained by regulators across countries and sectors, and the effects of variation therein on regulatory outcomes and sector performance. Furthermore, going beyond the scope of the present article, particularly intriguing is a study of the use of regulatory competencies in practice: How frequently do regulators actually employ granted competencies, and what organizational and institutional factors determine the variation in the *de facto* autonomy?

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## Appendix

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