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Independent Agencies, Political Interference and Firm Investment. Evidence from the European Union

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Independent Agencies, Political Interference and Firm Investment Evidence from the European Union[*]

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Abstract

Investment in network infrastructure is crucial for economic growth. This paper studies the impact of the presence of Independent Regulatory Agencies (IRAs) on the investment of European regulated firms. We account for measurement error in *formal* independence of IRAs by exploiting cross-country heterogeneity in the quality of political institutions. Results show that regulatory independence increases firms' investment rate by around 1.2-3.3%. The positive effect survives when we control for social capital accumulation, investor protection and market liberalization. However, the effect of IRAs is not immune to politics, as we find that political interference in regulatory functions persists in EU and is detrimental to firm investment.

JEL Classification: D78, L50, D92, H1

Keywords: Regulatory Institutions; Firm Investment; Agency Independence; Political Influence; Private and State ownership

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1. Introduction

Since the early nineties, European Union's network industries - energy, telecommunications, railways, airports, ports and water supply - have gone through substantial structural reforms such as market liberalization, privatization of state-owned utilities and inception of Independent Regulatory Agencies (IRAs) that replaced executive-branch commissions in the regulation of public utility services' provision. When evaluating the effect of these reforms, infrastructure investment is perhaps the most important economic dimension because of its impact on social welfare and dynamic efficiency. On the one hand, public utilities typically deliver essential services through a network that constantly requires maintenance and upgrade. On the other hand, infrastructure investment is acknowledged as a driving force of economic growth. Guthrie (2006), for example, estimates that network industries contribute, on average, 5% of the GDP of OECD countries, and 15% of gross fixed capital formation in the non-agricultural business sector. The European Commission has recently recognized the need for large scale investments in new infrastructure: conservative estimates show that, by 2020, €180-268 billions are needed to deploy the new broadband infrastructure and €0.5 trillions for upgrading the electricity grids in the member states.[1]

The European Commission mandated national governments to set up IRAs not only to regulate the activity of network industries but also to insulate regulators from political interference, especially in the presence of (even partially) state-owned utilities (OECD, 2012)[2]. In principle, the underlying idea is that when regulatory tasks are carried out by ministries or executive-branch commissions, and not by independent agencies, the government can easily influence them to ex-post modify their decisions[3], thus constraining their ability to commit to their regulatory policy.[4] The incursion of politicians in regulatory decisions may thus exacerbate the well-known time-inconsistency problem that typically undermines investment incentives of regulated firms,

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[1] See the European Commission - DG Infosoc (2012) and the European Commission – DG Energy (2010).

[2] The latest OECD recommendation on the status of regulatory policy and governance within OECD countries states: "Creating a regulatory agency independent from the government and from those it regulates can provide greater confidence that decisions are fair and impartial. This may be warranted when the decisions of the regulatory agency have significant financial and market consequences and are required to be arm's length from the political process to reduce the regulatory risk of investments." (OECD, 2012, page 28).

[3] In this paper, we focus on independence of regulators from politicians and not on interest group competition and lobbying (see Peltzman, 1976; for a direct measure of firm level influence on regulators, see Macher and Mayo, 2012), which is beyond the scope of the paper.

[4] That politicians may be "bad regulators" is eloquently described by Stigler (1971, p. 3): "the political process defies rational explanation: 'politics' is an imponderable, a constantly and unpredictably shifting mixture of forces of the most diverse nature, comprehending acts of great moral virtue (the emancipation of slaves) and of the most vulgar venality (the congressman feathering his own nest)".

especially when investments are irreversible.[5]   The purpose of this paper is to analyze and empirically investigate whether the presence of IRAs exerts a positive influence on regulated firms' investment decisions and whether regulatory decisions are still affected by political interference by the government.

In a setting where government intervention looms, the design of new, and yet credible regulatory authorities has to rely on institutional arrangements that restrain the government from opportunistically influencing firms' investment decisions. A regulatory agency can be provided with *formal (de jure)* authority, i.e. with the right to decide on specified matters. However, *formal* authority not necessarily confers *real (de facto)* authority, that is effective regulator's control over his own decisions. As pointed out by the new institutional economics literature (North, 1990; Aoki, 2001), formal and informal institutions are equally important, and the enforcement of the (regulatory) institution is as relevant as its inception. Thus, the degree of their independence will depend on how much power governments are willing to delegate and on how counterbalanced are the institutional powers that enforce and surround the regulatory agency itself. An increase in *real* authority through delegation of powers may enhance the regulator's effectiveness, e.g. to acquire the relevant information on the regulated activity, but in the trade-off there is usually a loss of control by politicians (Aghion and Tirole, 1997). This trade-off affects the politicians' decision about the extent of truly delegated powers and, in turn, the independence of regulatory intervention (Alesina and Tabellini, 2008). Therefore, despite EU-driven reforms, and notwithstanding the presence of formally independent authorities, politicians may still try to pursue their partisan goals by interfering with regulators and regulated firms' decisions in order to be re-elected or simply because they want to achieve their favorite policy outcome.[6]

From the econometric point of view, since laws are no more than ink on the paper (Basu, 2011), the mere presence of the IRA is obviously an imperfect measure of *de facto* regulatory independence,[7] and furthermore likely affected by reverse causality. In our empirical analysis, we thus account for the potential endogeneity of the IRA by applying appropriate instrumental variable

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[5] In regulation theory, time inconsistency due to regulatory opportunism is critical for firm investment (Besanko and Spulber, 1992, and Armstrong and Sappington, 2007). More generally, the problem of time-inconsistency in relation with the issue of independence of regulatory authorities was introduced with reference to central banks (see among the others, Cukierman, 1992) and is still viewed as critical within bank capital regulation in relation to costly bank failures following the recent financial crisis (Bulow and Klemperer, 2013).

[6] Alesina and Tabellini (2008) view the regulation of public utilities as an example of bureaucratic delegation that implies *imperfect* delegation of power because it generates, for politicians, a cost in terms of loss of political control over the industry.

[7] The recent political science literature on the assessment of regulatory independence has found that measures of de jure independence are generally uncorrelated with the actual, de facto, independence (see for example Gilardi, 2005; and Hanretty and Koop, 2012).

methods, relying on time-varying instruments that exploit the cross-country variation in the quality of political institutions. At the root of this strategy is the idea that political institutions and the legal environment shape the political process leading to economic policies, in our case the inception of an independent regulatory agency, while the quality of these institutions affects the credibility and independence of the IRA by constraining the interference of the executive (North and Weingast, 1989; Levy and Spiller, 1994). However, recent literature suggests that political institutions may also display a direct effect on economic performance (Stasavage, 2002, Keefer and Stasavage, 2003), in our case regulated firms' investment. Therefore, one challenge to our identification strategy is to establish whether political institutions exercise their influence on firm investment exclusively by making the set-up of the IRA more likely and its policy more independent.

In the EU, the European Commission set the general framework and the guidelines of market reforms, but national governments set the pace of their implementation. Hence, to date, regulation and privatization policies still differ considerably across member states and industries. For this reason, in the empirical analysis, we test whether the effect of the IRA's presence on firm investment varies with political partisanship and government's ownership.[8] Our empirical model, therefore, accounts for: (i) government's ownership stake, as it changes within firms over time, (ii) political orientation of the national government, as it changes through the years, and (iii) their interaction with the presence of the IRA.

We use a panel dataset of EU-15 publicly traded firms operating in energy, telecommunications, water supply and transport infrastructures, tracked from 1994 to 2004, a period that allows us to examine their investment behavior before and after the set-up of IRAs, typically at the end of the nineties.[9] We complement firm-level variables with country and sector specific variables on the regulatory framework and the political, institutional and social environment. We control for the effect of potentially conditioning variables, such as the impact of market liberalization (Alesina *et al.*, 2005) at the industry level, and the degree of investor protection (La Porta *et al.*, 1997) and social capital accumulation (Knack and Keefer, 1997; Aghion et al., 2012) at the country level. Our empirical strategy starts with the estimation of simple investment models in the spirit of difference-in-difference methods, it then tests the possibility of anticipatory effects with

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[8] See Friedman (1962) and Alesina and Rosenthal (1995) for the influence of partisan politics and ideology on economic policies. While rightwing parties are generally viewed as more in favor of deregulation and less inclined to support consumers' interests, leftwing parties are rarely associated with market-oriented policies.
[9] The sample covers more than 85% of publicly traded European utilities in that period and comprises 10 of the top 30 companies in terms of market capitalization within the European Industrial Sector (Mediobanca Investment Bank, yearly reports). Note that in Europe, utilities and telecommunications companies play a much more prominent role within financial markets *vis à vis* the U.S. where only two firms (AT&T and Verizon) rank among the top thirty.

a "placebo" exercise and finally turns to instrumental variable estimations of an Euler equation investment model, using the GMM-System estimator.

Our results show that the presence of the IRA has a positive influence on the investment of regulated firms, which persists after we account for political partisanship, for state ownership and for their interplay with the IRA. The positive effect of the IRA survives when we control for market liberalization, investor protection and social capital accumulation. In a separate exercise, we also estimate the impact of the IRA on firm investments in individual sectors and we find that the effect is larger in the telecommunications industry and smaller in the water supply industry.

Political institutions - such as the rule of law, parliamentary fragmentation, government stability and the system of checks and balances among government branches– feature as important determinants of the establishment of the IRA, but not of firm investment, so our results suggest their influence on EU regulated firms' investment is only *indirect*, i.e. through the channel of the IRA.

However, we also find that, notwithstanding the IRAs, political partisanship is still influential and that its interference is detrimental to firm investment. Our results suggest that the tension arising between politicians and regulators is likely to boost instability and uncertainty in the regulatory framework, ultimately reducing firms' incentives to invest (Alesina, Ozler, Roubini and Swagel, 1996).

This paper contributes to the extant literature along three directions. First, it contributes to the positive analysis of the implementation of the regulatory reforms in Europe by providing evidence about the effect of recently set up IRAs on European regulated firms' investment. To our knowledge, this is the first paper that studies the implications for firm investment of regulatory reforms introduced less than two decades ago in Europe. Second, it explores the interaction between independent authorities and governments, thus contributing to the literature on the microeconomic implications of political partisanship on firm performance. To address the potential endogeneity of the policy reforms, we draw on the applied political economy literature, using a set of variables that account for time-varying characteristics of political institutions to identify the direction of the relationship between independent regulation and firm investment (Bertrand and Kramarz, 2002; Keefer and Stasavage, 2003; Griffith, Harrison, and Macartney, 2007; Tabellini, 2010, Potrafke, 2010). Third, our results show that independent regulators in Europe are not immune to political interference and this is detrimental to firm incentives to invest in infrastructure.

The rest of the paper is organized as follows. In Section 2, we briefly describe the EU institutional context and review the literature background. In Section 3, we present the endogeneity problems and our identification strategy. In Section 4, we present the econometric model of

investment and the estimation methods. In Section 5, we describe the dataset and define the variables and the instruments. In Section 6, we present the results, while Section 7 concludes.

2. Institutional Background: theory and practice in the EU

The European context is interesting but complex to analyze, due to the cross-country institutional differences that persist despite economic and monetary integration. Until the early nineties, public utilities in Europe were characterized by vertical integration, state monopoly and public ownership, with the UK being the only exception. From those years onwards, the European Commission issued various directives to prompt national reforms that redesigned the legal and regulatory frameworks in order to raise efficiency, service quality, and spur infrastructure investment within EU member states. In particular, the European Commission mandated national governments to delegate regulatory competencies to independent authorities, entitled to act on the behalf of the central government, but outside state departments or ministries. The new regulatory bodies ought to operate with their own specialized staff, with specific and detailed tasks and independently of ministries or government departments. The European Commission, however, left to national executives the decision about the definition and the scope of the delegated powers.

Within our sample period, IRAs have been established in energy and telecommunication sectors in most EU countries. In Appendix I, we report the dates of the establishment acts of IRAs in the telecom and the energy sectors in each country, as well as the political coalition of the executive in charge when the IRA was set up. The Table shows that telecom IRAs have been mostly established around 1996 and energy IRAs around 1998. Two notable exceptions are the UK and Germany. In the UK, privatization and regulatory reforms were implemented in the eighties. In Germany, the regulatory competencies on energy and transport have been assigned in June 2005 to the existing telecom regulatory agency, which took the name *Federal Network Agency for Electricity, Gas, Telecommunications, Posts and Railways*. In contrast, in this period, IRAs did not exist in transportation infrastructure (freight motorways, airports and docks and ports) in any country or in water supply industry with the only UK exception.

With the gradual liberalization of public utilities in Europe, private investors also became gradually involved in the ownership and control of firms' assets. The Commission, however, though in favor of privatization, left the decision about the ownership structure entirely in the hands of national governments. To date, privatization of public utilities within EU member states is far from complete, and central and local governments still hold majority and minority ownership stakes in many regulated firms, particularly in France, Germany, Italy and Portugal.

The creation of an institution such as an IRA is the necessary (though insufficient) condition for policy credibility. Levy and Spiller (1994) show that "independence" improves regulators' ability to make long-term commitments to their decisions and that, as a consequence, sunk investments are less likely expropriated ex post (Armstrong and Sappington, 2007).

However, the credibility of IRA's policy intervention depends on the institutional endowment of a country (Spiller and Vogelsang, 1997) and on the delegation of powers received from the government, that may have its own political returns (Niskanen, 1971) and lead to *impefect* delegation (Alesina and Tabellini, 2008).[10] In addition, politics, political institutions and the effectiveness of regulatory intervention are also intertwined with the issue of state ownership of many regulated firms. Governments may in fact require regulators to use the assets of the state-owned utility for policy objectives (e.g. to extend the universal service obligation or to provide the service in geographically disadvantaged areas) rather than to maximize profits (Laffont and Tirole, 1991).

Our paper's empirical analysis is related to three branches of the recent literature on the applied political economy of regulation. The first one studies the impact of independent regulation and firm ownership on the investment incentives of regulated companies. While the presence of an IRA is found to have a positive effect on firms' investment in Latin America and developing countries (Gutiérrez, 2003; Cubbin and Stern, 2005), the impact of firm ownership is more ambiguous (Megginson and Netter, 2001; Gupta, 2005; Cambini and Rondi, 2010). Conversely, the interplay between privatization and independent regulation apparently contributed to encouraging investments and market penetration (Wallsten, 2001; Li and Lyons, 2012). Independent regulators appear also to mitigate the ability of governments to raise interconnection rates in state-controlled telecom companies (Edwards and Waverman, 2006). Moreover, they have been associated with more entry and technological diffusion (Koski and Kretschmer, 2005) in telecoms markets, greater labour productivity, higher service quality, an increase in electricity sold and higher consumer welfare in the electric industry (Estache and Rossi, 2007; Andres, Guasch and Lopez Azumendi, 2008) and greater financial leverage in a range of utilities sectors (Bortolotti, Cambini, Rondi and Spiegel, 2011).[11] However, differently from this paper, none of these studies focuses on Europe or

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[10] Alesina and Tabellini (2008) write that "institutions are more likely to be designed so as to deliver maximal rents at the lowest risk for the incumbent politician" (page 444-445).
[11] Guasch *et al.* (2008) study the impact of regulatory independence in a different context. Using data from 307 transportation and water concession contracts in Argentina, Brazil, Chile, Colombia, and Mexico from 1989 to 2000, the authors find that the presence of an IRA lowered the probability of renegotiation by 5%-7.3%.

controls for either *direct* government interference in the investment decisions or for the potential endogeneity of such reforms.

The second branch of literature studies the microeconomic effects of partisanship, political institutions and social capital on firm performance.[12] While the electoral cycle influences the price setting for specific regulated services, like the price of gasoline and electricity (Moita and Pavia, 2013), political institutions are found to affect regulated firms' investment decisions. For example, Henisz and Zelner (2001) show that, when political constraints are weak, state owned enterprises (SOEs) may be driven by political actors to undertake excessive investment projects (the so-called "white elephants") in order to benefit their constituencies. Stasavage (2002) finds that, in developing countries with higher checks and balances, governments find it easier to commit credibly to their policies, and that this, in turn, positively affects private investment. Social capital is associated also with more benign politics, greater political stability and accountability and to institutions that restrain predatory actions of chief executives (Knack and Keefer, 1997; Nannicini et al., 2013); this leads to greater respect of property rights, larger investment in human and physical capital and finally economic growth. These studies, however, confirm the impact of political institutions on firm investment for a single country or for highly heterogeneous country samples including developing and developed nations, where the distance among institutions is much greater than among the EU15 member states we consider in our analysis. Bortolotti, Cambini and Rondi (2013) is one of the few studies focusing on the EU. It shows that, in EU countries where political institutions do not constrain the power of the executive, politicians are more likely to influence regulatory agencies in order to benefit state-owned firms, thus boosting their market value.

The third branch of the literature looks at how political systems and partisanship affect market reforms in regulated industries. Bjørnskov and Potrafke (2011) analyze the impact of government ideology on the privatization efforts in Central and Eastern Europe after the transition from socialism and show that market-oriented governments promoted privatization, while leftist governments stuck to public ownership more strongly after the transition. Gilardi (2005) shows that, in West European countries, the likelihood to set up an IRA increases when political competition is intense and executives are less stable.[13] Duso and Seldeslachts (2010) show that executives in

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[12] The impact of political partisanship at macro level has instead received considerable attention in the literature. See for example Alesina and Rosenthal (1995), Persson and Tabellini (1999) among the others.

[13] Hanretty and Koop (2012) analyze how politicians design regulatory agencies asking whether levels of *de jure* independence really translate into actual, or *de facto*, independence. They construct a time-invariant index of independence for regulators operating in seven sectors – competition, financial markets, telecommunications, energy,

favour of de-regulation as well as small welfare states speed up market entry in mobile telecom industry, while Potrafke (2010) finds that government partisanship influences product market deregulation in OECD countries.

Our study is the first one in the recent literature on political economy of regulation that specifically looks to EU regulatory reforms and allows for the potential endogeneity of independent regulation while controlling for the direct effect of government partisanship and residual state ownership.

3. Estimating Firm Investment with Independent Regulation, Politics and Mixed-Ownership

In this Section, we address the identification problems that arise when estimating the impact of the IRA's presence on regulated firms' investment. The literature review in Section 2 shows that time inconsistency and lack of commitment in regulatory policy undermine investment incentives. From the empirical point of view, the main challenge is that "lack of commitment", or "regulatory opportunism", is not observable and cannot be measured. However, the theory also shows that appropriate institutions can be designed to discipline the lack of commitment and alleviate the hold-up problem, thereby strengthening (at least in part) the incentives to invest (Levy and Spiller, 1994).

As recent product market reforms in Europe suggest, the positive answer to this normative problem is the inception of independent regulatory agencies. However, as discussed in Section 2, the inception of the IRA is obviously a formal legislative act, which only dictates the requirements for a *de jure* independent agency and, as such, provides an imperfect measure of *de facto* independence. Moreover, the presence of the IRA is likely endogenous to the investment decision, given that the decision itself to establish an independent agency may be related to lack of infrastructure in the country, and motivated by the intent of reassuring firms that their investment rents will not be expropriated as soon as capital expenditures are sunk. To tackle this problem we use instrumental variable methods that exploit the cross-country variation in the political and legal endowments that may ensure credibility to the regulatory institution and make it genuinely independent of political power. This strategy allows us to account for the heterogeneity and the

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pharmaceuticals, food safety, and the environment. The analysis shows that measures of de jure independence – e.g. the tenure of the regulatory board, the security of funding, the difficulty of dismissal - are not statistically linked with measures of de facto independence – e.g. appointment process of regulators or the frequency of legislative scrutiny. They also find a high correlation (0.69) between their index and the one developed by Gilardi (2005), which we employ in this paper.

change in institutional arrangements designed to restrain government's room for maneuver and to guarantee the enforcement of the regulatory policy, such as, for example, the rule of law, the system of checks and balances among government branches, parliamentary fragmentation, and government stability. For this purpose, we have to control if these institutional characteristics contribute also directly to the investment decision.

The second identification problem arises from the links among the IRA, investment and politics, given that the decision to establish the IRA is made by politicians. In principle, partisanship could be a suitable instrument, to the extent that it affects firm investment only *indirectly*, i.e. through the decision to set up the IRA. In practice, politics is likely to affect investment also *directly*, especially when infrastructure investment is concerned, - think of the decision to set up a nuclear or photovoltaic, or a wind-power energy plant; to deploy a broadband telecom network, to expand the motorway or the railway transportation system, or the choice between a labour- or a capital-intensive technology. Because in all these cases, the exclusion restrictions would surely be rejected, we include partisanship in the investment regression, and we test whether its impact on investment changes when the IRA exists.

The third estimation concern is about the presence of the government as a shareholder in the regulated firm. Again, similarly to partisanship, residual state ownership may affect firm investment both *directly* and *indirectly*, i.e. through government and ministries' interference in regulatory policy as well as with regulatory *de facto* independence. For this reason, we include government ownership both linearly and interactively with the IRA, to control for its effect on investment when the firm is subject to the IRA.

Finally, we consider the potential influence on regulated firms' investment of three external factors. The first one is social capital, i.e. the level of trust and "civic-ness" in the country (Knack and Keefer, 1997). In societies with higher levels of trust, government officials are perceived as more trustworthy, and their policy pronouncements as more credible. Hence, in a trust-sensitive relationship such as the one between regulators and regulated firms, trust might even trigger *directly* investment in new infrastructures. As reported in Knack and Keefer (1997), "*trust and civic norms may improve economic out-comes indirectly, through political channels. They may improve governmental performance and the quality of economic policies, by affecting the level and character of political participation.*" (p. 1254). Indeed, the recent literature (Tabellini, 2010; Aghion et al., 2012; Nannicini *et al.*, 2013) emphasizes the link between trust and both the quality of economic policies and the demand of government regulation since lack of trust (*distrust*) is generally associated with fear of fraud by citizens, thereby increasing demand for government intervention and regulation. Therefore, because trust may also have an *indirect* effect on

the investment decision, we empirically check whether to include trust as an internal or an external instrument. The second external factor is the degree of openness and liberalization in the industry, as previous studies have shown that market liberalization positively affects the aggregate industry level of investment in OECD countries (Alesina et al., 2005). The third factor is the country's legal system as La Porta et al. (1997) have shown that in countries where the common law system (as opposed to civil law) ensures stronger protection to investors, firms can raise funds more easily and cheaply and are therefore more likely to invest.

In sum, to identify the impact of *de facto* independent regulation on firm investment, we postulate that regulatory independence depends on the quality of the country institutions (provided the quality of institutions does not directly affect investment).

4. Econometric Models and Estimation Methods

Company investment decisions are difficult to model both theoretically and empirically due to the problem of controlling for its dynamic component and for the potential endogeneity of its firm level determinants. In addition, in this paper we carry out a positive analysis of the implementation of a key regulatory reform on firms' investment. To address this complexity we draw on three different empirical models, briefly discussing their specifications and estimation problems.

We start with a simple difference-in-difference specification where the investment to capital stock ratio of firm i in the years t, $(I/K)_{it}$, is regressed on the lagged IRA dummy, only adding firm and time fixed effects. The estimating equation is the following:

$$(I/K)_{it} = \beta_0 + \alpha_1 IRA_{it-1} + d_t + \eta_i + \varepsilon_{it}, \tag{1}$$

where η_i are the firm fixed effects to control for the invariable idiosyncratic factors within the firm, d_t are time specific fixed effects to account for the common macroeconomic shocks that may affect the business cycle over time, and ε_{it} is the error term. As a robustness test, we also include country specific time trends to account for possible changes in country specific macroeconomic or institutional conditions. We report standard errors that are clustered at the firm, sector and country level because the set up of national IRAs was prompted by the European Commission to address industry specific and Europe-wide issues and each country has its own way to implement reforms.

In our second model, we add the growth rate of real sales, $(Y/K)_{it-1}$, to account for the traditional acceleration principle, which links the demand for capital goods to demand

growth. Moreover, we add the lagged operational cash flow (including depreciations) to capital ratio, $(\Pi/K)_{it\text{-}1}$, to control for the potential sensitivity of investment to internal funds, as the literature has shown that investment may depend on internal finance, when capital markets are imperfect (Hubbard, 1998). We thus estimate the following reduced form investment equation:

$$(I/K)_{it} = \beta_0 + \beta_1(\Pi/K)_{it\text{-}1} + \beta_2(Y/K)_{it\text{-}1} + \alpha_1 IRA_{it\text{-}1} + d_t + \eta_i + \varepsilon_{it}, \qquad (2)$$

One problem with the models above is that they do not control for the firms' future investment opportunities or for the capital stock adjustment. Therefore, our third specification is the Euler equation model, as developed by Bond and Meghir (1994). The Euler equation derives from the first-order conditions for the optimal capital stock and therefore describes the optimal path of firm investment. It is not an investment rule where investment is a function of predetermined or exogenous variables but, rather, a structural relation between investment rates in successive periods, as derived from dynamic optimization in the presence of symmetric and quadratic adjustment costs that take the form of foregone production. The advantage of the Euler equation model is that it captures the influence of current expectations of future profitability on current investment decisions without having to rely on stock market valuations of the firm as in the usual Q model approach.[14] The Euler specification that we use is the following:

$$(I/K)_{it} = \beta_0 + \beta_1(I/K)_{it-1} + \beta_2(I/K)^2_{it-1} + \beta_3(\Pi/K)_{it-1} + \beta_4(Y/K)_{it-1} + \\ + \alpha_1 IRA_{it-1} + \eta_i + d_{tt} + \varepsilon_{it}, \qquad (3)$$

where $(I/K)_{it\text{-}1}$ and $(I/K)^2_{it\text{-}1}$ are the linear and squared investment to capital stock ratio of firm i in the years $t\text{-}1$, the output term, $(Y/K)_{it\text{-}1}$, here accounts for imperfect competition reflecting that prices depend on output (see, for example, Schiantarelli and Geourgoutsos, 1990), while the cash flow term $(\Pi/K)_{it\text{-}1}$ represents financial factors. $IRA_{it\text{-}1}$ is the usual dummy that denotes the presence of an independent authority.[15] η_i are the firm specific effects and d_t the time dummies, that capture the cost of capital among other things. ε_{it} is an expectational error since, to implement the model, the

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[14] The estimation of the Q model with our data would imply a sizeable reduction in the number of firm-year observations. Moreover, since many utilities were (partially) privatized and gradually offered to the public equity market in a period of changing competitive conditions and liberalization, the market values are likely to be less reliable and affected by measurement problems reflecting uncertainty about the pace of the market reforms.
[15] Notice that also Bertrand and Kramarz (2002) and Griffith *et al.* (2007) test the impact of reforms by using similar reduced-form specifications.

unobserved expected investment term $E_t(I/K)_{it}$ is replaced by the observed I/K_{it} plus a forecast error. As shown by Bond and Meghir (1994), $\beta_1 \geq 1$ and $\beta_2 \geq 1$, in absolute values, while $\beta_3 > 0$ under the null hypothesis of perfect capital markets and when, for the investing firm, internal and external sources of funds are perfect substitutes. Notably, rejection of this latter hypothesis is typically interpreted as suggesting the presence of informational and incentive problems in the capital markets (see Hubbard, 1998). The coefficient β_4 – that incorporates the mark up coefficient - is positive with imperfectly competitive markets or companies facing increasing return to scale. In our setting, while it is true that utilities typically face non-constant returns to scale, they are also subject to price regulation and one goal of regulation is to ensure that they behave similarly to firms operating in a competitive environment and that regulated prices tend to marginal costs. Moreover, the demand of public utility services is typically price inelastic. Hence, even though these markets are imperfect, the sign of β_4 is ambiguous because the two effects might compensate each other.[16]

In order to estimate whether the impact of independent regulation varies with residual state ownership and government political orientation, we include the interactions of the IRA dummy with *Government UCR*$_{it}$ and *Political Orientation*$_{it}$. The estimating equation is the following:

$$
\begin{aligned}
(I/K)_{it} = {}& \beta_0 + \beta_1 (I/K)_{it-1} + \beta_2 (I/K)^2_{it-1} + \beta_3 (\Pi/K)_{it-1} + \beta_4 (Y/K)_{it-1} + \\
& + \alpha_1 IRA_{it-1} + \alpha_2 GovernmentUCR_{it-1} + \alpha_3 PolOrient_{it-1} + \\
& + \alpha_4 GovernmentUCR_{it-1} * IRA_{it-1} + \alpha_5 PolOrient_{it-1} * IRA_{it-1} + \alpha_6 X_{it-1} + \eta_i + d_t + \varepsilon_{it}
\end{aligned}
\tag{4}
$$

where $X_{i,t-1}$ is either a sector or country-specific control variable that might influence firms' investment decision, that is the level of social capital (*Distrust*), the degree of market liberalization (*OECD Liberalization Index*), and the intensity of investor protection (*Investor Protection*).

To estimate our models, we start by reporting fixed effects results, but then proceed using the GMM-SYS estimator when we turn to dynamic models. Estimation of dynamic panel data models with the within estimator has serious drawbacks. First, as shown by Nickell (1981), the coefficients on the lagged dependent variables are biased and inconsistent. Second, Bertrand, Duflo and Mullaithan (2004) warn about the validity of differences-in-differences estimates as obtained by OLS on panel data because they tend to over-reject the null hypothesis of no effect due to serial correlation problems, even when standard errors are clustered at different levels of aggregation. As

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[16] An attractive feature of the Euler equation approach is that Equation (3) can be extended to debt as a source of investment finance (Bond and Meghir, 1994). This allows us to test for the impact of bankruptcy risk and financial distress on regulated utilities' investment.

an alternative, they suggest the GMM estimator, particularly when the main purpose is to identify the effects of specific policy interventions or treatment within a difference-in difference approach.[17] Third, as explained in Section 4, the IRA dummy is potentially endogenous. For this reason, we employ the Arellano and Bond (1991) and Arellano and Bover (1995) linear generalized method of moments (GMM) estimator, which is especially designed for panel data models where the lagged dependent variable is included and some of the regressors are potentially endogenous. More specifically, we use the dynamic System-GMM estimator (Blundell and Bond, 1998), which deals with situations where the lagged dependent variable is persistent (i.e. the autoregressive parameter is large). This model estimates a system of first-differenced and level equations and uses lags of variables in levels as instruments for equations in first-differences and lags of first-differenced variables as instruments for equations in levels, in which the instruments must be orthogonal to the firm-specific effects.[18] For the validity of the GMM estimates, it is crucial that the instruments are exogenous, so we report the appropriate tests: the Arellano and Bond (1991) autocorrelation tests to control for first-order and second-order correlation in the residuals, the two-step Sargan-Hansen statistic to test the joint validity of the instruments, and the Difference-in-Hansen (or C-statistic) test of exogeneity of individual instruments to test the overidentifying restrictions for the external instruments.[19] Standard errors are robust to heteroskedasticity and arbitrary patterns of autocorrelations within firms.

5. Dataset and Variables

5.1 Sample and firm level data

For the empirical analysis, we use an unbalanced panel of 80 publicly traded utilities and transportation infrastructure operators from EU 15 countries as of 1994, tracked to 2004. The data cover privately- or state-controlled firms that are regulated by an IRA or by a governmental body. Firms operate in electricity and natural gas (distribution and transmission), water supply, telecommunications, freight road concessions, ports, and airports. In all, we have 37 energy utilities,

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[17] They write: "We […] hope that our study will contribute in generating further work on alternative estimation methods for DD models (such as GLS estimation or GMM estimation of dynamic panel data models) that could be more efficient in the presence of serial correlation" (p. 274).
[18] We tested the time series properties of our main variables and found that the unit root hypothesis can be rejected. We do not report the results for reasons of space, but they are available upon request.
[19] The Sargan-Hansen test is robust, but may be weakened if there are too many instruments with respect to the number of observations (see Roodman, 2006). Therefore, we follow a conservative strategy using no more than two lags of the instrumenting variables, so to assure that the number of instruments is not greater than the number of firms.

12 water supply companies, 15 fixed telecom incumbent operators, 6 freight road concessionaires, and 10 transportation infrastructure operators (airport, ports and docks). In order to be included in our sample firms must be publicly traded and their accounting and financial data available for at least five consecutive years, which is what we need to estimate dynamic econometric specifications with lagged variables and instruments. Our sample covers more than 85% of publicly listed European utilities in the period 1994-2004.[20]

Firm level accounting data have been collected from *Worldscope*. The dependent variable is the investment to capital stock ratio (*I/K*). In the econometric analysis, we use the ratio of capital expenditures to capital stock at the replacement value.[21] Other key variables of the investment equation are the operating cash flow (including depreciations) to capital stock ratio (*Π/K*), the growth rate of real sales (*Sales Growth*) and the output (real sales) to capital stock ratio (*Y/K*). Table 1 summarizes the descriptive statistics of the main variables for the full sample (see Panel A), for firm-year observations with an IRA (Panel B) and without an IRA (panel C), for the sub-sample of firms that, at some point in time, became regulated by an IRA (Panel D), and that are never subject to an IRA (Panel E). We notice that the average investment rate for both firm-year observations under an IRA (Panel B) and firms that experienced the regime switch, and eventually became regulated by an IRA (Panel D) is greater than the mean investment rate of their respective counterparts in Panels C and E, though the difference is not large. In Figure 1, we inspect the investment activity of firms undergoing the change in the regulatory regime *before* and *after* the introduction of the IRA. The picture clearly shows that the introduction of the IRA brings about an increase in the investment rates compared to one-to-three years before the event.

To define state ownership, we employ a continuous variable constructed by Bortolotti and Faccio (2009), which uses the weakest link approach to measure the government's ultimate control rights (*Government UCR*). Within our sample, 21 firms switched from state controlled to privately-controlled (i.e. the government has less than 50% of the ultimate control rights), 38 are privately- and 21 state-controlled for the entire period.

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[20] We cannot cover the entire population because we had to exclude firms that went public almost at the end of our time span (such as the Belgian operator Elia System, which went public in 2002; or German Mainova and Swedish Elverket Vallentuna, that IPOed in 2000), and firms that were acquired by other firms already in our sample (for example, Swedish Sydkraft was acquired by the German EON in 2000; and Lech Werke was acquired by RWE). Moreover, small and medium sized local utilities, mainly present in Germany and Italy were also not included because they are not listed in the stock exchange.

[21] The accounting data from *Worldscope* only include historic cost valuations of fixed assets. Hence, we calculate the replacement cost of the capital stock using the perpetual inventory formula. We derived the sector specific depreciation rates from Bureau of Economic Analysis estimates reported in "Rates of Depreciation, Service Lives, Declining Balance Rates, and Hulten-Wykoff Categories" and used 4.4% for energy, gas and water supply, 3% for freight roads concessionaires, 8% for telecommunications, and 4.5% for ports and airports.

5.2 IRA variable

In order to study the effect of regulatory independence on firms' investment decisions, we use a dummy that is equal to 1 in all years in which the firm was subject to an IRA, and 0 when it is subject to an executive branch commission. The dummy was constructed using data and information about the dates of the IRAs' act of establishing as reported in Gilardi (2005) for the energy and telecommunication sectors (see Appendix I). We then used regulatory and governmental sources[22] to obtain information about the presence of IRAs in the other sectors and found that only the UK water industry has an IRA.[23]

5.3 Country- and sector-specific characteristics

As discussed in Section 4, country and sector characteristics may affect firm investment decisions directly or through the channel of the regulatory institution. To account for these environmental factors we use the following variables (Table 1 reports the summary statistics).

To measure political partisanship, we use the *Political Orientation* index, a continuous and time-variant measure of the government's political stance, i.e. from leftwing to rightwing. We use it to capture whether the political attitude of the executive in charge is more pro-firm (right-wing) or pro-consumer (left-wing) (see Huber and Inglehart, 1995, and Bortolotti and Pinotti, 2008). The index ranges from 0 (extreme left wing) to 10 (extreme right wing), and is the weighted average of the right/left political orientation scores of the parties forming the executive branch of government, where the weights are the ratios of the number of parliamentary seats held by each party to the total held by the ruling coalition. Table 1 shows that the average index is 5.67, the minimum is 3.67 (corresponding to the German government led by Gerard Schroeder in 2003 and 2004), and the maximum is 8.03 (assigned to the Italian executive led by Berlusconi from 2002 to 2004), the mean

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[22] We check official governmental websites and documents from all EU15 countries to verify the presence (or the lack of) *ad hoc* regulatory institutions supervising the transport and water sectors in the period of our analysis (1994-2004).
[23] For robustness, as an alternative to the IRA dummy, we also employ an Index of formal regulatory independence, constructed by Gilardi (2005), which allows us to control for differences in the regulatory environment across countries and sectors where the IRA exists, According to this index, regulatory independence varies considerably across European countries and sectors. Telecoms authorities are highly independent in Austria, Ireland, Portugal, and the U.K., while in the energy industry, regulatory independence is high in Austria, Belgium and Italy.

value suggesting that the distribution is more skewed towards the right.[24] As an alternative to the index of *Political Orientation* we also use *EXERLC*, a time-varying variable equal to 1 when the executive is leftwing, 2 when it is centre, and 3 when it rightwing and can be used (World Bank database on Political Institutions, see Beck *et al.*, 2001, for a detailed description of the variable).

To control for social capital, we use *Distrust,* a country specific variable drawn from the World Values Survey (1995 and 1999-2003 waves).[25] We use the point data for the 1995 survey to measure trust up to 1998 and the 1999-2003's wave survey data to measure trust up to 2004. The index ranges from 0 (if the respondent answers "Most people can be trusted") to 1 (if she answers "I need to be very careful"). As discussed in Section 4, this variable may have both a direct and indirect (through the institutional channel of the IRA) effect on firm investment

To account for differences in the legal system and different degrees of shareholder protection, we use the *Investor Protection* index, i.e. the "anti-director rights" index developed by La Porta *et al.* (1997) and updated by Pagano and Volpin (2005). The advantages of this index (as opposed to a simple dummy that classifies countries under Common Law or Civil Law) are that it varies through time and ranges from 0 to 7 as investor protection increases. As suggested by the Law and Finance literature, stronger protection should positively influence the issuance of external finance (new debt and equity), hence favoring the decision to invest.

Finally, we control for the pace and intensity of liberalization in the various industries, using the OECD index of Product Market Regulation database by Conway and Nicoletti (2006). The index is the average of several sector-specific indicators that allow for entry barriers, vertical integration, market share of the dominant player(s), state ownership and regulatory controls on retail prices. We eliminate the state ownership component, because we have a well-defined ownership variable, and recalculate the average over the remaining OECD sub-indicators (market entry, vertical integration and market structure). The index varies from 0 to 6, with higher values indicating lower degrees of liberalization.

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[24] As shown by the inter-quartilic distribution of the *Political Orientation* index the first quartile is at 4.43, the median is at 5.27 and the third quartile is at 7.44, which indicates a fat tail towards the centre-left and a thinner (and longer) tail towards the right wing of the political spectrum.
[25] *Distrust* is obtained from answers to the following question: "*Generally speaking, would you say that most people in your country can be trusted or that you need to be very careful in dealing with people?*" For further details, see the web portal of the World Values Survey Association: www.worldvaluessurvey.org .

5.4 Institutional and Political variables

To define this socio-political environment, we rely on a set of country-specific variables typical of the political economy literature: the institutional checks and balances, the level of fragmentation in the parliament, the stability of the central government and the rule of law, all of them time-varying so as to match the time dimension of our panel. Table 1 reports the summary statistics.

Delegation is thought to be credible only when it cannot be revoked easily and this is generally associated with political institutions constraining executive discretion.[26] Indeed, North and Weingast (1989) argue that political institutions characterized by high checks and balances can allow governments to credibly commit. We use the *Checks & Balances* index, from the World Bank Database on Political Institutions, which measures the number of veto powers in a political system according to specific legislative and executive indexes of electoral competitiveness. As the number of veto players increases, the executive (the politicians) will find it more difficult to find the room for maneuver to renege or limit the powers delegated to the regulators. As an alternative, we use the *Political Constraints* (POLCON) index by Henisz (2000), which accounts for the diminishing marginal returns to the addition of veto players, differently from *Checks and Balances* that assumes a linear relationship between the number of adjusted veto points and the degree of constraints on policy change.

From the World Bank database we also draw Government *Stability*, i.e. a survey-based index that captures the extent of turnover of a government's key decision makers in any year and ranges from 0 (high stability) to 1 (low stability). Low stability of government's decision-makers increases the risk of policy reversals, and this in turn should lead the government to insulate policies from politics (Gilardi, 2005) and therefore to enhance regulatory independence. However, low stability and policy uncertainty may also (negatively) affect firm-level investment decisions.

To capture the characteristics of the electoral system, we use the Political Institutional Gallagher Index of *Disproportionality*, which classifies countries based on a majoritarian vs. consensual dimension (Gallagher, 1991, updated by Bortolotti and Pinotti, 2008). The index is continuous, it equals zero when the apportionment of parliamentary seats is exactly proportional to electoral results and increases as disproportionality leads to the majority system. As argued by Henisz and Zelner (2001) and Henisz (2002), policies and reforms are less likely revoked when

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[26] This is a quite robust result of the literature on central banks' independence; see Keefer and Stasavage (2003).

disproportionality is low and minorities' veto power is large. Hence, when disproportionality is low, politicians are less likely to be able to interfere with regulatory decisions (Spiller and Urbiztondo, 1994) and regulators may act more independently.

Finally, we use the *Rule of Law* index, one of the Worldwide Governance Indicators (WGI) constructed by the World Bank[27], which captures perceptions of the extent to which agents have confidence in and abide by the rules of society, such as contract enforcement and property rights, the police and the courts. The index increases with the respect of law in the society. The rule of law is generally associated with a judiciary body that is independent of the executive in charge (Hanretty and Koop, 2012) and with efficient law enforcement. This is likely associated with lower politicians' discretionality and lower distance between *formal* and *informal* independence of regulators. On the other hand, in countries where the law rules and the risk of expropriation is low, firms may be more willing to invest. The index is continuous and time-variant and it ranges from 0 to 100, with higher values indicating a higher respect of civil law in the society.

The socio-political environment contributes to enhance credibility and independence of the regulatory authority, but may also condition the investment decision at the firm level. We exploit the cross-country heterogeneity and time variation of these variables to control for unobserved country-level factors that may influence the *de facto* independence of the IRA, but we turn to the empirical analysis to test their direct or indirect role in the investment decisions of the regulated firms.

6. Results

We start with the results from the simple investment models (1) and (2) in the spirit of a difference-in-difference strategy and testing the possibility of anticipatory effects with a "placebo" exercise. We then turn instrumental variable estimations of models (3) and (4) using, first, the usual GMM lagged internal instruments and then employing the country-specific variables to instrument the IRA, after testing the exclusion restrictions.

6.1 Diff-in-diff analysis of the impact of the IRA

In Table 2a, we report the results of four difference-in-differences specifications where, in turn, we include the lagged IRA dummy and the typical firm level controls (cash flow and output) as well as

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[27] For more details, see http://info.worldbank.org/governance/wgi/resources.htm .

firm and year fixed effects and sector, country and country*year dummies to account for country specific time trends. We estimate our models on the full sample as well as on the sub-sample that at a point in time became subject to an IRA – namely energy and telecom firms -, in order to focus on the investment behavior of companies that underwent a change in the regulatory regime, before and after the IRA. We report robust standard errors, clustered by firm and we also check for alternative clustering such as at the sector and country level.

Results for the full sample (Columns (1)-(4)) show that the estimated coefficient on *IRA* is positive and significant in all columns, regardless of the specification and the clustering of the standard errors, suggesting that the switch to a regulatory regime with a *de jure* independent agency had a positive effect on the investment decisions of European utilities. When we focus on the investment behavior of firms that became subject to the IRA, the results are similar. More precisely, we calculate that the introduction of the IRA generates, on average, an increase in the investment rate between 2.3 and 5 percentage points, depending on the specifications, which is quite substantial, considering that the mean rate is about 11%. Such an increase is consistent with graphical evidence in Figure 1, for the sub-sample of firms undergoing a change in regulatory regime.

Looking at the trend in the investment ratio around the IRA date, however, one may wonder that the above evidence relies on the negative shock the year before the set-up of the IRA and the positive shock on the IRA date. To check that this is not the case, we re-estimated the regressions excluding the year *zero* and the year *minus one*. The results show the coefficient on the IRA dummy remains statistically significant and similar in size, as the positive effect ranges from 2.7 to 4.3 percentage points (results available on request).

Another challenge to our results is represented by the set up of IRAs not being a sudden, unanticipated event. Firms that will be subject to an IRA at *t*+1 might anticipate the impact of the IRA. In order to test this hypothesis, we perform an "in-time" placebo exercise (Abadie, Diamond and Hainmueller, 2015) in which we regress the (once and twice) lagged investment ratio on the contemporaneous IRA dummy. A statistically significant IRA dummy would reveal the existence of pre-trends in the investment levels of firms that would be later on subject to the IRA. In Table 2b, we report the results of these tests. We find no evidence of anticipatory effects, i.e. firms at *t*-3, *t*-2, and *t*-1 do not appear to invest anticipating that an IRA will be in place at time *t*. The results do not

change when we include the firm-level control variables (Columns (5) and (6)) nor if we include country*year fixed effects[28].

6.2 The Euler equation approach

We start in Table 3 with the estimation of the dynamic Euler investment model (3). In Columns (1) - (3), we report the results for the full sample, while in Columns (4)-(6) we focus on the sub-sample of firms that became subject to an IRA during the sample period, i.e. energy and telecom companies.

The fixed effects results in Columns (1) and (4) show that the coefficients on the lagged investment and lagged investment squared terms are always significant and have the expected sign. The coefficient on the output to capital stock ratio is positively signed, but insignificant in all columns. This is probably due to the combined effects of imperfect competition in a regulated environment and inelastic demand of public utility services, which compensate each other, leading to an insignificant coefficient. The estimated cash flow terms are positive and significant. More importantly to us, we find that the estimated coefficient on the IRA dummy is positive and significant, confirming the evidence in Table 2. The positive and significant coefficient on the IRA survives whether we cluster standard errors at the firm, sector, or country level.

When we apply the GMM-SYS estimator, we notice that the coefficients on the lagged investment terms (both linear and squared) increase and are not significantly different from 1 in absolute value, as the theory predicts, suggesting that the investment dynamics implied by the Euler approach is not rejected by the data. The cash flow term has turned insignificant. The linear coefficients on government ownership (positive) and political orientation (negative) are both insignificant in Column (3) for the full sample, but we note that *Political Orientation* turns significant in Column (6), for the subsample of firms subject to the IRA.

Focussing on our variable of interest, we find that the *IRA*, dummy remains positive and significant in all columns. The effect on the investment rate can be quantified in an increase that ranges from 1.2 to 1.4 percentage points for the full sample and from 2.4 to 3.3 percentage points for the sub-sample of industries that introduced the IRA.

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[28] We do not report the results for reasons of space, but they are available on request.

In Columns (7) and (8) we further explore whether the impact of IRA varies across sectors interacting our *IRA* dummy with sectoral (i.e. Telecom, Electricity, Gas and Water) dummy variables.[29] Results suggest that the set-up of IRAs in Europe has considerably affected the investment of telecom firms, where the investment rate increases by more than 4 percentage points, i.e. more than the industry average (3.3 percentage points). Moreover, we find that the impact is weaker on the investment of water suppliers (2-2.7 percentage points) while for electricity and gas the increase in the investment rates ranges from 2.6 to 3.8 percentage points. In a nutshell, the sectoral analysis suggests that the telecoms and, to a lesser extent, the energy industry respond in a greater fashion to IRAs.

6.3 Dealing with the endogeneity of the IRA

As discussed in Section 3, to handle the endogeneity and measurement error of the IRA with external instruments, we rely on the political and social institutions' characteristics in each country that have likely influenced the inception of the IRA and the degree of its independence and credibility. The crucial identification assumption is that these external instruments should not affect investment directly, but only through the channel of the decision to set up the IRA.

We begin by testing the relationship between the IRA and the country-specific variables described in Section 6 and we report the results of these pseudo first-stage regressions in Appendix II. Overall, the empirical evidence suggests that this set of variables do matter, either individually or jointly. More specifically, the negative sign on *Disproportionality* might reveal the reluctance to set up an IRA by unified, majoritarian governments, as predicted by Spiller and Urzibitondo (1994), while the negative coefficient on *Checks & Balances* suggests that where countervailing powers are already strong, the need for a regulatory institution is less urgent. As an alternative to *Checks & Balances*, we also used the Henisz's measure of political constraints, *POLCON*, but we found that the variable is never significant and we do not report the results, for brevity's sake. *Rule of Law* enters with a positive and significant coefficient, as expected, while (low) *Stability* seems to positively affect the introduction of the IRA as predicted by Gilardi (2005), but the coefficient in Column (1) is insignificant at conventional levels (p-value = 11.8%). When we focus on the sub-sample of firms subject to the IRA all variables become significant, and their significance increases. Finally, following Aghion *et al.* (2012), we check if social capital, as measured by *Distrust*, can be related to the decision to set up an IRA (Columns (3) and (4)). We find that the sign of *Distrust* is

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[29] We thank the referees for suggesting this further analysis.

positive, suggesting that when people do not trust in each other, the demand for regulation increases, though the coefficient is significant only for the sub-sample of firms subject to IRA.

The statistical significance of these variables, however, confirms their influence on the IRA, but does not rule out that they may directly affect firm investment. To probe the exclusion conditions, we rely on four strategies.

First, we directly test the exclusion restrictions by including the instruments in the investment equation (for a similar strategy see Tabellini, 2010). In order to be valid, the instruments variables should display no direct statistically significant effect on firm investment, but only affect the instrumented variable, i.e. the IRA. In Table 4, the results show that none of these variables displays a statistically significant effect on firm investment, while *IRA* remains highly significant. Second, we wonder if the statistical insignificance of the included instruments in Table 4, Columns (1)-(5), could be driven by their correlation with the IRA, so that the IRA's coefficient might pick up the direct effect of the instruments as well. In Column (6), we focus on the firm-year observations where the IRA dummy is zero (i.e. firms never subject to the IRA and firms before being subject to the IRA) to check that, absent the IRA, the political institution variables have no direct influence on investment. Comfortingly, the results show that all coefficients remain insignificant. Third, we conjecture that political institutions may affect investment also through other (omitted) channels, for example, through the social capital, the investor protection and the degree of liberalization in the industry. Therefore, in Table 5, we control for these country and sector-specific factors, and assume that the chosen instruments have no additional impact on investment after conditioning on these covariates (see Aghion *et al.*, 2009). Fourth, we use the Difference-in-Hansen statistic to test the exogeneity of each external instrument and report the results at the bottom of the table.

6.4 Introducing Interacted Effects with Politics and Government Ownership

According to the European Commission, IRAs were expected to curb political interference on state controlled utilities as well as to enforce a "more" credible regulatory policy than the one carried out by the previous executive-branch commissions. The empirical question is therefore whether the impact of the presence of the IRA on the investment that we found in Tables 2 and 3 may survive and possibly change if we account for the government's political orientation and for residual state ownership stakes.

In Table 5, we extend the empirical strategy in three directions: (i) we use political institution variables as external instruments, instead of lags of the IRA dummy; (ii) we

test interacted effects of the IRA with government's ownership and political orientation; (iii) we account for country and sector-specific control variables that, if omitted, might act as additional channels of the effect of political institutions on investment. Thus, in line with arguments that social capital, market liberalization and shareholder protection might positively affect firm's propensity to invest, we add *Distrust, OECD Liberalization Index* and *Investor Protection*.

The results in Column (1) show that, notwithstanding the different instrumenting strategy, the coefficient of *IRA* does not differ much from the one in Table 3 (0.015 vs. 0.014) and is equally significant. The set of external instruments is listed at the bottom of the table, along with the individual Diff-in-Sargan tests. *Government UCR* and *Political Orientation* are both insignificant.

We now turn to the core results of this section, i.e. the interacted effects of the IRA with government ownership and political orientation. In Columns (2)-(4), both the linear *Government UCR* term and its interaction with *IRA* are insignificant. *Political Orientation* (α_3) is also insignificant, but its interaction with *IRA* (α_5) is significant in all columns, which indicates that the effect of IRA (α_1) on investment changes conditional on political partisanship. The statistically significant interaction suggests that the effect of the IRA on investment depends on the colour of the executive, hence regulation is not immune to politics, or political interference. In particular, our results indicate that the IRA's positive effect on investment decreases when the government is decidedly right-wing. As a further test the existence of political interference, in Column (5) we re-estimate the investment equation using only the firm-year observations subject to the IRA (hence dropping the IRA dummy). We find that, when the IRA is in place, the estimated coefficient on *Political Orientation* is negative and significant, consistently with the previous results.[30] To interpret this result we draw on Alesina and Rosenthal (1995), who show that right-wing executives are typically more eager than left-wing governments to curb state as well as bureaucratic intervention in the economy. In the case in point, it can be envisaged that, with a right-wing executive in charge, potential conflicts arising between the policy agendas of the executive and of the independent regulator could make the institutional and regulatory environment more uncertain and unstable. As shown by the literature (Besanko and Spulber, 1992, and more recently, Strausz,

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[30] As an additional test on the potential impact of political *institutions* (vis-à-vis political *orientation*), we investigated whether parliamentary disproportionality may influence firm investment, contingent on the presence of the IRA. We thus included *Disproportionality* index and its interaction with IRA in the model, instead of *Political Orientation*. While *IRA* remained significantly positive, *Disproportionality* was never significant, neither linearly nor interactedly. As a further test, considering that the effect captured by the political variables might proxy a business-cycle related trend; we included the country-specific GDP growth rates to check whether *Political Orientation*, or the *IRA*, or their interaction loose significance. We found that they do not and that the GDP growth rate is never significant. Results are available upon request.

2011), political and regulatory uncertainty undermines firms' investment incentives, consistently with our findings.[31]

When we add the sector/country control variables in Columns (2)-(4), we find that they are not statistically significant. One possible explanation of the insignificance of the *OECD Index of Liberalization* may be that the index ultimately covers many of the outcomes of regulatory interventions typically implemented by the IRA itself. In contrast, it may be surprising that also *Investor Protection* has no significant effect on regulated firms' investment. However, it may be recalled that large utilities typically tap the international capital market when they have to finance large infrastructure investment, so in the end the country-specific provision of the corporate law about investor protection may be less relevant for them. Finally, we find that also *Distrust* is not a significant determinant of regulated firms' investment. As this result is at variance with Aghion et al. (2012), to check its robustness, we include a new variable, *Lawyers*, in the instrument set. As pointed out by Knack and Keefer (1997), less trusting and more litigious societies tend to have a higher demand for lawyers. We thus collect the number of lawyers (per 100,000 inhabitants) in Western European countries in 1990 and 1995 (to ensure some time variation, albeit small, as well as enough time distance to minimize reverse causality problems).[32] The results from re-estimating the investment equation are in the table Appendix III (Columns (1) and (2)). They show that *Distrust* remains insignificant (and IRA significant) also when we use *Lawyers* as an additional instrument.[33]

Overall, the results are very similar, through various specifications and instrumenting methods, and confirm both the positive effect of the presence of the IRA and the negative influence of partisanship on firm investment.[34] As a final step in Figure 2, we report the marginal effects graphically to illustrate the negative spillovers of political interference. We plot the effect of the IRA conditional on the executive's political orientation (i.e. the sum $\alpha_1 + \alpha_5 * Political\ Orientation$) and the corresponding 95% confidence intervals based on the estimated coefficients in Column (4).

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[31] For recent evidence, see Julio and Yook (2012), who find that political uncertainty negatively affects corporate investment by creating an unstable and uncertain regulatory setting.

[32] The source of the variable *Lawyers* is Blankenburg E. (2003). Comparable cross-country data for two points in time were available only for seven EU countries, Austria, France, Germany, Italy, Netherlands, Portugal, Spain and UK, which amount to 88% of the observations.

[33] As a further experiment, we use *Distrust* as an instrument and not as a control variable, on the ground that social capital may affect investment indirectly through the channel of the IRA, and given the results of the first-stage analysis (Column (4)). The estimation results are in Appendix III, where Columns (3) and (4) are very similar to those in Table 5 and confirm all the evidence so far.

[34] In a set of robustness checks (available upon request), we also experimented with the alternative regulatory variable constructed by Gilardi (2005) as well as with the impact of financial distress on firm investment (see Section 4, footnote 15), and found that all previous results remain unchanged.

The figure shows that the positive effect of IRA on investment reduces in size as the *Political Orientation* index increases, i.e. as the government becomes increasingly rightwing. If we calculate the impact of IRA at the average value of the index (5.66, see Table 1), we find that the increase in the investment rate is still positive and as large as 0.48%. However, clearly, the interplay with politics appears to reduce increasingly the positive marginal effect of the IRA and, as the executive becomes increasingly conservative, the effect turns even negative. More in general, the empirical evidence of negative spillovers due to political interference suggests that IRAs only partially succeed in restraining political interference.

7. Conclusions and Implications

Over the last 20 years, in most European countries, regulatory competencies have been delegated to independent agencies, mainly to insulate regulators from political interference when governments partially own and control firms that provide essential services for citizens (OECD, 2012). An important anticipated effect of newly set up IRAs was a more stable and credible regulatory framework so as to proceed with market liberalization and boost firms' incentives to invest in network infrastructures. However, because regulatory agencies may be independent *de jure* but not *de facto*, politicians can still influence the regulatory policy to pursue either a political agenda or their private interests. The institutional factors that contribute to enhance genuine independence need to be located.

This paper investigates the investment decisions of a large panel of publicly traded European regulated firms from 1994 to 2004, controlling for government's partisanship and residual state ownership. Because the presence of an IRA imperfectly gauges *de facto* regulatory independence, we rely on instrumental variables that account for cross-country and time variation in political and legal institutions that may influence the credibility of the regulatory institution by constraining interference from the political power.

Our results show that when an Independent Regulatory Agency is in place, investment does increase. The size of the effect in the investment rate ranges between 1.2 and 1.4 for the full sample and from 2.4 to 3.3 percentage point increase for the sub-sample of industries that introduced the IRA (over an average of 11%). From the normative point of view, delegation to bureaucrats – to IRAs in our case - is preferable, when time inconsistency, short-termism and policy reversals may influence the decision process, or if vested interests have large stakes in the policy outcomes, as in the case of regulated utilities. However, from the positive point of view, politicians are reluctant to delegate policy powers to bureaucrats. Therefore, a *formally* independent regulatory

authority *per se* might not be the sufficient condition to create a more stable and reliable environment if politicians retain the latitude to intervene/influence in the regulatory decisions to pursue their political goals. Indeed, we find that political constraints on the executive *indirectly* influence the investment of regulated firms through the channel of the IRA.

What are the implications for firm investment? We find that the interaction between IRA and political partisanship generates a negative spill-over: the positive effect of the IRA on investment shrinks and the magnitude of the increase of the investment rate decreases from 1.4 to 0.48 percentage points or even disappears. Our interpretation is that interference by the government may raise conflicts about policy objectives with the regulatory institution. In the example at hand, conflicts arise from the cohabitation of formally independent agencies and executives whose political programme aims at reducing government and bureaucratic intervention in the economy. More in general, conflicting policy agendas and any form of political interference introduce instability and uncertainty that undermine the investment incentives of regulated firms.

Overall, our analysis suggests that the effect of the IRA is positive on infrastructure investment provided there is no political interference. Though difficult to curb, political interference can be disciplined by institutional constraints that significantly reduce the likelihood of policy reversal and time-inconsistent regulatory intervention. When such constraints are not effective, the mere presence of *de jure* independent agencies does not help to reduce uncertainty and regulatory risk, and may only generate extra administrative costs for the public budget without any benefit for firm incentives and consumer welfare.

References

Abadie, A. Diamond A., and P. Hainmueller (2015), "Comparative Politics and the Synthetic Control Method", *American Journal of Political Science,* **59(2)**, 495–510.

Aghion, P. and J. Tirole (1997), "Formal and Real Authority in Organizations", *Journal of Political Economy*, **105(1)**, 1-29.

Aghion, P., Y. Algan, P. Cahuc and A. Shleifer (2012), "Regulation and Distrust", *Quarterly Journal of Economics*, **125(3)**, 1015-1049.

Aghion, P., Blundell, R., Griffith, R., Howitt, P., and S. Prantl (2009), "The Effects of Entry on Incumebent Innovation and Productivity", *Review of Economics and Statistics*, **91(1)**, 20-32.

Alesina A. and H. Rosenthal (1995), *Partisan Politics, Divided Government and the Economy.* Cambridge: Cambridge University Press.

Alesina A., S. Ozler, N. Roubini and P. Swagel (1996), "Political Instability and Economic Growth," *Journal of Economic Growth*, **1(2)**, 189-211.

Alesina A., S. Ardagna, G. Nicoletti and F. Schiantarelli (2005), "Regulation and Investment," *Journal of European Economic Association*, **3(4)**, 791- 825.

Alesina A. and G. Tabellini (2008), "Bureaucrats or Politicians? Part II: Multiple Policy Tasks", *Journal of Public Economics*, **92**, 426-447.

Andres L., J.L. Guasch and S. Lopez Azumendi (2008), "Regulatory Governance and Sector Performance: Methodology and Evaluation for Electricity Distribution in Latin America", Policy Research Working Paper n. 4494, The World Bank.

Aoki M. (2001), *Toward a Comparative Institutional Analysis*, The MIT Press, Boston (MA).

Arellano M. and S. Bond (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, **58(2)**, 277-297.

Arellano M. and O. Bover (1995), "Another Look at the Instrumental-Variable Estimation of Error-Components Models," *Journal of Econometrics*, **68,** 29-51.

Armstrong, M. and D. Sappington (2007), "Recent Developments in the Theory of Regulation," in M. Armstrong and R. Porter (eds.), *Handbook of Industrial Organization (Vol. III)*, Elsevier Science Publishers: Amsterdam.

Beck T., G. Clarke, A. Groff, P. Keefer and P. Walsh (2001), "New Tools in Comparative Political Economy: The Database of Political Institutions", *World Bank Economic Review*, **15(1)**, 165-176.

Bertrand M. and F. Kramarz (2002), "Does Entry Regulation Hinder Job creation? Evidence from the French Retail Industry", *The Quarterly Journal of Economics*, **117(4)**, 1369-1413.

Bertrand M., Duflo E. and S. Mullainathan (2004), "How Much Should We Trust Differences-in-Differences Estimates?", *The Quarterly Journal of Economics*, **119(1)**, 249-275.

Besanko D. and D. Spulber (1992), "Sequential Equilibrium Investment by Regulated Firms," *Rand Journal of Economics*, **23**, 53-170.

Bjørnskov C. and N. Potrafke (2011), "Politics and Privatization in Central and Eastern Europe. A panel data Analysis", *Economics of Transition*, **19(2)**, 201-230.

Blankenburg E. (2003) "Judicial Systems in Western Europe: Comparative Indicators of Legal Professionals, Courts, Litigation and Budgets in the 1990s", in E.G. Jensen and T.C. Heller (Eds.), *Beyond Common Knowledge: Empirical Approaches to the Rule of Law*, Stanford University Press, Stanford, California

Blundell R. and S. Bond (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics*, **87**, 115-143.

Bond S. and Meghir C. (1994), "Dynamic Investment Models and the Firm's Financial Policy," *Review of Economic Studies*, **61(2)**, 197-222.

Bortolotti B., Cambini C., Rondi L. and Y. Spiegel (2011), "Capital Structure and Regulation: Do Ownership and Regulatory Independent Matter?", *Journal of Economics & Management Strategy*, **20(2)**, 517-564.

Bortolotti B., Cambini C., and L. Rondi (2013), "Reluctant Regulation", *Journal of Comparative Economics*, **41**, 804-828.

Bortolotti B. and M. Faccio (2009), "Government Control of Privatized Firms," *Review of Financial Studies*, **22(8)**, 2907-2939.

Bortolotti B. and P. Pinotti (2008), "Delayed Privatization," *Public Choice*, **136(3)**, 331-351.

Bulow J. and P. Klemperer (2013), "Market-Based Bank Capital Regulation", *CEPR Discussion Paper*, DP 9618, London

Cambini C. and L. Rondi (2010), "Incentive Regulation and Investment: Evidence from European Energy Utilities", *Journal of Regulatory Economics*, 38, 1-26.

Conway P. and G. Nicoletti (2006), "Product Market Regulation in the Non-Manufacturing Sectors of OECD Countries: Measurement and Highlights", *OECD Economics Department Working Paper* n. 530, OECD, Paris.

Cubbin J. and J. Stern (2005), "Regulatory Effectiveness and the Empirical Impact of Variations in Regulatory Governance: Electricity Industry Capacity and Efficiency in Developing Countries." *World Bank Policy Research*, Working Paper n. 3535, Washington D.C.

Cukierman A. (1992), *Central Bank Strategy, Credibility and Independence: Theory and Evidence*, The MIT Press, Cambridge, MA.

Duso T. and J. Seldeslachts (2010), "The Political Economy of Mobile Telecommunications Liberalization: Evidence from OECD Countries", *Journal of Comparative Economics*, **38(2)**, 199-216.

Edwards, G. and L. Waverman (2006), "The Effects of Public Ownership and Regulatory Independence on Regulatory Outcomes," *Journal of Regulatory Economics*, **29(1)**, 23-67.

Estache A. and M. Rossi (2007) "Regulatory Agencies: Impact on Firm Performance and Consumer Welfare," The World Bank.

European Commission - DG Infosoc (2012). *Digital Agenda Scorecard 2012*. June, Bruxelles.

European Commission - DG Energy (2010). *Energy Infrastructure. Priorities for 2020 and beyond. A blue print for an integrated European energy network*, November, Brussels.

Friedman M. (1962), *Capitalism and Freedom*, Chicago/London: The University of Chicago Press.

Gallagher, M., (1991), "Proportionality, Disproportionality and Electoral Systems," *Electoral Studies*, **10**, 33-51.

Gilardi F. (2005), "The Institutional Foundations of Regulatory Capitalism: The Diffusion of Independent Regulatory Agencies in Western Europe", *The ANNALS of the American Academy of Political and Social Science*, **598**, 84-101.

Griffith R., R. Harrison and G. Macartney (2007), "Product Market Reforms, Labour Market Institutions and Unemployment", *The Economic Journal*, **117,** March, 142-166.

Guasch J.L., Laffont J-J, and S. Straub (2008), "Renegotiation of Concession Contracts in Latin America," *International Journal of Industrial Organization*, **26(2)**, 421-442.

Gupta N. (2005), "Partial Privatization and Firm Performance", *The Journal of Finance*, **60(2)**, 987-1015.

Gutièrrez L.H. (2003), "The Effect of Endogenous Regulation on Telecommunications Expansion and Efficiency in Latin America", *Journal of Regulatory Economics*, 23(3), 257-286

Guthrie, G. (2006), "Regulating Infrastructure: The Impact on Risk and Investment", *Journal of Economic Literature*, **44(4)**, 925-972.

Hanretty, C. and C. Koop (2012), "Measuring the Formal Independence of Regulatory Agencies", *Journal of European Public Policy*, 19(2), 198-216.

Henisz, W.J. (2002). "The Institutional Environment for Infrastructure Investment," *Industrial and Corporate Change*, 11(2), 355-389.

Henisz, W.J. and B.A. Zelner (2001), "The Institutional Environment for Telecommunications Investment", *Journal of Economics & Management Strategy*, **10(1)**, 123-147.

Hubbard, G. (1998), "Capital-Market Imperfections and Investment", *Journal of Economic Literature*, 36, 193-225.

Huber, J., and R. Inglehart (1995), "Expert Interpretations of Party Space and Party Locations in 42 Societies," *Party Politics*, **1**, 73-111.

Julio B. and Y. Yook (2012), "Political Uncertainty and Corporate Investment Cycles", *Journal of Finance*, **67(1)**, 45-83.

Knack S. and P. Keefer (1997), "Does Social Capital Have an Economic Payoff? A Cross-country Investigation", *Quarterly Journal of Economics*, 112(4), 1251-1288.

Keefer, P. and D. Stasavage (2003), "The Limits of Delegation: Veto Players, Central Bank Independence, and the Credibility of Monetary Policy", *American Political Science Review*, **97(3)**, 407-423.

Koski H. and T. Kretschmer (2005), "Entry, Standard and Competition: firm Strategy and the Diffusion of Mobile Telephony", *Review of Industrial Organization*, **26(1)**, 89-113.

Laffont J.-J. and J. Tirole (1991), "Privatization and Incentives", *Journal of Law, Economics and Organization*, **7**, 84-105.

La Porta R., Lopez-de-Silanes F., Shleifer A. and Vishny R.W. (1997). Legal Determinants of External Finance, *Journal of Finance*, Vol. LII (**3**), pp. 1131-1150.

Levy B. and P. Spiller (1994), "The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Telecommunications Regulation," *Journal of Law, Economics, and Organization*, **10(2)**, 201-246.

Li Y. and B. R. Lyons (2012), "Market Structure, Regulation and the Speed of Mobile Network Penetration", *International Journal of Industrial Organization*, **30**, 697-707.

Macher J. T. and J. W. Majo (2012), "The World of Regulatory Influence", *Journal or Regulatory Economics*, **41**, 59-79.

Megginson W., and J. Netter (2001) "From State to Market: A Survey of Empirical Studies on Privatization," *Journal of Economic Literature*, **39(2),** 321–89.

Moita, R.M.S. and Pavia C. (2013), "Political Price Cycles in Regulated Industries: Theory and Evidence", *American Economic Journal: Economic Policy*, **5(1)**, 94-121.

Nannicini T., A. Stella, G. Tabellini, and U. Troiano (2013), "Social Capital and Political Accountability." *American Economic Journal: Economic Policy*, **5(2),** 222-50.

Nickell S. (1981), "Biases in Dynamics Models with Fixed Effects", *Econometrica*, **49**, 1417-1426.

Niskanen W. (1971), *Bureaucracy and Representative Government*. Aldine Press, Chicago.

North, D. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press.

North, D. and B. Weingast (1989), "Constitutions and Commitment: the Evolution of Institutions Governing Public Choice in Seventeenth Century England", *Journal of Economic History*, **49**, 803-832.

OECD (2012), *Recommendation of the Council on Regulatory Policy and Governance*, Paris.

Pagano M. and P. Volpin (2005) "The Political Economy of Corporate Governance," *American Economic Review*, **95(4)**, 1005-1030.

Peltzman S. (1976), "Toward a More General Theory of Regulation", *Journal of Law and Economics*, **19(2)**, 211-240.

Persson, T. and G. Tabellini (1999) "The Size and Scope of Government: Comparative Politics with Rational Politicians." *European Economic Review*, **43**, 699-735.

Potrafke N. (2010), "Does Government Ideology Influence Deregulation of Product Markets? Empirical Evidence from OECD Countries", *Public Choice*, **143(1-2)**, 135-155.

Roodman D. (2006), "How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata," *The Center for Global Development*, WP n. 103.

Schiantarelli F. and D. Geourgoutsos (1990), "Monopolistic Competition and the Q Theory of Investment", *European Economic Review*, **34**, 1061-1078.

Spiller, P.T.; Vogelsang, I. (1997), "The Institutional Foundations of Regulatory Commitment in the UK: The Case of Telecommunications", *Journal of Institutional and Theoretical Economics,* 153(4): 607-629.

Spiller , P.T. and S. Urbiztondo (1994), "Political Appointees vs. Career Civil Servants: A Multiple-Principals Theory of Political Institutions", *European Journal of Political Economy*, **10(3)**, 465-497.

Stasavage D. (2002), "Private Investment and Political Institutions", *Economics and Politics*, 14(1), 41-63.

Stigler, G. (1971), "The Economic Theory of Regulation", *Bell Journal of Economics*, **2**, 3-21.

Strausz, R. (2011), "Regulatory risk under Optimal Incentive Regulation", *The Economic Journal*, 121, 740-762.

Tabellini G. (2010), "Culture and Institutions: Economic Development in the Regions of Europe", *Journal of European Economic Association*, 8(4), 677 – 716.

Wallsten S. (2001), "An Econometric Analysis of Telecom Competition, Privatization and Regulation in Africa and Latin America", *Journal of Industrial Economics*, **49(1)**, 1-19.

Table 1 - Summary Statistics

Variable	Mean	Std. Dev.	Min	Max	No. Obs.
Panel A: Full Sample					
Real Sales (in millions of 2005 dollars)	9,688	14,834	8	80,226	720
Real Total Asset (in mills. of 2005 dollars)	20,746	32,083	29,7	156,216	720
Investment Rate	0.111	0.072	0.000	0.674	703
Cash flow to Capital Stock	0.135	0.102	- 0.940	0.871	719
Sales to Capital Stock	0.742	0.804	0.020	6.191	684
Independence Regulatory Agency dummy	0.585	0.493	0	1	720
Index of Regulatory Independence	0.616	0.114	0.36	0.83	421
Government's UCR	0.344	0.357	0	1	720
Political Orientation	5.662	1.481	3.665	8.025	720
EXERLC	1.960	0.942	1	3	720
Disproportionality Index	10.527	8.222	0.428	33.739	720
Checks & Balances	3.874	0.975	2	7	720
Rule of Law	87.944	10.098	45.694	100	621
Government Stability	0.156	0.320	0	1	720
Distrust	0.352	0.104	0.1	0.665	720
OECD Liberalization Index	2.708	2.042	0	6	521
Investor Protection	3.826	1.216	1	5	720
Lawyers (number per 10^5 inhabitants)	127.178	49.007	29	209	633
Panel B: Firm-year observations under an IRA					
Real Sales (in millions of 2005 dollars)	9,321	13,373	36	80,226	421
Real Total Asset (in mills. of 2005 dollars)	20,736	30,177	108	155,349	421
Investment Rate	0.114	0.071	0.008	0.673	408
Cash flow to Capital Stock	0.133	0.098	- 0.940	0.498	420
Sales to Capital Stock	0.730	0.863	0.020	6.191	403
Government's UCR	0.285	0.341	0	1	421
Panel C: Firm-year observations without an IRA					
Real Sales (in millions of 2005 dollars)	10,203	16,687	8	75,287	299
Real Total Asset (in mills. of 2005 dollars)	20,760	34,6404	30	156,216	299
Investment Rate	0.107	0.073	0.000	0.537	295
Cash flow to Capital Stock	0.138	0.107	- 0.561	0.871	299
Sales to Capital Stock	0.758	0.709	0.093	4.670	281
Government's UCR	0.402	0.368	0	1	299
Panel D: IRA regulated firms (before and after the establishing of the IRA)					
Investment Rate	0.114	0.068	0.006	0.674	489
Cash flow to Capital Stock	0.133	0.106	-0.939	0.498	502
Sales to Capital Stock	0.723	0.823	0.020	6.191	473
Government's UCR	0.321	0.353	0	1	503
Panel E: Regulated firms never under an IRA					
Investment Rate	0.105	0.080	0.000	0.536	214
Cash flow to Capital Stock	0.141	0.094	0.016	0.871	217
Sales to Capital Stock	0.783	0.758	0.093	4.670	211
Government's UCR	0.362	0.365	0	1	217

Table 2a – OLS Estimates of Simple Investment Models

I/K$_t$	All firms				Firms subject to IRA (before and after the IRA)			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
IRA $_{t-1}$	0.032	0.031	0.032	0.047	0.025	0.051	0.023	0.051
	(0.015)**	(0.017)*	(0.015)*	(0.024)*	(0.014)*	(0.030)*	(0.013)*	(0.030)*
	(0.012)**		(0.012)*		(0.009)*		(0.007)**	
	(0.017)*		(0.015)**		(0.015)[1]		(0.014)[1]	
(Π/K)$_{t-1}$	-		0.115	0.067	-	-	0.085	0.058
	-		(0.056)**	(0.047)	-	-	(0.048)*	(0.044)
	-		(0.077)		-	-	(0.072)	
			(0.065)*				(0.043)*	
Sales Growth$_t$	-		0.038	0.037	-	-	0.035	0.038
	-		(0.015)**	(0.021)*	-	-	(0.018)*	(0.026)
	-		(0.013)**		-	-	(0.018)	
			(0.015)**				(0.017)*	
	-	-			-	-		
Firm dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies			Yes	Yes			Yes	Yes
Country dummies			Yes	Yes			Yes	Yes
Country * Year dummies			Yes	Yes			Yes	Yes
R squared within	0.115	0.593	0.149	0.620	0.120	0.627	0.149	0.633
N. Firms [N. Obs.]	80 [590]	80 [590]	80 [502]	80 [502]	55 [405]	55 [405]	55 [403]	55 [403]

Notes. Standard errors in parentheses are robust to heteroschedasticity and to within group – i.e. at firm, sector and country level in the first, second and third row, respectively- serial correlation. The dependent variable (*I/K*) is the investment rate measured as the ratio between capital expenditures and capital stock at replacement value. (Π/*K*) is the ratio between operational cash flow and the capital stock at replacement value. *Sales growth* is the rate growth of real sales. *IRA* is a dummy equal to 1 if an independent regulatory agency (IRA) is in place and equal to 0 otherwise. ***, **, * denote significance of the coefficients at 1%, 5% and 10%.

[1] P value = 0.12

Table 2b: In-time "placebo" test of the presence of pre-trends in the investment of firms subject to IRA

Dep. Var. IK_t	(1)	(2)	(3)	(4)	(5)
IRA_{t+1}	-0.004			-0.010	
	(0.011)			(0.013)	
IRA_{t+2}		-0.006			-0.015
		(0.011)			(0.011)
IRA_{t+3}			-0.005		
			(0.011)		
$(\Pi/K)_{t-1}$				0.075	0.086
				(0.052)	(0.055)
Sales growth$_t$				0.042**	0.053**
				(0.020)	(0.023)
Firm dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
R-squared	0.069	0.038	0.031	0.091	0.063
N. firms	60	59	59	60	57
Observations	430	370	311	344	284

Notes. Fixed effects estimation. Standard errors in parentheses are robust to heteroschedasticity and to within group (firm) serial correlation. The dependent variable (I/K) is the investment rate measured as the ratio between capital expenditures and capital stock at replacement value. (Π/K) is the ratio between operational cash flow and the capital stock at replacement value. *Sales growth* is the rate growth of real sales. *IRA* is a dummy equal to 1 if an independent regulatory agency (IRA) is in place and equal to 0 otherwise. ***, **, * denote significance of the coefficients at 1%, 5% and 10%

Table 3 – Investment Euler-Equation with IRA (Within-group and GMM-SYS estimates with internal instruments)

(I/K)$_t$	All firms			Firms subject to IRA (before and after the IRA)				
	(1) WG	(2) GMM-SYS	(3) GMM-SYS	(4) WG	(5) GMM-SYS	(6) GMM-SYS	(7) GMM-SYS	(8) GMM-SYS
(I/K)$_{t-1}$	0.601 (0.095)*** [0.056]*** [0.164]***	0.965*** (0.136)	0.939*** (0.133)	0.573 (0.134)*** [0.055]*** [0.201]**	0.905*** (0.152)	0.864*** (0.141)	0.846*** (0.161)	0.819*** (0.144)
(I/K)$^2_{t-1}$	-0.767 (0.181)*** [0.165]*** [0.253]***	-1.195*** (0.196)	-1.160*** (0.190)	-0.874 (0.199)*** [0.189]** [0.249]***	-1.156*** (0.218)	-1.118*** (0.202)	-1.088*** (0.229)	-1.061*** (0.205)
(Π/K)$_{t-1}$	0.113 (0.051)** [0.053]** [0.068]	-0.003 (0.030)	-0.007 (0.031)	0.083 (0.042)* [0.043]* [0.052]	0.026 (0.030)	0.027 (0.029)	-0.014 (0.035)	-0.009 (0.032)
(Y/K)$_{t-1}$	0.012 (0.013) [0.010] [0.013]	0.003 (0.004)	0.002 (0.004)	-0.10 (0.016) [0.012] [0.017]	-0.0005 (0.001)	-0.001 (0.002)	0.001 (0.002)	-0.0004 (0.003)
IRA$_{t-1}$	0.021 (0.010)** [0.008]** [0.010]**	0.012* (0.006)	0.014** (0.007)	0.022 (0.011)** [0.006]** [0.011]*	0.024** (0.012)	0.033*** (0.013)	- -	- -
Government UCR$_{t-1}$		- -	0.007 (0.008)		- -	0.015 (0.011)	- -	0.009 (0.012)
Political Orientation$_{t-1}$		- -	-0.002 (0.002)		- -	-0.005* (0.003)	- -	-0.005* (0.003)
IRA*Electricity	- -	- -	- -	- -	- -	- -	0.027* (0.015)	0.036** (0.016)
IRA*Telecoms	- -	- -	- -	- -	- -	- -	0.040** (0.019)	0.046** (0.019)
IRA*Water	- -	- -	- -	- -	- -	- -	0.020* (0.011)	0.027** (0.012)
IRA*Gas	- -	- -	- -	- -	- -	- -	0.026* (0.016)	0.038** (0.017)
Firm dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R squared within	0.242	-	-	0.195	-	-	-	-
F-test (p-value)	12.93 (0.00)	-	-	16.06 (0.00)	-	-	-	-

AR(1) test *(p-value)*	-	0.004	0.004	-	0.011	0.011	0.009	0.010
AR(2) test *(p-value)*	-	0.863	0.865	-	0.892	0.797	0.852	0.765
Sargan-Hansen test *(p-value)*	-	0.446	0.341	-	0.939	0.867	0.900	0.942
N. Firms [N. Obs.]	80[582]	80[521]	80[521]	55[400]	55 [359]	55 [359]	55 [359]	55 [359]

Notes. Fixed effects (Within-Group) and dynamic panel-data estimation, one-step system GMM estimates. All regressions include firm and year dummies. Standard errors in parentheses are robust to heteroschedasticity and to within group serial correlation. In Columns (1) and (4) standard errors are clustered at firm, sector and country level (first, second and third row, respectively). (*I*/*K*), *(Π/K)*, (*Y*/*K*), *IRA*, *Government's UCR* and *Political orientation* are defined in Table 2. AR(1) [AR(2)] tests the null hypothesis of no first-order [second-order] correlation in the differenced residuals. The Sargan-Hansen statistic tests the null hypothesis that the over-identifying restrictions are valid. ***, **, and * denote significance of the coefficients at 1%, 5% and 10%.

Table 4 – Direct Impact of Political and Institutional Variables on Firms' Investment

$(I/K)_t$	(1)	(2)	(3)	(4)	(5)	No IRA in place (6)
$(I/K)_{t-1}$	0.947***	0.823***	0.934***	0.942***	0.834***	0.725***
	(0.133)	(0.122)	(0.131)	(0.135)	(0.126)	(0.188)
$(I/K)^2_{t-1}$	-1.183***	-0.999***	-1.157***	-1.159***	-1.031***	-0.515
	(0.197)	(0.174)	(0.188)	(0.193)	(0.196)	(0.342)
$(\Pi/K)_{t-1}$	-0.003	-0.004	-0.013	-0.003	-0.001	0.190
	(0.029)	(0.038)	(0.032)	(0.031)	(0.039)	(0.122)
$(Y/K)_{t-1}$	0.002	-0.0001	0.003	0.001	-0.001	0.018***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.007)
IRA_{t-1}	0.014**	0.020***	0.015**	0.014**	0.021***	-
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	-
Government UCR $_{t-1}$	0.008	-0.001	0.006	0.006	-0.001	-0.005
	(0.008)	(0.010)	(0.008)	(0.008)	(0.013)	(0.021)
Political Orientation $_{t-1}$	-0.001	-0.003	-0.002	-0.002	-0.003	-0.011**
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)
Disproportionality $_{t-1}$	0.0002	-	-	-	0.0003	0.000
	(0.0003)	-	-	-	(0.0004)	(0.001)
Rule of Law $_{t-1}$	-	-0.0004	-	-	-0.0005	-0.002
	-	(0.0004)	-	-	(0.0005)	(0.007)
Checks & Balances $_{t-1}$	-	-	0.003	-	0.003	0.000
	-	-	(0.004)	-	(0.006)	(0.001)
Stability $_{t-1}$	-	-	-	0.017	0.010	0.024
	-	-	-	(0.014)	(0.012)	(0.019)
Arellano-Bond test for AR(1) *(p-value)*	0.004	0.010	0.004	0.006	0.010	0.006
Arellano-Bond test for AR(2) *(p-value)*	0.885	0.900	0.842	0.968	0.831	0.764
Sargan-Hansen test *(p-value)*	0.353	0.192	0.404	0.544	0.294	0.760
N. Firms [N. Obs.]	80 [521]	80 [442]	80 [521]	80 [521]	80 [492]	37 [175]

Notes. The sample in Column (6) includes firms before or never under the IRA. Dynamic panel-data estimation, one-step system GMM estimates. All regressions include firm and year dummies. Standard errors in parentheses are robust to heteroschedasticity and to within group serial correlation. (*I/K*), *(Π/K)*, (*Y/K), IRA, Government's UCR* and *Political orientation* are defined in Table 2. Political and Institutional variables are defined in Section 5.4. AR(1) [AR(2)] tests the null hypothesis of no first-order [second-order] correlation in the differenced residuals. The Sargan-Hansen statistic tests the null hypothesis that the over-identifying restrictions are valid. ***, **, * denote significance of the coefficients at 1%, 5% and 10%.

Table 5 – Investment Equation with IRA, Government Ownership and Political Orientation

I/K_t	(1)	(2)	(3)	(4)	IRA in place (5)
$(I/K)_{t-1}$	0.937***	0.928***	0.914***	0.882***	0.855***
	(0.167)	(0.129)	(0.124)	(0.143)	(0.162)
$(I/K)^2_{t-1}$	-1.130***	-1.267***	-1.176***	-1.122***	-1.205***
	(0.242)	(0.186)	(0.206)	(0.234)	(0.233)
$(\Pi/K)_{t-1}$	-0.006	-0.012	-0.001	0.0001	-0.009
	(0.035)	(0.075)	(0.031)	(0.031)	(0.059)
$(Y/K)_{t-1}$	0.001	-0.003	0.002	0.002	-0.001
	(0.005)	(0.006)	(0.005)	(0.005)	(0.003)
IRA_{t-1} (α_1)	0.014*	0.143**	0.136**	0.152***	-
	(0.008)	(0.070)	(0.062)	(0.059)	-
Government UCR $_{t-1}$ (α_2)	-0.016	-0.032	0.006	0.004	0.051**
	(0.025)	(0.045)	(0.039)	(0.042)	(0.024)
Political Orientation$_{t-1}$ (α_3)	-0.005	0.004	0.003	0.004	-0.015**
	(0.004)	(0.010)	(0.006)	(0.006)	(0.007)
Government UCR $_{t-1}$* IRA (α_4)	-	0.063	0.027	0.030	-
	-	(0.051)	(0.029)	(0.030)	-
Political Orientation $_{t-1}$* IRA (α_5)	-	-0.023**	-0.023**	-0.026**	-
	-	(0.011)	(0.011)	(0.010)	-
OECD Liberalization Index $_{t-1}$	-	0.004	-	-	-
	-	(0.005)	-	-	-
Investor Protection $_{t-1}$	-	-	-0.003	-	-
	-	-	(0.004)	-	-
Distrust $_{t-1}$	0.034	-	-	0.055	0.005
	(0.060)	-	-	(0.054)	(0.061)
P-value test on $\alpha_1 + \alpha_4 = 0$	-	0.005	0.002	0.001	-
P-value test on $\alpha_2 + \alpha_4 = 0$	-	0.123	0.284	0.251	-
P-value test on $\alpha_1 + \alpha_5 = 0$	-	0.044	0.028	0.011	-
P-value test on $\alpha_3 + \alpha_5 = 0$	-	0.036	0.008	0.006	-
Arellano-Bond test for AR(1) *(p-value)*	0.005	0.010	0.005	0.005	0.012
Arellano-Bond test for AR(2) *(p-value)*	0.922	0.415	0.675	0.612	0.654
Sargan-Hansen test *(p-value)*	0.356	0.263	0.224	0.251	0.507
External Instruments					
Disproportionality	0.545	0.271	0.255	0.670	0.640
Checks & Balances	-	0.876	0.617	0.704	0.686
Stability	0.487	0.359	0.615	0.505	-
Rule of Law	-	-	-	-	0.242
EXECRLC	0.850	-	-	-	-
N. Firms [N. Obs.]	80 [521]	58 [367]	80 [521]	80 [521]	55 [300]

Notes. Dynamic panel-data estimation, one-step system GMM estimates. All regressions include firm and year dummies. Standard errors in parentheses are robust to heteroschedasticity and to within group serial correlation. (*I/K*), *(*Π*/K*), (*Y/K, IRA, Government's UCR* and *Political orientation* are defined in Table 2. *Distrust, OECD Liberalization Index* and *Investor Protection* are defined in Section 5.3. External instruments are defined in Section 5. AR(1) [AR(2)] tests the null hypothesis of no first-order [second-order] correlation in the differenced residuals. The Sargan-Hansen statistic tests the null hypothesis that the over-identifying restrictions are valid. The *Difference-in-Hansen* statistics tests the exogeneity of subsets or individual instruments. ***, **, * denote significance of the coefficients at 1%, 5% and 10%.
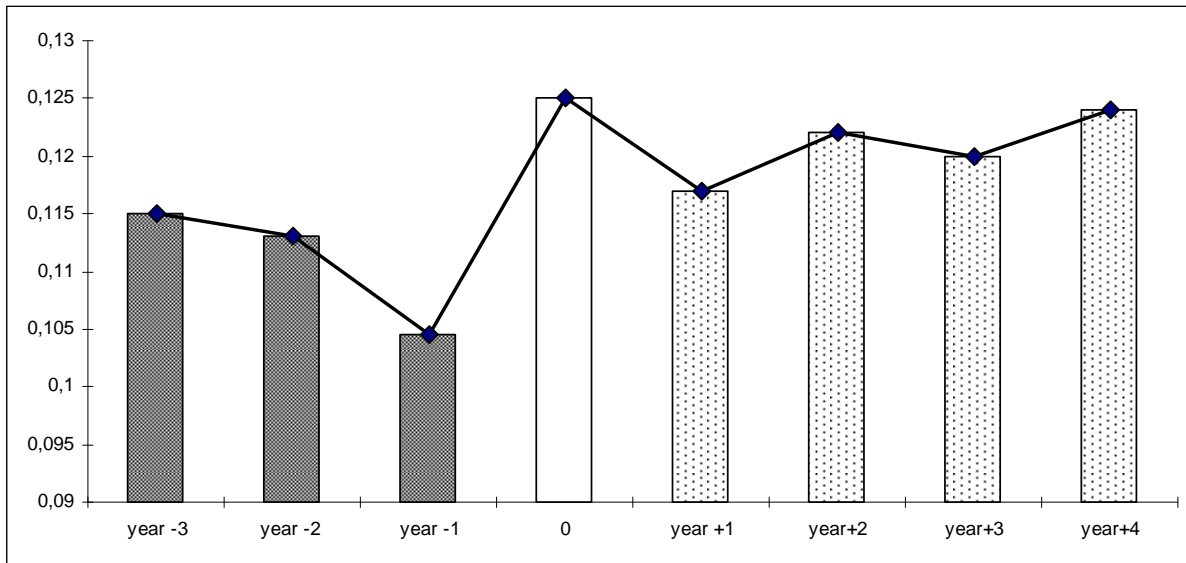
FIGURE 2 - MARGINAL EFFECT OF IRA ON *IK* AS POLITICAL ORIENTATION SHIFTS FROM LEFT TO RIGHT[1]
($\alpha_1 + \alpha_5$*Political Orientation*)

Marginal Effect of IRA on *IK* as Political Orientation changes (95% confidence intervals)

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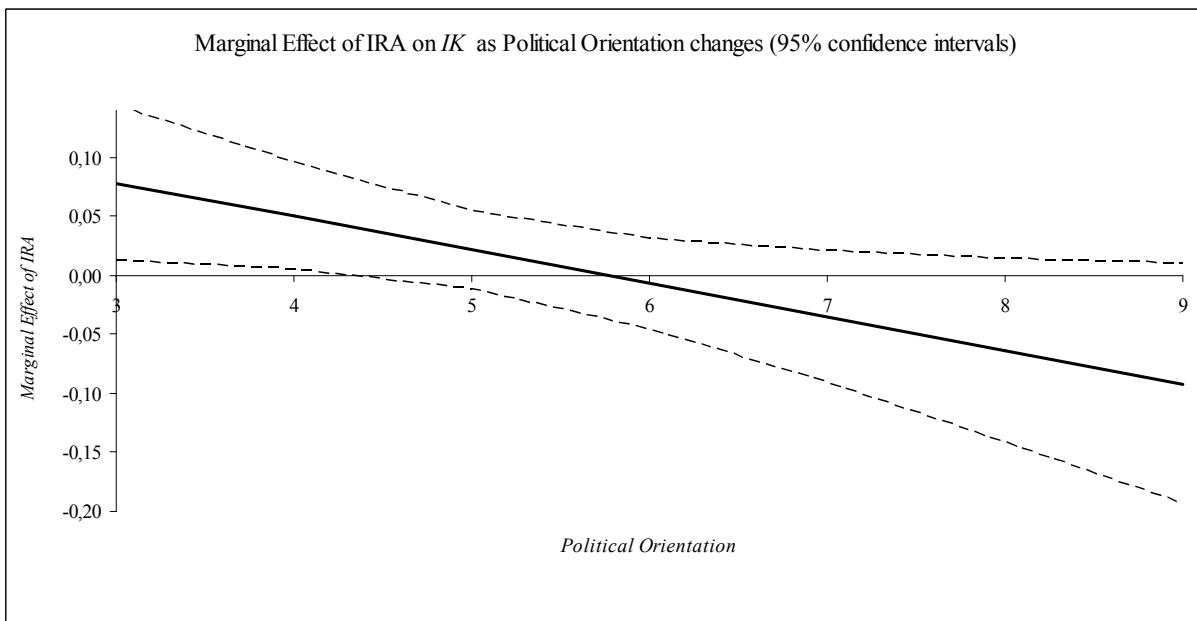
[1] We report values only for the range of variation of the *Political Orientation* variable, i.e. [3.665 – 8.025]. Note that the 80% of observations belongs to the range [4 – 7.71].

**Dates of the establishing acts of energy and telecom IRAs and
Political orientation of the Government in charge**

Country	Energy		Telecom	
	Date of establishing act of energy IRA (Gilardi, 2005)	**Leading party or coalition and political orientation of the Government when the IRA's establishing act is approved (Henisz, 2000)****	**Date of establishing act of telecom IRA (Gilardi, 2005)**	**Leading party or coalition and political orientation of the Government when the IRA's establishing act is approved (Henisz, 2000)****
Austria	2000	Social Democratic Party run by Franz Vranitzky *Executive Or.:* Right	1997	Social Democratic Party run by Franz Vranitzky *Executive Or.:* Right
Belgium	1999	Dutch Christian Social Coalition run by Jean-Luc Dehaene *Executive Or.:* Center	1991	Dutch Christian Social Coalit run by Wilfred Martens *Executive Or.:* Center
Denmark	1999	Social Democratic Party run by Poul Nyrup Rasmussen *Executive Or.:*Left	2002	Liberal Party of Denmark run by Anders Fogh Rasmussen *Executive Or.:* Right
Finland	1995	Centre Party run by Esko Aho *Executive Or.:* Center/Right	1987	Social Democratic Party run by Kalevi Sorsa *Executive Or.:* Center/Right
France	2000	Socialist Party run by Lionel Jospin *Executive Or.:* Left	1996	Rally for the Republic run by Alain Juppe *Executive Or.:* Right
Germany	2005*	CDU/CSU run by Angela Merkel *Executive Or.:* Right	1996	CDU/CSU run by Helmut Kohl *Executive Or.:* Right
Greece	2000	Pan-Hellenic Movement run by Costas Simitis *Executive Or.:* Center/Left	1992	New Democracy run by Constantine Mitsotakis *Executive Or.:* Right
Ireland	1999	Fianna Fail-Labour run by Bertie Ahern *Executive Or.:* Center/Right	1997	Fianna Fail-Labour run by Albert Reynolds *Executive Or.:* Center/Right
Italy	1996	Technical (Non-partisan) govn.'t run by Lamberto Dini *Executive Or.:* Center	1997	Socialist Party run by Romano Prodi *Executive Or.:* Center/Left
Netherlands	1998	Labour Party run by William Kok *Executive Or.:* Center/Right	1997	Labour Party run by William Kok *Executive Or.:* Center/Right
Portugal	1995	Social Democratic Party run by Anibal Cavaco Silva *Executive Or.:* Right	2001	Socialist Party run by Antonio Gutteres *Executive Or.:* Left
Spain	1998	Popular Party run by Jose Aznar *Executive Or.:* Right	1996	Socialist Party run by Felipe Gonzales *Executive Or.:* Left
Sweden	1998	Social Democratic Labour Party run by Göran Persson *Executive Or.:* Left	1992	Moderate Party run by Carl Bildt *Executive Or.:* Right
UK	1989	Conservative Party run by Margaret Thatcher *Executive Or.:* Right	1984	Conservative Party run by Margaret Thatcher *Executive Or.:* Right

* In July 2005 the previous regulatory authority of telecoms was renamed as *Federal Network Agency for Electricity, Gas, Telecommunications, Posts and Railway* (Bundesnetzagentun) extending its competencies from telecoms and postal services to energy and railways.

** The *Political Constraint Index Database*, developed by Henisz (2002), is available at: http://www-management.wharton.upenn.edu/henisz/)

Pseudo First-Stage Analysis: IRAs and Country Institutions

IRA$_t$	(1)	(2)	(3)	(4)
	All Firms	Firms under IRA (before and after the IRA)	All Firms	Firms under IRA (before and after the IRA)
Disproportionality $_{t-1}$	-0.051***	-0.058***	-0.038*	-0.038
	(0.018)	(0.024)	(0.019)	(0.027)
Rule of Law $_{t-1}$	0.014*	0.022*	0.015**	0.023**
	(0.007)	(0.011)	(0.007)	(0.010)
Checks and Balance $_{t-1}$	-0.064**	-0.078*	-0.056*	-0.069
	(0.032)	(0.044)	(0.032)	(0.043)
Stability $_{t-1}$	0.022[2]	0.034*	-	-
	(0.014)	(0.020)	-	-
Distrust $_{t-1}$	-	-	0.819	1.145*
	-	-	(0.540)	(0.691)
Firm dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
F-test joint significance	2.85	2.83	2.79	3.54
p-value	*0.029*	*0.032*	*0.022*	*0.007*
R squared within	0.205	0.274	0.222	0.296
N. Firms [N. Obs.]	80 [536]	55 [375]	80 [536]	80 [536]

Notes. Fixed effects estimation. All regressions include firm and year dummies. Standard errors in parentheses are robust to heteroschedasticity and to within group serial correlation. *Disproportionality, Rule of Law, Checks and Balances, Stability,* and *Distrust* are defined in Section 5. ***, **, * denote significance of the coefficients at 1%, 5% and 10%.

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[2] P value = 0.118

Investment Equation with *Distrust*

I/K$_t$	*Distrust* as regressor		*Distrust* as instrument	
	(1)	**(2)**	**(3)**	**(4)**
(I/K)$_{t-1}$	0.949***	0.909***	0.835***	0.882***
	(0.204)	*(0.173)*	*(0.125)*	*(0.165)*
(I/K)$^2_{t-1}$	-1.094***	-1.029***	-1.033***	-1.021***
	(0.337)	*(0.300)*	*(0.174)*	*(0.303)*
(Π/K)$_{t-1}$	0.044	0.055*	-0.015	0.068
	(0.030)	*(0.033)*	*(0.040)*	*(0.031)*
(Y/K)$_{t-1}$	0.0001	0.002	-0.0003	0.003
	(0.004)	*(0.003)*	*(0.003)*	*(0.005)*
IRA$_{t-1}$ (α_1)	0.011*	0.080**	0.016***	0.130**
	(0.007)	*(0.041)*	*(0.006)*	*(0.071)*
Government UCR$_{t-1}$ (α_2)	-0.001	-0.018	0.013	-0.030
	(0.012)	*(0.015)*	*(0.022)*	*(0.021)*
Political Orientation$_{t-1}$ (α_3)	-0.004	0.006	-0.005	0.012
	(0.005)	*(0.004)*	*(0.003)*	*(0.009)*
Government UCR$_{t-1}$* IRA (α_4)	-	0.030	-	0.043*
	-	*(0.031)*	-	*(0.024)*
Political Orientation$_{t-1}$* IRA (α_5)	-	-0.013*	-	-0.024*
	-	*(0.007)*	-	*(0.013)*
Distrust$_{t-1}$	-0.062	-0.012	-	-
	(0.091)	*(0.106)*	-	-
Arellano-Bond test for AR(1) *(p-value)*	0.002	0.001	0.009	0.002
Arellano-Bond test for AR(2) *(p-value)*	0.990	0.769	0.870	0.773
Sargan-Hansen test *(p-value)*	0.524	0.766	0.237	0.387
External Instruments				
Political variables	0.917	0.701	0.804	0.531
Lawyers	0.326	0.437	-	-
Distrust	-	-	0.899	0.707
N. Firms [N. Obs.]	75 [459]	75 [514]	80 [442]	80 [521]

Notes. Dynamic panel-data estimation, one-step system GMM estimates. All regressions include firm and year dummies. Standard errors in parentheses are robust to heteroschedasticity and to within group serial correlation. (*I/K*), (*Π/K*), (*Y/K*), *IRA*, *Government's UCR* and *Political orientation* are defined in Table 2. *Distrust* is defined in Section 5.3. *Lawyers* is defined in Section 7.4. Political variables are defined in Section 5. AR(1) [AR(2)] tests the null hypothesis of no first-order [second-order] correlation in the differenced residuals. The Sargan-Hansen statistic tests the null hypothesis that the over-identifying restrictions are valid. The *Difference-in-Hansen* statistics tests the exogeneity of subsets or individual instruments. ***, **, * denote significance of the coefficients at 1%, 5% and 10%.