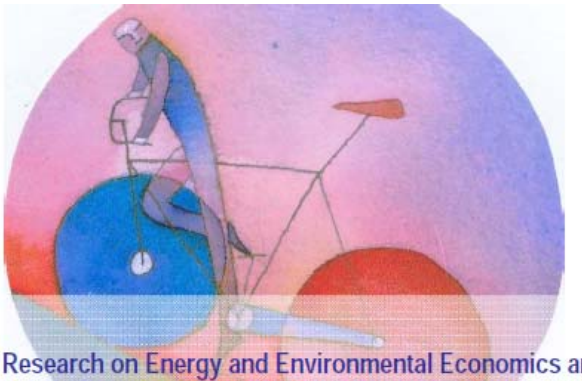

IEFE
Centre for Research on Energy and Environmental Economics and Policy

Working Paper Series - ISSN 1973-0381

Incentive Compensation and Incentive Regulation: Empirical Evidence

Carlo Cambini, Sara De Masi and Laura Rondi

Working Paper n. 58

December 2013

IEFE - The Center for Research on Energy and Environmental Economics and Policy at Bocconi University
via Guglielmo Röntgen, 1 - 20136 Milano
tel. 02.5836.3820 - fax 02.5836.3890
www.iefe.unibocconi.it – iefe@unibocconi.it

Incentive Compensation and Incentive Regulation: Empirical Evidence[†]

Carlo Cambini[*]

Sara De Masi[**]

Laura Rondi[***]

4th December, 2013

Abstract

This paper examines the relationship between CEO pay and firm performance within a sample of European publicly listed energy utilities from 2000 to 2010, focusing on the differential responses that arise from being subject to different regulatory regimes. In particular, we investigate the difference in pay-performance sensitivity across regulated and unregulated firms as well as the impact of different regulatory schemes – incentive vs. cost-based regulation - on CEO monetary incentives. Using various measures of performance, we find that European energy utilities link CEO compensation to firm performance, but CEO pay-performance is higher for unregulated companies. When we focus on the effect of alternative regulatory schemes, our results show that pay-performance sensitivity is significantly higher for firms under incentive regulation than within firms under cost-based regulation. This result holds after controlling for firm - private vs. state - ownership and for varying degrees of market liberalization across countries.

JEL classification: G30, J33, L51, M12

Key words: Managerial compensation, Incentive contracts, Incentive regulation, Energy utilities

---

[†] We thank Kose John, Robert Ritz, David E.M. Sappington and seminars participants at the 2013 EARIE Annual Meeting in Evòra, Stern School of Business NYU, for comments and suggestions on an earlier version of the paper.

[*] Politecnico di Torino - Department of Management (DIGEP), IEFE-Bocconi & Florence School of Regulation – European University Institute. Email, carlo.cambini@polito.it

[**] New York University, Stern School of Business, 44 West 4th Street, 10012, New York, United States. Email, sdemasi@stern.nyu.edu and University of Florence, via delle Pandette 9, 50127 Florence, Italy.

[***] *Corresponding author*: Politecnico di Torino - Department of Management (DIGEP), Corso Duca degli Abruzzi, 24, 10129 Torino, Italy. Tel: + 39-0115647232, Email, laura.rondi@polito.it

1. Introduction

CEO compensation and its sensitivity to performance are among the most widely studied topics in corporate governance (Murphy, 1999; Goergen and Renneboog, 2011; Murphy, 2012). Remuneration contracts can be designed as an incentive mechanism that may influence the way in which individuals behave, turning into a corporate governance instrument that aligns interests between managers and shareholders. Specifically, when in a corporation shareholders do not have complete information about the CEO's activities and the firm's investment opportunities, a performance-based remuneration contract can be introduced. This contract links CEO pay to shareholder wealth via performance indicators, pushing the CEO to take decisions that maximize shareholders' value. Compensation contracts may be a powerful way of motivating, attracting and retaining managers.

The incentive mechanisms for managers and, in particular for CEOs, are not only internal to the firm, but they can be also external. For example, the product market, through its structure and its dynamics, has a strong influence on managers' behavior. In competitive markets, managers have to take decisions that improve firm efficiency and performance in order to make profits and stay in the market. In other words, by leaving managers under constant pressure the product market discipline is expected to provide incentives to mitigate the classical managerial agency problems (Hart, 1983; Holmström and Tirole, 1989; Giroud and Mueller, 2010).

To the contrary, in non-competitive or regulated markets, managerial slack and agency problems are pervasive and managers are more likely to behave so as to maximize their own self-interests rather than those of shareholders. The public utility sector is one of these non-competitive markets where economic regulation plays a strong influencing role. Utilities provide services of general interests, operating in a regulated environment that sets a variety of constraints on their behavior and decisions. On the other hand, regulators seek to make firms investing, innovating and operating as if they were in a competitive market. So, if on one hand economic regulation is expected to preserve efficiency incentives within regulated firms, on the other hand, by reducing the complexity of CEOs' tasks and the discretion of their decision-power, or even imposing constraints on the level of the compensation, it may dampen CEOs' internal incentives, thus making regulated firms less attractive for more talented managers (Joskow, Rose and Shepard, 1993; Palia, 2000; Hadlock, Scott Lee and Parrino, 2002). The overall implications of economic regulation for CEO incentives are thus uncertain, and we draw on the corporate governance and regulation literatures to

develop an encompassing research framework that allows us to derive new evidence from the interaction between incentive compensation and incentive regulation. We thus analyze the relationship between CEO pay and firm performance within a sample of European publicly listed energy utilities, focusing on the differential responses that arise from being subject to different regulatory regimes, exploiting cross-country heterogeneity and the recent evolution in the regulatory regimes within the European energy industry.

The existing evidence for US companies (Joskow, Rose and Shepard, 1993; Joskow, Rose and Wolfram, 1996) has clearly demonstrated substantial and persistent differences in executive compensation between firms subject to economic regulation and those in unregulated industries. The authors found that CEOs of regulated firms are paid less, that their compensation packages are more weighted toward fixed salary and, more importantly, that they are less responsive to variations in firm financial performance. This evidence suggests that corporate governance mechanisms might be less relevant for regulated firms and even substituted by regulation instruments. In contrast, however, recent evidence from a wide set of regulated industries hints at a more complex interrelation between regulation and corporate governance where governance instruments such as board size, monitoring directors and holdings and equity-based compensation appear to "work together to ensure an effective governance structure" (Becher and Frye, 2011, p. 736).

In Europe, the introduction of corporate governance guidelines issued by both the OECD (1999) and the European Commission, and the growing attention by the media and the public opinion have lighted up the importance of CEO incentives, but the topics of regulation and corporate governance have been so far separately analyzed. Moreover, to our knowledge, the issue of substitutability or complementarity between regulation and governance has never been explored for European firms.

In this paper we take seriously the view of Joskow, Rose and Wolfram (1996) whereby regulation changes the "optimal" compensation level in the sector, thus implying that observed variations in pay across industries could be due, in whole or in part, to unmeasured differences in CEO productivity or ability. Therefore, to build a suitable framework to closely studying the interaction of the state of regulation and the incentives provided by the firms or by the market, we focus on a sample of firms operating in a single industry – the energy sector – but in different segments, both unregulated (generation) and regulated (distribution or transmission), and also subject to different regulatory mechanisms (incentive vs. cost-based schemes). Differing regulatory

mechanisms provide us with the within sector heterogeneity that allows us to investigate the substitutability/complementarity issue.

Regulators of European energy utilities either continued with the low powered incentives/cost-based mechanisms already in place, or switched to incentive regulation over time. Under cost-based schemes (like the so called rate-of-return regulation), regulators fix the rate of return the firm can earn on its assets, deciding the price that the companies have to charge, considering all main operating costs to cover. Evidently, by guarantying the firm's financial integrity, cost-based regimes do not provide any specific incentives to efficiency-seeking managerial practices. Under incentive regulation[1], regulators apply fixed-price contracts, leaving firms to choose a price below or equal to a certain threshold. By pursuing cost savings, managers can then generate higher profits and thus benefit shareholders. In other words, firms under incentive regulation are the "residual" claimants of their performance and this, in theory, reduces managerial slack and provides the appropriate efficiency incentives to managers. Over time, however, incentive regulation has become the most adopted regulatory scheme by national authorities in Europe.

The goal of this paper is to understand whether "externally" (the regulatory mechanism) and/or "internally" (the CEO compensation contract) provided incentives better align managers and shareholders' interests. Moreover, by testing whether the effect exerted by incentive compensation provides an additional, or an alternative, source of efficiency-inducing behavior we aim at throwing some light on the complementarity or substitutability of these two governance instruments. Our analysis accounts for potential influences of firms' residual state ownership as well as for cross-country differences in the extent of market openness and liberalization. To our knowledge, this is the first paper that investigates the CEO pay-performance sensitivity in the public utility sector in Europe, by spelling out the effects of different regulatory regimes.

Our results show that, overall, consistent with previous studies, energy utilities link CEO compensation to firm performance. Using different measures of firm performance, we find a positive and statistically significant CEO pay-for-performance relationship within energy companies. Specifically, the CEO pay-performance sensitivity in the full sample is 0.09, 0.16 and 0.14 if we consider, respectively ROA - Return on Assets, market capitalization and market to book as a firm performance indicators. These results imply that an increase of 10% in ROA, in market

[1] In Europe, incentive regulation is usually implemented as price- or revenue-cap mechanisms or benchmarking, while earnings sharing plans are not implemented in Europe. For a more general analysis, see Armstrong and Sappington (2006), while Joskow (2008) surveys incentive regulation schemes as adopted in the energy industry.

capitalization and in market to book leads respectively to an increase of 0.9%, 1.6% and 1.4% in CEO compensation.

When we focus on the differences between regulated and unregulated firms, we find that compensations of CEOs in the regulated segments are lower and less responsive to variations in firm performance. We argue that this difference can be explained, at least in part, by the different intensity of market competition. Managers at transmission service operators (TSOs) or distribution service operators (DSOs) perform in a less competitive environment, where profitability targets are more or less set – and somewhat guaranteed - by regulators, particularly so for companies subject to cost-based regulation. For this reason, shareholders may be more reluctant to bear the agency costs that are associated with high monetary incentives tied to firm performance. Or, alternatively, the regulatory environment might impose political constraints (in other words, a cap) on executive compensation, as suggested by Joskow, Rose and Wolfram (1996). Indeed, in many regulated utilities, particularly if they are state-controlled, directors are either politicians or appointed by politicians who are under public opinion pressure. So, in order to avoid public concern about excessive executive compensation, CEO remunerations are expected to be lower and less tied to firm profitability.

In the last part of this analysis, we focus on the sub-sample of regulated energy companies, and test the implications of the specific regulatory mechanisms for the CEO compensation scheme. As argued before, in regulated utilities the incentives expected to reduce managerial slack are provided by two main sources: incentive compensation and market competition, insofar as regulators successfully enforce a scheme that reduce monopoly power. Price- or revenue-caps or benchmarking, altogether defined “incentive regulation”, are the instruments that are expected to do this job. Our results show that the difference in CEO pay-sensitivity between incentive and cost-based regulation is statistically significant. More specifically, pay-performance sensitivity for CEOs operating under incentive regulation is significantly higher, confirming that whenever residual profits may be obtained by relying on efficient managerial practices, shareholders opt to rely on more effective corporate governance mechanisms that reduce managerial slack and align managers’ interests.

These results survive once we account for firms’ ownership status (as many energy firms are still partially owned by the state) and for the extent of market competition and openness, which still differs across countries after the liberalization reforms. We find that executive compensations

increase as the industry becomes more competitive and liberalized, and decrease when the firms is controlled by the state, while are unaffected by the degree of firm multinationality. Overall, our results suggest that incentive regulation, a scheme that is explicitly designed to transform utilities into the "residual" claimants of their performance (as opposed to cost-plus regulation), does complement the internal governance incentives of European energy companies.

The paper is organized as follows. Section 2 describes the literature review. Section 3 presents the empirical modeling and the testable hypotheses. Section 5 describes the data and the variables used in the estimation. Section 5 presents the results of the econometric analysis and Section 6 concludes.

2. Related literature

In modern corporations the separation between ownership and control has created a divergence of interests between shareholders and managers. Specifically, shareholders are interested in that managers take decisions that maximize firm value, while managers are typically more concerned with their own wealth and well-being (Jensen and Meckling, 1976; Demsetz 1983; Fama and Jensen 1983). Moreover, information asymmetries make it difficult for shareholders to monitor managers' actions and to understand which investment opportunities could maximize their wealth. To alleviate these typical principal-agent problems and to align shareholders and managers' interests, scholars and practitioners have considered several corporate governance mechanisms (Agrawal and Knoeber 1996; Shleifer and Vishny 1997). Compensation policies that tie CEO welfare to shareholder wealth can be a powerful tool to decrease agency costs and discourage managerial opportunistic behaviors.[2]

The structure of CEO compensation and pay for performance sensitivity play a particular role within a company. Early studies such as Murphy (1985), Gibbons and Murphy (1990), Jensen and Murphy (1990), document the relation between CEO pay and corporate performance. They argue that when CEO compensation depends on firm results, CEOs will benefit from firm value-maximizing decisions. So, in the case of high information asymmetries and the absence of strong board mechanisms that can monitor the internal decisions process, firms might find benefits in using

[2] For comprehensive surveys, see Murphy (1999), Goergen and Renneboog (2011) and Murphy (2012).

either the stock price or accounting indicators or both as performance measures to link executive compensation to performance (Bushman et al., 1996; Fernandez et al., 2013).

Most of this vast empirical literature focuses on US companies (among the others: Hall and Liebman 1998; Guay 1999; Frydman and Saks 2010). These studies find the predicted positive relationship between executive compensation and firm performance in US companies and they highlight the relevance of the compensation in providing incentives for CEOs.

In Europe, the evidence on executive compensation is more recent. An early interesting study on international differences in executive compensation is Abowd and Bognanno (1995). They show that American managerial pay is higher, more sensitive to firm size and long-term compensation plans such as stock options than other European countries. Also Conyon et al. (2011) show that CEOs pay is more tightly linked to performance in the United States than throughout most of Europe, and that American executives hold more wealth in company stock and options than do their European counterparts. A very recent study on executive compensation in US, Europe and other countries with mandated pay disclosures is provided by Fernandez, Ferreira, Matos and Murphy (2013). They show that US CEOs receive a higher fraction of their compensation in the form of stock and options and they earn an average of 26% more than their foreign counterparts. Looking at only European companies, Muslu (2010) studies the effect of the board composition on CEO compensation. He provides evidence that for the largest 158 companies of Germany, France and UK, the sensitivity of executive pay-to-performance increases with the proportion of executives in the board and with the duality of CEO and chairman. Croci et al. (2012) show that in continental Europe, the differences in the level of CEO compensation depend on the ownership structure.

Another stream of the research focuses on CEO compensation and market competition as an important condition for the severity of the agency problem (Hart, 1983, Hermalin, 1992; Bertrand and Mullainathan, 2003; Giroud et al., 2010; Beiner et al., 2011). These papers show that fierce product market competition spurs managers' effort while disciplining managerial slack. By pushing managers to be efficient it may even render additional incentives redundant (Schmidt 1997). In line with this reasoning, Nickell (1996) and Giroud and Mueller (2010) find that industry competition can be an effective substitute for other governance mechanisms.

The literature on executive compensation in non-competitive and, more generally, regulated sectors is scant. Regulation, by constraining firms' activities, alters the internal incentives resulting from standard market-based mechanism. Hubbard and Palia (1995), Booth et al. (2002), Becher and

Frye (2011) argue that, in the bank industry, the threat of corrective actions by regulators and their scrutiny can pressure regulated firms to adopt effective corporate governance monitoring systems. These studies examine the overall effect of market regulation, but without considering the impact of different regulatory schemes as we analyze in this paper.

Within regulated firms, there is even less empirical evidence for public utilities. Because of the particular features of the industry, managers may behave differently and therefore need different forms of incentive. Carroll and Ciscel (1982) and Murphy (1999) analyze compensation in several industries in US, documenting that the variable part in CEO annual pay is less important for utility firms. Comparing regulated and unregulated companies, Joskow, Rose and Shepard (1993) find that CEOs of US firms subject to economic regulation earn significantly less than CEOs of unregulated firms. They argue that this difference reflects, at least in part, the political constraints on CEO compensation imposed, directly and indirectly, by the regulated environment in which the firms operate. According to their view, regulators are reluctant to allow compensation levels that the public might judge to be excessive and, as a consequence, to set CEO compensation that is tied to firm profitability. In another paper, Joskow, Rose, and Wolfram (1996) explore the effect of political and regulatory constraints showing that CEO pay differs with the regulatory climate in which firms operate. In the US, investment firms systematically rate the regulatory environment faced by electric utilities in order to inform investors about whether the regulatory process favor consumers or shareholders. The authors show that firms subject to more consumer-oriented regulation pay less their CEOs than do firms under shareholder-oriented regulation. Turning to the comparison between regulated vs. unregulated firms, Yermack (1995) shows that US executives in highly regulated industries receive lower incentives from compensation or equity ownership than in unregulated industries, because the reduced managerial discretion in these industries diminishes the consequences of good or bad decisions. Hence, regulation generates more pressure to limit standard pay-for-performance schemes. Palia (2000) conducts a study about the differences in the compensation schemes during the deregulation process in the US utility sector, finding that CEOs that work in utilities have less pay-performance sensitivity than CEOs operating in manufacturing firms and that after the deregulation, in the utilities the pay-performance sensitivity is higher.

Finally, Hadlock et al. (2002) show that, in the US, utility CEOs tend to be older and have less-prestigious educational background than CEOs in unregulated firms. [3]

While the majority of existing studies deal with US regulated companies, our paper is the first analysis based on European Union, where regulatory reforms were introduced only two decades ago (with the only notable exception of UK), the degree of liberalization is still extremely heterogeneous across countries and the privatization process is incomplete.[4] Furthermore, to the best of our knowledge, this paper is the first empirical study on the CEO incentive compensation of European public utilities that takes into account the effect of the regulatory schemes. In the last two decades, many European regulators switched from cost-based to incentive regulation, a mechanism that is, in principle, more likely to reduce managerial slack. Finally, by looking at CEOs operating in a single (energy) industry, hence with similar tasks and attributes, we can isolate more precisely the effect of different regulatory contracts on pay-performance. The main purpose of this paper is to understand the roles of CEO compensation and market regulation jointly, and more precisely how the incentives provided by compensation interrelate with those provided by the different regulatory contracts.

3. Empirical model and testable hypotheses

Pay- performance sensitivity quantifies managerial incentives by relating changes in CEO pay to firm performance (Frydman and Saks, 2010; Goergen and Renneboog, 2011). The incentive effects of CEO compensation are typically calculated using different metrics and different performance variables. In their seminal paper Jensen and Murphy (1990) define the pay for performance sensitivity as the dollar change in the CEO's wealth associated with a dollar change in the wealth of shareholders. This specification measures the *magnitude* of the CEO sensitivity to the change in the firm performance and denotes the CEO's "share" of value creation. A second metric widely used in the literature is the *elasticity* of the pay-performance. In this case both CEO compensation and firm performance are in the logarithm form. The regression coefficient is interpreted as the percentage change in the CEO's wealth associated with the percentage change in the wealth of shareholders.

[3] The empirical evidence on CEO pay-performace for European energy utilities is also very scant. Most of this research focuses more on board composition and governance than on CEO pay for performance sensitivity (Bender, 2003), while it does not address the impact of regulatory regimes on CEO compensation as we do in our analysis.

[4] For a description of the evolution of the institutional setting within EU utilities, see Bortolotti, Cambini, Rondi and Spiegel (2011**).**

The third metric is *semi-elasticity* of the pay for performance*,* where the dependent variable, *CEO compensation*, is in the logarithmic form and the independent variable, *firm performance,* is in the linear form. The regression coefficient is the *semi-elasticity* of CEO compensation with respect to shareholder value (Joskow et al., 1993): it indicates the percentage change in CEO compensation due to a unit change in the variable that measures firm performance. In each of these three specifications, the higher coefficient is interpreted as a closer alignment of interests between the CEO and his shareholders and, as consequence, a stronger incentive for the CEO.

Following Joskow *et al.* (1993), in our baseline model, we calculate the *pay-performance semi-elasticity* to estimate the relationship between CEO pay, using *Stock return* to measure firm performance. Stock return is widely employed in the literature, it indicates the appreciation in the price plus any dividends paid, divided by the original price of the stock, hence the yield realized by shareholders. To check the robustness of our results, we test CEO pay-performance sensitivity using two other stock-based variables: market capitalization and market-to-book. However, although a substantial body of theoretical and empirical work supports stock market-based variables as the relevant performance indicators for assessing executive action choice - like any other stock performance measure - they are noisy measures of the executive's performance/success because they are influenced by too many factors beyond the executive's control. Moreover, since public utilities typically provide services of general interest, and may be asked to comply with general purpose and consumer welfare objectives, relying on stock market-based measures only appears somewhat incomplete. As a result, we also consider an accounting, or book, measure of performance, the return on assets, or *ROA* (EBIT to total assets), which is an overall measure of profitability that gauges how efficiently the firm's assets are employed (see also Hadlock et al., 2002).

To test managerial incentives within EU electric and gas companies, we employ three models. Initially, we investigate whether pay for performance sensitivity can be detected at all in the full sample of publicly listed energy utilities. Then, drawing on our previous arguments, we derive two testable hypotheses about the differential impact on pay-performance sensitivity depending on whether firms are regulated or unregulated and, for regulated firms whether they are subject to different regulatory schemes or contracts.

Within the energy industry, transmission and distribution operators are typically subject o ex ante regulation while firms in generation and retailing operate in fully liberalized markets. Existing evidence, summarized in Section 2, for US electric utilities has shown that CEO compensations of

regulated firms are less responsive to changes in firm performance. We estimate a model in which the performance variable is interacted with a dummy that accounts for the regulatory status of the company. We thus test the following hypothesis:

H1: Regulated firms display lower CEO pay-performance sensitivity than unregulated firms.

It has been suggested however, that the interrelation between regulatory scrutiny and corporate governance may be more complex and that they may even complement each other to ensure an effective governance structure (Becher and Frye, 2011). Focusing on the sub-sample of regulated firms, we investigate the combined effect of regulatory mechanisms designed to prompt cost-saving, efficiency-seeking incentives and incentive compensation schemes. We thus estimate a model where the performance variable is interacted with a dichotomous variable that accounts for the presence of incentive regulation (e.g. price-, or revenue-cap, or benchmarking) as opposed to cost-based (e.g. rate-of-return) regulation. This leads us to our second testable hypothesis:

H2: Firms under incentive regulation display higher CEO pay-performance sensitivity than firms under cost-based regulation

As mentioned before, pay-performance sensitivity is measured as the change in the CEO's wealth associated with the change in the wealth of shareholders. Different from Jensen and Murphy (1990), but consistent with many other studies (Gibbons and Murphy, 1990, Yermack, 1995, Palia, 2000), we use fixed effects as estimation method. This method allows us to calculate the effect of the change in the compensation level within a firm and to control for omitted variables and unobservable firm (and country) characteristics that are not included in the usual cross-sectional regressions, but that can be controlled by panel data. The results of the regressions are presented in Section 5.

4. The sample and the data

As a consequence of liberalization and privatization reforms in the early nineties, most European countries set up national regulatory authorities to regulate the distribution and transmission activities in the energy industry.[5] Electric and gas utilities, most of them former fully integrated state monopolists, underwent a deep change: many companies unbundled the generation, transmission and distribution activities and many went public, opening their capital to new investors and to different categories of shareholders that naturally aim at maximizing firm value. However, although these firms are now publicly listed and have accordingly modified their goals, embracing the shareholder view more than they did before, they still provide services of general interests, operating in a regulated environment that imposes constraints on their behavior (for instance, on prices, profit levels and service quality) and their governance.

To test the interplay between regulatory and governance mechanisms, we use a sample of 59 listed public utilities of the energy industry (electricity and gas) from 12 European countries (Spain, France, United Kingdom, Germany, Italy, Austria, Switzerland, Norway, Poland, Portugal, Finland and Belgium), over the period 2000-2010. Of the 59 energy utilities, 43 transmission and distribution operators are subject to regulation. To estimate pay-performance sensitivity we have data for 101 CEOs, for a total of 436 CEO compensation-years observations.

Data are collected by different sources. Data about CEOs' compensations and tenure are hand collected, downloading each annual corporate governance reports of every company. This collecting process makes the uniqueness of this dataset. Our data about CEO compensation are carefully divided in salary and annual bonus. A comprehensive measure of CEO pay should take into account the values of the CEO's stock and option holdings, but these data turned out to be unavailable on a consistent basis. Specifically, when we tried to collect the data we found that, for most of the European energy utilities, information about the use of stock options and the detailed description of individual CEO's stock option plans (i.e. the number of options, the exercise price, the exercise date etc) are not fully disclosed. In that we could only rely on a partial and approximate picture of the real effect of stock option, we considered that adding this partial information would only lead to

[5] The reform of the European electricity market was prompted by Directive 96/92/EC. The directive contained common rules for electricity generation, transmission and distribution, in order to induce convergence in production and in market structures in single member states. In addition, monopolistic (transmission and distribution) and potential competitive markets (generation and retail) were distinguished and national regulatory authorities were required to implement specific regulatory schemes for regulated segments.

misleading results. Following Jensen and Murphy's approach, we thus calculate CEO compensation as the sum between salary and bonus awarded by the CEO in the year.

Financial and accounting data come from Datastream-Worldscope and Compustat Global database. Datastream-Worldscope is a global financial database covering equities, stock market measures and company fundamentals. Compustat Global consists of annual and quarterly report data of listed companies. It provides complete information about income statements and balance sheets of not US-companies. From these sources we obtained the variables to calculate the book and market-based measures of performance. Among stock-based indicators we start with *Stockret*, the one-year stock return for the firm over its fiscal year. It is calculated as $\{[SharePrice_t * Adjusted\ Factor/SharePrice_{(t\text{-}1)}]-1\}$ where $SharePrice_t$ is the share price time *t*, *Adjusted Factor* is the factor to adjust price by splits and dividends in period t; $SharePrice_{(t\text{-}1)}$ is the share price at the previous period. We then use two other market-based variables: Market-to-Book, *MTB*, the ratio of the market and the book value of equity, and market capitalization, *MarketCap*, i.e. the product between the share price at the end of the year and the number of outstanding shares in the market. Finally we calculate the *ROA* as the ratio of EBIT to total assets and we use this as a measure of accounting profitability. In Table 1, we report the variable description and definition.

A key variable in this study is regulation. Regulatory regimes vary across countries and across segments (transmission and distribution). We first divided sample firms between regulated or unregulated based on their primary activity. In particular, for each firm we indicate the main segment in which it operates (generation, transmission and distribution). Firms classified as generators do actually produce energy from primary or renewable resources. As the generation segment has been fully deregulated, firms operating in the generation segment are defined as unregulated. Transmission and distribution activities are subject to ex ante regulation, generally by a national agency. Hence, we consider firms operating in the transmission and distribution segment as regulated.A few distributors are also involved in generation and in this case we classify the firm according to the primary activity as per the information taken from the annual reports. These firms are not systematically subject to either incentive or cost-based regulation.

We then collected information about the regulatory schemes - incentive or cost-based – which the regulators apply in each country and in each of the two activities. The information is derived directly from previous research (Cambini and Rondi, 2010), updated using recent documents released by national regulatory agencies which indicates whether the activity is under incentive

regulation (in its different forms, i.e. price cap, revenues cap or firms' benchmarking) or cost-based (e.g. rate of return) scheme.

To test the robustness of our results, we take into account three main potential sources of influence: firm ownership, the actual extent of market liberalization and reforms, and firm multinationality. We thus collected information about the ownership status of each firms in the sample. In particular, we define firms as "privately-controlled" if the state holds directly or indirectly less than 30% of the firm's control rights (i.e., private investors hold at least 70% of the control rights). In order to measure the state's ultimate control rights (UCR), we use the weakest link approach (see, for example, La Porta, Lopez-de-Silanes, and Shleifer, 1999). According to this approach, the UCR of a given investor (the state in our case) is simply equal to the minimum ownership stake along a chain (i.e., the weakest link). In the case of multiple chains, the UCR's are summed up across all chains.[6]

The different pace and intensity of liberalization characterizing the energy industries in different countries may also affect incentive compensation schemes. To control for this additional effect, we use the OECD index of Product Market Regulation database by Conway and Nicoletti (2006). This index is an average of several indicators which vary from 0 to 6 (lower numbers indicate a greater degree of market openness) and allows for entry barriers, the vertical structure of the market, the market share of the dominant player(s),[7] and the presence of the state as a shareholder. We eliminate the state ownership component from the index, because we already construct a "firm by firm" ownership dummy (rather than using a sectoral level variable), and recalculate the average over the remaining OECD sub-indicators (market entry, vertical integration and market structure). As in the original OECD index, high values of the index are associated with low degrees of market competition and liberalization.

Finally, many sample firms extend their activities in several countries. In order to allow for the potential effect of the internationalization on CEO compensation (a larger and more sophisticated market for managers, the more complex organization of multinational enterprises), we checked the geographical diversification of the energy utilities and then constructed, for each firm-year

[6] We implement here the same methodology as in Bortolotti, Cambini, Rondi and Spiegel (2011). We merged ownership information from that database (ranging from 1994 to 2005) and we then completed the data up to 2010 with hand collected information from companies' web sites.

[7] Low values of the entry barriers indicators are associated with competition in all segments of the relevant sector as well as with vertical separation between downstream and upstream firms. High values are associated with the existence of a vertically integrated legal monopoly.

observation, a dummy variable that takes a value equal to 1 when the firm operates in more than one country.

Table 1 provides the variable definitions; Table 2 reports the summary statistics for the full sample and Table 3 averages the data by country.

At country level, CEO compensations appear to be highest in Germany and Spain, but then we also note that firms in these countries are also very large, confirming the typical positive correlation between pay and firm size. Managers seem to be well paid also in Finland, Austria and (to a lesser extent) Italy, where firms are not only quite large but also profitable in terms of return on assets (ROA). Interestingly, we observe that, in the UK, mangers appear to be paid less than the average though they achieve the highest accounting profitability levels (and the second highest market-to-book ratio) among all countries. Table 4 and 5 presents the summary statistics by regulation and by regulatory mechanisms. Here we find several interesting differences. As compared with unregulated energy utilities, regulated firms are, on average, larger, less profitable (but stock returns are higher), more state controlled, but pay their managers more. Moreover, not surprisingly, the average OECD indexes show that they operate in less open and liberalized segments. When we look at differences by regulatory mechanisms we note that managers under incentive regulation are paid less than managers at firms regulated by cost-based contracts and, while operating in a more open and competitive environment (lower *OECD Index of Liberalization*), they achieve higher ROAs (but lower stock returns). Admittedly however, incentive regulated firms are also more typically small and privately controlled. Clearly the descriptive statistics highlights several intriguing differences, but also reveal that too many factors should be accounted for, hence, in the next sections, we turn to the results from the regression analysis.

5. Empirical results

5.1 Full sample

To test whether CEO pay is responsive to firm performance in our full sample of EU energy firms, we estimate the following model:

$$Log(CEOcomp)_{it} = \alpha + \beta_1(stockret)_{it} + \beta_2 tenure_{it} + X_{it} + \mu_{it} + \varepsilon_{it} \quad (1)$$

where $Log(CEOcomp)_{it}$ is the logarithmic transformation of the sum of (inflation corrected) salary and bonus awarded by the CEO in the year and $Stockret_{it}$ is the market-based performance variable. $Tenure_{it}$ indicates the number of years served as a CEO in the company and accounts for the fact that the CEO's compensation is likely to increase with tenure as well as for CEO turnover, which would brings undesirable breaks in the estimation of sensitivity at the firm level. μ_{it} is the firm specific fixed effect and ε_{it} is the error term. X_{it} represents additional control variables, such as the logarithmic transformation of real total assets, *Log(Total Assets),* to proxy firm size, because past research has clearly established that managerial pay tend to increase with firm size (Baker and Hall, 2003), or the Gross Domestic Product (*GDP*), to partly control for the heterogeneity in the size and growth of the national economies.

We report the fixed effects results in Table 6. The results shows that the relationship – as defined by the semi-elasticity - between pay and performance is positive even if it is not statistically significant: an increase of 1 percentage points in the stock return leads to an increase of 0.09% in the CEO compensation. In order to a have a broader picture of CEO incentives in the energy companies, we report evidence of the sensitivity – the elasticity – of CEO pay to three other measures of firm performance: *ROA* – return on assets, market-to-book (*MTB*) and market capitalization (*MarketCap*). Calculating the elasticity, the relationship is positive and statistically significant. The results show that a 10% change in ROA leads to an increase in CEO total compensation of about 0.9%. The change of CEO total compensation is 1.6%, when we consider *MarketCap*, while it is equal to 1.4% when we consider market-to-book value (*MTB*). The firm level control variables enter significantly and with the expected sign while managerial compensation appears to increase with CEO tenure and with firm size.

Having showed that within European countries, CEO compensation in energy companies, similarly to their US counterparts (Joskow et al., 1993), is sensitive to changes in the firm performance, the next step is to focus on the difference between regulated and unregulated energy companies. The results are provided in Section 5.2.

5.2 Regulated versus Unregulated companies

In the second part of the study, we focus on the differences between regulated and unregulated energy firms. In particular, we re-estimate the model (1) by interacting firm performance with a dummy that indicates whether the company is subject to regulation. The baseline model is:

$$Log(CEOcomp)_{it} = \alpha + \beta_1(stockret)_{it} + \beta_2(stockret)_{it} * REG + \beta_3 tenure_{it} + X_{it} + \mu_{it} + \varepsilon_{it} \qquad (2)$$

The results using *Stock Return* are reported in Table 7, while in Table 8 we report the estimates using the three alternative measures of firm performance. In all the tables our variable of interest is the interaction term between the measure of firm performance and the dummy *REG* which indicates whether the firm is subject to regulation. In Table 7 the coefficient of *Stock Return* REG* is negative and statistically significant, suggesting that managerial compensation of companies subject to regulation is less responsive than that at companies not subject to any ex ante control. In Table 8 we find that this evidence is consistent across accounting (*ROA*) as well as market based (*Market Cap*) measures of firm performance. When we use market-to-book (*MTB*) the sign of the interacted coefficient is insignificant, but negative, as predicted. Overall, the evidence suggests that CEO pay for performance sensitivity is weaker in regulated firms rather than in the unregulated firms. This result is consistent with the previous studies in US by Joskow et al. (1993), Yermack (1996), and Palia (2000), among the others, which show that compensation in the regulated sectors is less sensitive to firm performance. Under regulation, CEOs have less discretion in undertaking managerial strategies and operative decisions aimed at increasing firm value profitability (beyond cost-reducing actions). Moreover, they operate in sectors where competition is weak, allowing managers to live "a quiet life". Such a limited managerial discretion is thus likely to reduce the consequences of the CEO's decisions and, therefore, to discourage the adoption of compensation contracts that are highly tied to firm performance. According to Joskow et al. (1996), this difference can be explained also by the political constraints on CEO compensation imposed, directly or indirectly, by the regulated environment in which the firms operate. As a consequence of this "moral suasion" CEO compensation in regulated companies would be voluntarily less tied to firm profitability.

5.3 Incentive regulation versus cost-based regulation

After having examined the differences in incentive compensation practices between regulated and unregulated companies, we analyze the effect of different regulation regimes on compensation contracts of managers operating in regulated companies. By addressing the question whether different regulation schemes affect the corporate governance decision to link more or less tightly the CEO pay to the firm performance, our purpose is to understand whether incentive mechanisms provided by the board of directors and those provided by the regulation are substitute or complementary ways to reduce agency costs.

To study this, we interact the performance measure with a dichotomous variable, *CAP*, which is 1 when the firm is under incentive regulation, 0 otherwise (under cost-based regulation). The estimating equation is:

$$Log(CEOcomp)_{it} = \alpha + \beta_1(stockret)_{it} + \beta_2(stockret)_{it} * CAP + \beta_3 tenure_{it} + X_{it} + \mu_{it} + \varepsilon_{it} \qquad (3)$$

Similarly as before, we start with stock return as a first measure of firm performance. Our variable of interest is *Stock Return*CAP* and the regression coefficient indicates the differential semi-elasticity of the pay-performance sensitivity in incentive regulated firms with respect to cost-based regulated utilities. The results in Table 9 show that under incentive regulation, CEO pay sensitivity is higher, suggesting that incentive regulated firms are keener to provide incentive compensation contracts to their managers than firms under cost-based regulation. This evidence supports our testable Hypothesis 2.

In Table 10, we test the robustness of this result using alternative measures of performance and obtaining the elasticity of CEO pay to the ROA, market-to-book and market capitalization. The coefficients of the interaction terms are positive and statistically significant in all columns.

Finally, in Table 11, we also estimate the simple linear model that allows us to compute the *magnitude* metrics of the CEO pay sensitivity, that is the relationship between the Euro compensation and the Euro market value of the firm. The results confirm that under incentive regulation CEO compensations are more responsive to firm performance with a positive and significant coefficient on the interacted term. Similar to most of the existing evidence (starting from

Murphy and Jensen, 1983) the economic significance of the estimated coefficients is low. More precisely, the estimates in Column (2) suggest that managers in incentive regulated firms receive on average 3.83€ cents more than their counterparts at cost-based regulated firms for each 1,000 Euro increase in market capitalization.

The tighter pay-performance sensitivity for companies under incentive regulation can be the result of optimal contracting in the market for managerial talents. By implementing regulatory contracts like price-, revenue-cap or benchmarking, regulators aim at enhancing the incentives to mimic market functioning, thus leaving residual profits to accrue to the firm. Hence, not surprisingly, shareholders look for more talented CEOs who, in turn, are keener to accept incentive compensation contracts. Our result is thus in line with existing studies. Jensen and Murphy (1990) argue that a high compensation will attract high-ability people to self-select into a company. Fernandez et Al. (2013) argue that firms attempting to attract global managerial talent need to offer to CEOs contracts more sensitive to firm performance. Hence, under incentive regulation the corporate governance incentives are strengthen.

Overall, our results suggest that regulation and governance are two mechanisms to discipline managers. When considering the difference between regulated and unregulated companies, regulation may substitute traditional instruments of shareholders monitoring (i.e CEO monetary incentives). However, when we look at differences across regulatory regimes, regulation and governance work together to ensure effective incentives. In other words, the CEO "internal" governance incentives may be a complement to the tighter scrutiny by the regulator.

5.4 Sensitivity Analysis: the impact of firm ownership and market liberalization

For robustness, we re-estimate the models (2) and (3) accounting for industry and firms specific features that may influence the propensity to rely on incentive compensation regardless of the regulatory regime. We control for these factors, namely the degree of market competition and the firm's ownership, and check if the difference in sensitivity across regulatory schemes survives.

As mentioned earlier, since the early nineties the energy industry has been subject to important liberalization and privatization reforms that have changed it from an entirely regulated structure of, predominantly, public-owned monopolists the control the entire supply chain, into an industry characterized by the presence of both monopolistic (transmission and distribution) and competitive

segments (generation and retailing). Moreover, many energy companies changed their ownership structure, opening their capital to private investors. The degree of market liberalization across countries as well as the residual presence of the state in the ownership structure of the energy firms may thus influence the compensation schemes of the managers. We expect that the higher is state's ownership stake and the lower the extent of liberalization and competition, the lower is managerial compensation.

To control for these effects, we include in our analysis two variables: *State Ownership* and *OECD Index of Liberalization*. *State Ownership* is a dummy variable that indicates if the state is the main shareholder. In particular, the dummy is 1 when the state has at least 30% of the ultimate control rights. The *OECD Index of Liberalization* indicates the degree of market competition: high values of the index are associated to low degrees of market competition and liberalization (Conway and Nicoletti 2006).

We add the control variables to our models. Table 12 tests the robustness of the difference between regulated and unregulated firms. The performance variable differs across the columns, but the results are similar, all indicating that the lower pay-performance sensitivity at regulated firms survives when we control for competition and firm ownership (*MTB*REG* is the only exception, with a negative but insignificant coefficient). Interestingly, we find that the dummy *State Ownership* is (insignificantly) negative, confirming the theoretical results by Hart et al. (1997) who show that managers in state controlled firms are less incentivized and receive lower rewards; our result also suggests that state control implies a sort of politically motivated "cap" on managerial compensation (see Joskow et al., 1996). Not surprisingly, we find that *OECD Index of Liberalization* enters with a negative and significant coefficient, which indicates that tougher competitive pressure (i.e. a lower value of the index) spurs managerial compensations and, we argue, the search for more talented CEO.

Using the same control variables, we re-estimate the effect of different regulatory schemes on CEO compensation (Table 13). Our main result still holds: CEO pay for performance sensitivity is higher for companies under incentive regulation. Our variable of interest, *Performance*CAP*, is positive and statistically significant among all four measures of performance. The dummy *State Ownership* is always negative, and statistically significant when we use stock return as measure of firm performance, confirming the results obtained in Table 12. The coefficient of the *OECD Index of Liberalization* is negative and statistically significant when we test with market capitalization and

market-to-book. As before, this result shows that CEO compensation is more responsive to firm performance in more open and liberalized markets.

Finally, we also tested whether the extent of multinationality might affect the structure of CEO compensations. For each company, we constructed a dummy that takes value 1 if the firm operates in more than one country. We then estimated the relationship between pay and performance, alternatively defined by the four measures we used in the rest of the paper, and we found that the dummy accounting for multinational activities was never significant. Comfortingly, the key results on the differential impact of the regulatory regime on the pay-performance sensitivity remained unchanged, as the coefficients on the interactions with *REG* and *CAP* kept their sign and significance. This implies that CEO compensation is not affected by the expansion of activities abroad, while remaining affected by firm performance and the specific regulatory contracts implemented by the regulator.[8]

5.5 Analysis at the CEO level

So far, we have estimated pay-performance relationships at the firm level, i.e. controlling for firm-specific fixed effects, and clustering the standard errors by firm. In this last section we re-estimate our models at CEO level, first by pooling all CEO-years observations and including country dummies to control for possible cultural and institutional heterogeneity across countries (Tables 14 and 15). Secondly, by running panel regressions with CEO fixed effects, instead of firm fixed effects (Tables 16 and 17). In all specifications, we cluster robust standard errors by CEO and we add the control variables introduced in the sensitivity analysis: firm ownership and market liberalization.

Table 14 reports the results of the difference among regulated and unregulated companies. Consistent with the previous findings, the coefficient of *Performance*REG* is always negative and statistically significant in Columns 2 and 4, showing that CEO compensation in regulated firms is less sensitive to changes in firm performance compared to CEO compensation in unregulated firms. The results also confirm that CEO pay tend to increase with tenure and with firm size. Interestingly, we note that the negative sign on the state ownership dummy has turned significant in the CEO level analysis, suggesting that ceteris paribus managers in state controlled firms are paid less than

[8] For reason of space, we do not report such estimates in the current version of the paper, but they are available from the authors upon request.

managers in privately controlled firms. In Table 15, we compare incentive and cost-based regulated firms. The estimated coefficients on the performance variable interacted with *CAP* suggest that pay-performance elasticity is higher for CEOs in the incentive regulation regime, but the coefficients are less precisely estimated (with p-value slightly below the conventional thresholds) and only significant in Column (2), where the elasticity is measure with respect to market capitalization.

Finally, in Tables 16 and 17, we run the panel regressions with CEO-fixed effects. The results slightly differ in that we now find that state ownership is now insignificant whereas the OECD index of Liberalization now enters with a negative significant coefficient when we use *MarketCap* and *MTB* (in both Tables). Moreover, the positive effect of incentive regulation on pay-performance sensitivity is highly significantly in all columns in Table 17, while the negative effect of regulation is statistically significant only when we use stock returns.

Overall, the evidence from the CEO level analysis is consistent with the key results that CEO compensations are less responsive to performance when the firm is subject to economic regulation, but relatively more responsive to stock-based and accounting measures when they are subject to incentive regulation aimed at enhancing efficiency. This evidence is robust across measures of performance and estimation methods, and suggests that incentive compensation contracts and incentive regulation schemes are complementary mechanisms that improve corporate governance as well as regulation outcomes.

6. Conclusions

In contemporary corporations the separation between ownership and control has created a divergence of interests between managers and shareholders. Specifically, shareholders want managers to take decisions that increase firm's equity value, while managers are interested in maximizing their own wealth and well-being rather than the firm value (Jensen and Meckling, 1976; Demsetz 1983; Fama and Jensen 1983). This principal-agent problem becomes even more relevant in the public utility sector.

Public utilities provide services of general interest that should be efficient, non-discriminatory and in line with consumers' interests. Moreover, these companies have traditionally operated in a non-competitive and regulated market. Theoretical and empirical studies in the economic literature have shown that in these less competitive industries agency problems are even more severe. In spite

of the reforms introduced by the national governments in the last decade, especially in Europe, these industries appear to still differ in terms of the degree competition within sectors, the type and extent of regulatory interventions and firm's (state vs. private) ownership. This heterogeneity is precisely what makes them an interesting case to study.

In these sectors regulation is used to intervene in the market, leading firms to increase their efficiency and reduce their agency costs. Different regulatory regimes influence firm decisions in different ways, creating incentives and effects that need to be analyzed in depth. Not only market regulation, but also firms provide incentives for managers. When CEO compensation is linked to an indicator of firm performance, CEOs take decisions that increase firm value and firm efficiency. Therefore, both external (i.e. regulation) and internal (governance) incentives affect CEO's behavior.

This paper studies the effects of incentive mechanisms provided by the regulation and by the firm in the energy sector during 2000-2010. Our result shows that a positive and statistically significant CEO pay-sensitivity relationship emerges. An increase of 10% in ROA, leads to an increase of 0.9%, in CEO compensation. If we consider other measures of firm performance, we find that a change of 10% in market to book and market capitalization leads, respectively, to an increase of 1.4% and 1.6% in CEO compensation.

We also find a difference in CEO pay-performance between firms subject to regulation and those that are unregulated. Specifically, CEOs of regulated companies have a compensation which is less tied to firm performance respect with their counterparts. We argue that when subject to regulation, CEOs have less discretion in undertaking managerial strategies and operative decisions aimed at increasing firm value profitability. So, this reduced managerial discretion diminishes the consequences for CEO of his decisions and it influences the CEO pay-sensitivity.

Different types of regulations may encourage firms to use different levels of CEO monitoring and the regulatory intensity can increase the monitoring mechanisms. In particular under incentive regulation the higher regulatory pressure may encourage firms to adopt greater monitoring (e.g., higher CEO pay sensitivity). Essentially, regulation and governance may work together to ensure an effective governance structure (Becher et al, 2011). We provide empirical evidence that there is difference in CEO pay-sensitivity between companies under incentive and cost-based regulation. Specifically, CEO pay-for-performance is more sensitive under incentive regulation. This is in

consistent with the previous studies that argue that regulation and governance work as complement incentive mechanisms (Adams and Ferreira, 2012).

These differences remain unaffected after controlling for the degree of market openness and liberalization, for firm (state vs. private) ownership and for the extent of company multinationality. Interestingly, our results show that in regulated industries executive compensation increases with market liberalization and decreases with state ownership, possibly due political constraints as suggested by Joskow et al. (1996). Finally, we point out that CEO compensation is not affected by the expansion of firms' activities in different countries. This result could be interpreted as the absence of global market for managers in utilities: since regulated firms are supervised by national regulators, managers of public utilities are more likely to be selected locally to deal with "local" regulators according to their "local" connections with firms, institutions and, last but not least, politicians (Faccio, 2006).

Overall, our result suggests that in European energy companies incentive regulation may complement governance incentives. The regulatory intensity contributes to put firms under scrutiny, driving them to adopt CEO monetary incentives to discourage opportunistic behavior by managers. These results could puzzle the literature about the substitute and complementary effect of regulation and governance.

References

Abowd J., M., Bognanno M. L., 1995. International differences in Executive and Managerial Compensation. In R. B. Freeman and L. F. Katz, eds.: "Differences and Changes in Wage Structures", *University of Chicago Press, pp. 67-104.*

Agrawal A., Knoeber C. R., 1996. Firm Performance and Mechanisms to Control Agency Problems between Managers and Shareholders, *The Journal of Financial and Quantitative Analysis, Vol. 31, No. 3, pp. 377-397.*

Adams R. B., Ferreira D., 2012. "Regulatory Pressure and Bank Directors' Incentives to Attend Board Meetings", *International Review of Finance, Vol. 12, No.1, pp. 227–248.*

Armstrong, M., D.E.M. Sappington, 2006. "Regulation, Competition and Liberalization", *Journal of Economic Literature*, *XLIV, 325-366*.

Barontini R., Bozzi S., 2011. CEO compensation and firm performance in family firms. *The Journal of Management and Governance, Vol. 15, No.1, pp. 59-89.*

Baker G. P., Hall B. J., 2004. CEO incentives and firm size. *Journal of Labor Economics, Vol. 22, No. 4, pp. 767-798.*

Becher D.A., Frye M. B., 2011. Does regulation substitute or complement governance?. *Journal of Banking & Finance, Vol. 35, pp. 736–751.*

Bender R., 2003. How Executive Directors' Remuneration is Determined in Two FTSE 350 Utilities. *Corporate Governance: An International Review, Vol. 11, No. 3, pp. 206–217*.

Bertrand M., Mullainathan S., 2003. Enjoying the Quiet Life? Corporate Governance and Managerial Preferences. *Journal of Political Economy, Vol. 111, No. 5, pp. 1043-1075.*

Beiner S., Schmid M. M., Wanzenried G., 2011. Product Market Competition, Managerial Incentives and Firm Valuation. *European Financial Management, Vol. 17, No. 2, pp. 331-*366.

Booth J.R., Cornett M. M., Tehranian H., 2002. Boards of directors, ownership, and regulation. *Journal of Banking and Finance Vol. 26, pp. 1973–1996.*

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

Bushman R. M., Indjejikian R. J., Smith A., 1996. CEO Compensation: The Role of Individual Performance Evaluation. *Journal of Accounting and Economics, Vol. 21, pp. 161-193.*

Carroll T. M., Ciscel D. H., 1982. The Effects of Regulation on Executive Compensation. *Review of Economics and Statistics Vol. 64, pp. 505-509.*

Cambini C., Rondi L., 2010. Incentive regulation and investment: evidence from European energy utilities. *Journal of Regulatory Economics, Vol. 38, No.1, pp. 1-26.*

Conyon M. J., Fernandes N., Ferreira M. A., Matos P., Murphy K. J., 2011. The Executive Compensation Controversy: A Transatlantic Analysis. *Working paper.*

Conyon M. J., Core J. E., and Guay W. R., 2011. Are US CEOs Paid More Than UK CEOs? Inferences From Risk-Adjusted Pay. *Review of Financial Studies Vol. 24, pp. 402-438*.

Conyon M., Murphy K., 2000, The Prince and the Pauper? CEO Pay in the United States and United Kingdom. *Economic Journal, Vol. 110, pp. 640–671.*

Claessens S., S. Djankov, L. Lang, (2000), "The Separation of Ownership and Control in East Asian Corporations," *Journal of Financial Economics*, **58**, 81-112.

Conway P., 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.

Croci E., Gonenc H., Ozkan N., 2012. CEO compensation, family control and institutional investor in continental Europe. *Journal of Banking and Finance, Vol. 36, No. 12, pp. 3318-3335.*

Demsetz H., 1983. The structure of ownership and the theory of the firm. *Journal of Law and Economics, Vol. 26, pp. 375-390.*

Faccio, M., L.H.P. Lang (2002), "The Ultimate Ownership of Western European Corporations," *Journal of Financial Economics*, **65**, 365-395

Faccio M. (2006), "Politically Connected Firms", *American Economic Review, 96(1), 369-386.*

Fama E F., Jensen M. C., 1983. Separation of Ownership and Control. *Journal of Law and Economics, Vol. 26, pp. 301-325.*

Fernandes N., Ferreira M. A., Matos P., Murphy K. J., 2013. Are U.S. CEOs Paid More? New International Evidence. *Review of Financial Studies, vol. 26, pp. 323-267.*

Frydman C, Saks R. E., 2010. Executive compensation: a new view from a long-term perspective, 1936-2005. *Review of Financial Studies. Vol. 23, pp. 2099-2138.*

Guay W.R., 1999. The sensitivity of CEO wealth to equity risk: an analysis of the magnitude and determinants. *Journal of Financial Economics, Vol. 53, No.1, pp.43-71.*

Gibbons R, Murphy K. J. 1990. Relative performance evaluation for chief executive officers. *Industrial Labor Relation Review, Vol. 43, No.3, pp.30S-51S*

Giroud X., Mueller H., 2010. Does corporate governance matter in competitive industries? *Journal of Financial Economics, Vol.95, pp. 312-331.*

Goergen M., Renneboog L., 2011. Managerial Compensation. *Journal of Corporate Finance, Vol. 17, No. 4, pp. 1068-1077*

Hadlock C.J., D. Scott Lee, R. Parrino, 2002. "Chief Executive Officer Careers in Regulated Environments: Evidence from Electric and Gas Utilities". *Journal of Law and Economics, 45(2), 535-563.*

Hagerman R., Ratchford B., 1978. Some determinants of allowed rate of return on equity to electric utilities. *Bell Journal of Economics, Vol. 9, pp. 46-55.*

Hall B., Liebman J., 1998. Are CEOs Really Paid like Bureaucrats? *Quarterly Journal of Economics, Vol. 113, pp. 653–691.*

Hart O. D., 1983. The Market Mechanism as an Incentive Scheme, *Bell Journal of Economics No.14, pp. 366-382.*

Hart, O., Shleifer, A., Vishny, R. (1997), "The Proper Scope of Government: Theory and Application to Prisons", *The Quarterly Journal of Economics,* 112 (4), 1091–1126.

Hermalin B. E., 1992. The Effects of Competition on Executive Behavior, *Rand Journal of Economics No.23, pp350-365.*

Holmström B. R., Tirole J., 1989. The Theory of the Firm, in: Handbook of Industrial Organization, *Volume I, ed. by R. Schmalensee and R. D. Willig. Amsterdam:Elsevier*.

Hubbard R. G., Palia D., 1995. Executive pay and performance Evidence from the U.S. banking industry, *Journal of Financial Economics Vol. 39, pp. 105-130.*

Jensen M. C., Meckling W.H., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics Vol. 3, pp. 305-360.*

Jensen M. C., Murphy K. J., 1990. Performance Pay and Top-Management Incentives. *Journal of Political Economy Vol. 98, pp. 225-64.*

Joskow P., Rose N., Shepard A., 1993. Regulatory constraints on CEO compensation, *Booking Papers on Economic Activity, Microeconomics, n.1, pp. 1-72.*

Joskow P., Rose N., Wolfram C., 1996. Political Constraints on Executive Compensation: Evidence From the Electric Utility Industry. *Rand Journal of Economics, Vol. 27, No. 1.*

Joskow P.L., 2008. "Incentive Regulation and Its Application to Electricity Networks," *Review of Network Economics, Vo.7, No.4, pp. 547-560.*

La Porta R., F. Lopez-de-Silanes, and A. Shleifer (1999), "Corporate Ownership Around the World," *Journal of Finance*, **54**, 471-518.

Murphy K. J., 1985. Corporate Performance and Managerial Remuneration: An Empirical Analysis, *Journal of Accounting and Economics*, Vol. 7, No.1, pp. 11-42.

Murphy K. J., 1999. Executive compensation, *Handbook of Labor Economics*, in: O. Ashenfelter & D. Card, *Handbook of Labor Economics, edition 1, Vol. 3, pp. 2485-2563*.

Murphy K. J., 2012. Executive compensation: Where we are, and how we got there. In *Handbook of the Economics of Finance*, ed. G. Constantinides, M. Harris, and R. Stulz. Amsterdam: Elsevier/North-Holland.

Muslu V., 2010. Executive directors, pay disclosures, and incentive compensation in large European companies. *Journal of Accounting, Auditing, and Finance, Vol. 25, pp. 569-605.*

Nickell S. J., 1996. Competition and corporate performance. *Journal of Political Economy, Vol. 104, pp. 724-746.*

OECD, 1999. Principles of corporate governance. http://www.oecd.org/dataoecd/32/18/31557724.pdf

Palia D., 2000. The Impact of Regulation on CEO Labor Market. *RAND Journal of Economics.*

Shleifer A., Vishny R.W., 1997. A Survey of Corporate Governance. *Journal of Finance, Vol. 52, pp. 737-783.*

Schmidt K., 1997. Managerial incentives and product market competition. *Review of Economic Studies, Vol. 64, pp. 191-213.*

Yermack D., 1995. Do corporations award CEO stock options effectively? *Journal of Financial Economics, Vol. 39, No. 23, pp. 237-269.*

Yermack D., 1996. Higher market valuation of companies with a small board of directors, *Journal of Financial Economics Vol.40, pp.185-211.*

Table 1 – Variables description

Variable name	Label	Description
CEO comp	CEO compensation	It is computed as the sum between salary and bonus awarded by CEOs at the end of the year. (Thousands of Euros)
Stock Return	*Stock Return*	It is calculated using prices from end-of-period to end-of-period (fiscal year). r(t)={[p(t)f(t)/p (t')]–1}where p(t) is the sale price or closing bid at time t, f(t) is the factor to adjust price by splits and dividends in period t; p(t') is the sale price or closing bid at the previous period
ROA	Return on Assets	It is calculated as: (Net Income before Preferred Dividends + ((Interest Expense on Debt-Interest Capitalized) * (1-Tax Rate))) / Average of Last Year's and Current Year's Total Assets * 100
MTB	Market-to-book	It is the ratio of the market value of equity and the book value of equity.
MarketCap	Market capitalization	It is Market Price-Fiscal Period End * Common Shares Outstanding
Tenure	CEO tenure	It indicates the number of years served as CEO.
REG	Regulation	It is a dummy that assumes 1 if the firm is under regulation.
CAP	Incentive regulation	It is a dummy that assumes 1 if the firm is under incentive regulation.
State Ownership	Government control rights	It is a dummy that assumes 1 if the government holds at least 30% of the ultimate control rights
OECD Index of Liberalization	Index of market competition	It ranges from 0 to 6. A high value is associated with a low degree of market competition and liberalization.

Table 2 – Descriptive statistics (Full sample)

Variable	Obs	Mean	Std. Dev.	Min	Max
CEO compensation	418	1262.67	1491.03	114.04	11640.74
Stock return	492	0.08	0.38	-1	1.89
ROA	535	6.90	7.03	-42.09	79.09
Market-to-book	482	1.40	0.55	0.01	4.17
Market capitalization	485	$1.36*10^7$	$2.27*10^7$	4503.35	$2.10*10^8$
Log (Total Asset)	580	15.47	2.23	4.66	19.23
Tenure	520	3.71	2.39	1	12
State Ownership	674	0.55	0.50	0	1
OECD Index of Liberalization	674	1.46	1.63	0	6

Notes: CEO compensations, Market capitalization and Total Assets are in Thousands of 2005 constant Euros

Table 3 – Descriptive statistics by country

Country	CEO compensation		Log (Assets)		Tenure		Market Capitalization		Stock Return		ROA		Market-to-book	
	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev*
Austria	933.55	*351.89*	15.85	*0.18*	2.3	*1.41*	$9.5*10^6$	*6082596*	0.21	*0.43*	9.50	*3.35*	2.04	*0.82*
Belgium	480.08	*21.70*	15.20	*00.11*	4	*2.16*	$1.8*10^6$	*188589*	0.04	*0.10*	6.00	*1.36*	1.11	*0.05*
Finland	986.10	*129.30*	16.61	*0.12*	4.25	*2.73*	$1.6*10^7$	$1.07*10^7$	0.32	*0.40*	9.79	*1.95*	1.56	*0.61*
France	855.96	*838.07*	15.67	*2.88*	3.56	*2.6*	$2.1*10^7$	$3.77*10^7$	0.05	*0.51*	4.2	*3.37*	1.55	*0.61*
Germany	2607.06	*2302.13*	16.66	*1.63*	3.2	*1.78*	$2.2*10^7$	$2.75*10^7$	0.11	*0.26*	5.67	*2.36*	1.33	*0.29*
Italy	897.16	*1154.64*	15.63	*1.66*	3.58	*2.2*	$1.4*10^7$	$2.30*10^7$	-0.02	*0.29*	7.11	*4.62*	1.22	*0.25*
Norway	378.35	*45.10*	14.87	*0.36*	3.5	*2.19*	$1.0*10^6$	*474621.1*	0.21	*0.57*	5.74	*3.01*	0.96	*0.19*
Poland	174.29	*53.65*	11.96	*0.76*	2.5	*1.05*	102096	*3929.42*	0.75	-	6.69	*3.13*	-	-
Portugal	733.81	*209.32*	17.04	*00.28*	3.33	*2.18*	$1.2*10^6$	*5123469*	0.06	*0.32*	6.06	*1.07*	1.22	*1.90*
Spain	1863.82	*2845.78*	16.46	*1.22*	4.78	*2.93*	$1.7*10^6$	$1.59*10^7$	0.54	*0.29*	8.11	*2.11*	1.46	*0.31*
Switzerland	378.00	*179.26*	15.17	*1.16*	4.38	*2.87*	$2.5*10^6$	*2865605*	0.30	*0.47*	3.97	*2.03*	1.15	*0.16*
UK	654.11	*620.16*	14.00	*2.71*	3.72	*2.30*	$8.7*10^6$	$1.02*10^7$	0.04	*0.34*	9.69	*13.77*	1.64	*0.85*

Notes: CEO compensations, Market capitalization and Total Assets are in Thousands of 2005 constant Euros

Table 4 – Descriptive statistics (Regulated versus Unregulated)

	Regulated					Unregulated				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
CEO compensation	321	1333.37	1638.36	114.05	11640.74	97	1028.67	798.44	135.7	3146.57
Stock return	396	0.09	0.35	-0.97	1.74	96	0.05	0.48	-1	1.89
ROA	431	6.83	4.61	-4.99	45.80	104	7.21	12.95	-42.09	79.09
Market-to-book	383	1.36	0.46	0.01	3.68	99	1.59	0.78	0.27	4.17
Market capitalization	386	$1.35*10^7$	$2.28*10^7$	30264.97	$2.10*10^8$	99	$1.42*10^7$	$2.24*10^7$	4503.35	$9.19*10^7$
Log (Total Asset)	450	15.85	1.69	11.30	19.23	128	14.16	3.19	4.66	18.65
Tenure	401	3.73	2.40	1	12	118	3.66	2.36	1	10
State Ownership	490	0.66	0.47	0	1	161	0.23	0.42	0	1
OECD Index of Liberalization	490	1.58	1.74	1	6	161	0.98	1.11	0	5.27

Notes: CEO compensations, Market capitalization and Total Assets are in Thousands of 2005 constant Euros

Table 5 – Descriptive statistics (Incentive versus Cost-Based Regulation)

	Incentive Regulation					Cost-based Regulation				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
CEO compensation	238	1201.25	1583.79	114.05	11640.74	83	1712.25	1740.45	177.78	8564.48
Stock return	248	0.04	0.32	-0.92	1.71	148	0.16	0.39	-0.97	1.74
ROA	285	7.65	5.22	-1.98	45.80	146	5.23	2.41	-4.99	11.46
Market-to-book	248	1.38	0.52	0.01	3.68	135	1.31	0.31	0.86	2.41
Market capitalization	251	$1.04*10^7$	$1.36*10^7$	30264.97	$7.06*10^7$	135	$1.93*10^7$	$3.30*10^7$	77122.21	$2.18*10^8$
Log (Total Asset)	292	15.58	1.60	11.30	18.82	158	16.35	1.76	12.89	19.23
Tenure	282	3.84	2.41	1	12	119	3.48	2.37	1	11
State Ownership	318	0.57	0.49	0	1	172	0.81	0.39	0	1
OECD Index of Liberalization	318	0.93	1.15	0	5.27	172	2.77	1.99	0	6

Notes: CEO compensations, Market capitalization and Total Assets are in Thousands of 2005 constant Euros

Table 6 – CEO pay for performance sensitivity of European Energy Utilities (Full Sample)

	Log (CEO compensation)			
	(1)	(2)	(3)	(4)
Stock Return	*0.09*			
	(1.32)			
Log(ROA)		*0.09***		
		(2.16)		
Log (MarketCap)			*0.16***	
			(2.02)	
Log (Market-to-book)				*0.14**
				(1.75)
Tenure	*0.06****	*0.04***	*0.05****	*0.05****
	(3.74)	*(2.36)*	*(3.07)*	*(3.09)*
Log (TotalAsset)	*0.13**	*0.35****	*0.25****	*0.32****
	(1.75)	*(4.34)*	*(3.09)*	*(4.12)*
GDP	*1.12e-06****	*5.09e-06*	*5.67e-07*	*7.75e-07***
	(3.76)	*(1.41)*	*(1.61)*	*(2.46)*
Firm Fixed Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummy	***No***	***No***	***No***	***No***
R-squared	*0.30*	*0.28*	*0.30*	*0.30*
N. Obs.	*355*	*362*	*347*	*345*
N. Firms	*54*	*53*	*55*	*54*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return, ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. GDP is the Gross Domestic Product.

Table 7 – CEO pay for performance sensitivity: Regulated vs. Unregulated Firms

Firm performance is measured as Stock Return.

	Log (CEO compensation)		
	(1)	(2)	(3)
Stock Return	*0.30***	*0.30***	*0.27***
	(2.12)	*(2.24)*	*(2.02)*
Stock Return*REG	*-0.32***	*-0.30***	*-0.36***
	(-2.05)	*(-2.08)*	*(-2.39)*
Tenure	*0.06****	*0.06****	*0.06****
	(3.67)	*(3.82)*	*(3.51)*
Log (TotalAsset)	*0.17**	*0.11*	*0.09*
	(1.86)	*(1.51)*	*(1.35)*
GDP		*1.10e-06****	
		(3.88)	
Firm Fixed Effect	*Yes*	*Yes*	*Yes*
Year Dummy	*No*	*No*	*Yes*
R-squared	*0.27*	*0.31*	*0.40*
N. Obs	*352*	*352*	*352*
N. Firms	*53*	*53*	*53*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return,* and *Log (Total Asset)* are defined as in Table 1. *REG* is a dummy equal to 1 when the firm is regulated. GDP is the Gross Domestic Product.

Table 8 – CEO pay for performance sensitivity: Regulated vs. Unregulated firms

ROA, Market-to-book and Market Capitalization

	Log (CEO compensation)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(ROA)	*0.26***	*0.18***	*0.08**						
	(2.32)	*(2.32)*	*(2.08)*						
Log(ROA)*REG	*-0.27***	*-0.11*	*-0.08**						
	(-2.15)	*(-1.18)*	*(-2.15)*						
Log(Martet-to-book)				*0.28***	*0.21**	*0.08*			
				(2.48)	*(1.73)*	*(0.67)*			
Log(Martet-to-book)*REG				*-0.11*	*-0.09*	*0.02*			
				(-0.71)	*(-0.64)*	*(0.15)*			
Log(MarketCap)							*0.38****	*0.33***	*0.28****
							(3.00)	*(2.30)*	*(3.56)*
Log(MarketCap)*REG							*-0.24**	*-0.24**	*-0.21**
							(-1.85)	*(-1.73)*	*(-2.00)*
Tenure	*0.07****	*0.04****	*0.05***	*0.05****	*0.05****	*0.05****	*0.04****	*0.05****	*0.05***
	(5.38)	*(2.40)*	*(2.76)*	*(2.96)*	*(3.06)*	*(2.97)*	*(2.87)*	*(2.96)*	*(2.85)*
Log (TotalAsset)		*0.35****	*0.17**	*0.39****	*0.31****	*0.21***	*0.27****	*0.25****	*0.14***
		(4.23)	*(2.17)*	*(4.75)*	*(4.23)*	*(2.48)*	*(3.14)*	*(3.02)*	*(2.42)*
GDP		*4.78e-07*			*7.63e-07***			*5.43e-07*	
		(1.30)			*(2.43)*			*(1.53)*	
Firm Fixed Effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummy	*No*	*No*	*Yes*	*No*	*No*	*Yes*	*No*	*No*	*Yes*
R-squared	*0.19*	*0.28*	*0.37*	*0.28*	*0.30*	*0.37*	*0.23*	*0.24*	*0.31*
N. Obs	*359*	*359*	*359*	*342*	*342*	*342*	*266*	*266*	*266*
N. Firms	*52*	*52*	*52*	*53*	*53*	*53*	*40*	*40*	*40*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *REG* is a dummy equal to 1 when the firm is regulated. GDP is the Gross Domestic Product.

Table 9 – CEO pay for performance sensitivity: Incentive vs. Cost-Based Regulation

Firm performance is measured by Stock Return

	Log (CEO compensation)		
	(1)	(2)	(3)
Stock Return	*-0.22**	*-0.22**	*-0.33****
	(-1.84)	*(-2.09)*	*(-2.72)*
Stock Return*CAP	*0.30***	*0.30***	*0.32***
	(2.11)	*(2.30)*	*(2.30)*
Tenure	*0.05***	*0.05***	*0.05***
	(2.48)	*(2.66)*	*(2.59)*
Log (TotalAsset)	*0.20**	*0.14*	*0.09*
	(1.74)	*(1.36)*	*(0.84)*
GDP		*8.91e*$^{-07***}$	
		(3.06)	
Firm Fixed Effect	*Yes*	*Yes*	*Yes*
Year Dummy	*No*	*No*	*Yes*
R-squared	*0.21*	*0.25*	*0.33*
N. Obs	*273*	*273*	*273*
N. Firms	*40*	*40*	*40*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return,* and *Log (Total Asset)* are defined as in Table 1. CAP is a dummy equal to 1 when the firm is subject to incentive regulation. GDP is the Gross Domestic Product.

Table 10 – CEO pay for performance sensitivity: Incentive vs. Cost-Based Regulation

ROA, Market-to-book and Market Capitalization

	Log (CEO compensation)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(ROA)	*-0.08*	*0.01*	*0.05*						
	(-1.38)	*(0.12)*	*(-1.28)*						
Log(ROA)*CAP	*0.11***	*0.09****	*0.07**						
	(2.18)	*(2.42)*	*(1.94)*						
Log(Martet-to-book)				*-0.25**	*-0.27***	*-0.34***			
				(-1.93)	*(-2.19)*	*(-2.46)*			
Log(Martet-to-book)*CAP				*0.42****	*0.40****	*0.45****			
				(3.88)	*(3.92)*	*(3.20)*			
Log(MarketCap)							*0.10**	*0.07*	*0.04*
							(1.82)	*(1.12)*	*(0.68)*
Log(MarketCap)*CAP							*0.02***	*0.02***	*0.01***
							(2.48)	*(2.52)*	*(2.45)*
Tenure	*0.07****	*0.04**	*0.04**	*0.04***	*0.04***	*0.05***	*0.04**	*0.04**	*0.04**
	(4.02)	*(1.91)*	*(2.18)*	*(2.05)*	*(2.11)*	*(2.19)*	*(1.94)*	*(2.02)*	*(2.12)*
Log (TotalAsset)		*0.35****	*0.17**	*0.33****	*0.29****	*0.16*	*0.27****	*0.26***	*0.14*
		(3.55)	*(1.95)*	*(3.38)*	*(2.91)*	*(1.36)*	*(2.69)*	*(2.59)*	*(1.72)*
GDP		*2.51e-07*			*5.25e-07*			*3.84e-07*	
		(0.61)			*(1.52)*			*(1.08)*	
Firm Fixed Effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummy	*No*	*No*	*Yes*	*No*	*No*	*Yes*	*No*	*No*	*Yes*
R-squared	*0.15*	*0.22*	*0.29*	*0.23*	*0.24*	*0.31*	*0.23*	*0.24*	*0.31*
N. Obs	*294*	*294*	*294*	*266*	*266*	*266*	*268*	*268*	*268*
N. Firms	*42*	*42*	*42*	*40*	*40*	*40*	*41*	*41*	*41*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *CAP* is a dummy equal to 1 when the firm is subject to incentive regulation. GDP is the Gross Domestic Product.

Table 11 – CEO pay for performance sensitivity of European Energy Utilities: Magnitude

Firm performance is measured by Market Capitalization.

	CEO compensation			
	Regulated vs Unregulated	Incentive vs Cost-Based Regulation		
	(1)	(2)	(3)	(4)
Market Capitalization	*0.0000156***	*7.70e-06*	*6.82e-06*	8.03e-06
	(2.41)	*(0.90)*	*(0.78)*	*(1.04)*
Market Capitalization *REG	*-3.48e-06*			
	(-0.32)			
Market Capitalization *CAP		*0.0000383**	*0.0000364**	*0.0000374**
		(1.96)	*(1.84)*	*(1.88)*
Tenure	*65.16**	*53.84*	*55.21*	*57.85*
	(1.88)	*(1.48)*	*(1.55)*	*(1.57)*
Log(TotalAsset)	*151.44*	*-20.63*	*-60.58*	*-155.19*
	(1.03)	*(-0.10)*	*(-0.29)*	*(-0.43)*
GDP			*0.0007457*	
			(0.76)	
Firm Fixed Effect	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummy	*No*	*No*	*No*	*Yes*
R-squared	*0.07*	*0.13*	*0.14*	*0.16*
N. Obs	*344*	*268*	*268*	*268*
N. Firms	*54*	*41*	*41*	*41*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Market Capitalization, Tenure* and *Log (Total Asset)* are defined as in Table 1. *REG* is a dummy equal to 1 when the firm is regulated. *CAP* is a dummy equal to 1 when the firm is subject to incentive regulation. GDP is the Gross Domestic Product.

Table 12 – Sensitivity Analysis: Controlling for Firm Ownership and Market Liberalization: Regulated vs. Unregulated Firms

	Log (CEO compensation) Regulated vs Unregulated			
	(1)	(2)	(3)	(4)
	Stock Return	*Log(MarketCap)*	*Log(ROA)*	*Log(MTB)*
Performance	*0.31***	*0.35***	*0.23****	*0.26**
	(2.13)	*(2.47)*	*(2.65)*	*(1.85)*
Performance*REG	*-0.33***	*-0.29**	*-0.18**	*-0.13*
	(-2.17)	*(-1.92)*	*(-1.91)*	*(-0.84)*
Tenure	*0.6****	*0.05****	*0.04***	*0.05****
	(3.24)	*(2.89)*	*(2.19)*	*(2.99)*
Log (TotalAsset)	*0.13*	*0.21****	*0.28****	*0.28****
	(1.60)	*(2.67)*	*(3.32)*	*(3.74)*
State Ownership	*-0.30*	*-0.26*	*-0.28*	*-0.27*
	(-1.51)	*(-1.24)*	*(-1.26)*	*(-1.25)*
OECD Index of Liberalization	*-0.11*	*-0.16****	*-0.13**	*-0.17****
	(-1.53)	*(-2.82)*	*(-1.71)*	*(-3.19)*
Firm Fixed Effect	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummy	*No*	*No*	*No*	*No*
R-squared	*0.30*	*0.35*	*0.31*	*0.33*
N. Obs	*355*	*347*	*362*	*345*
N. Firms	*54*	*55*	*53*	*54*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return, ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *REG* is a dummy equal to 1 when the firm is regulated. GDP is the Gross Domestic Product. *State Ownership* is a dummy variable that is 1 when the state has at least 30% the control rights. *OECD Index of Liberalization* indicates the degree of market competition: a high value of this index is associated with a low degree of market competition and liberalization.

Table 13 – Sensitivity Analysis: Controlling for Firm Ownership and Market Liberalization
Incentive vs. Cost-Based Regulation

	Log (CEO Compensation)			
	(1)	(2)	(3)	(4)
	Stock Return	*Log(MarketCap)*	*Log(ROA)*	*Log(MTB)*
Performance	*-0.27***	*0.04*	*-0.2*	*-0.31***
	(-2.43)	*(0.70)*	*(-0.30)*	*(-2.32)*
Performance*CAP	*0.34***	*0.02***	*0.09***	*0.42****
	(2.45)	*(2.21)*	*(2.15)*	*(3.71)*
Tenure	*0.05***	*0.04***	*0.04**	*0.05***
	(2.34)	*(2.15)*	*(1.80)*	*(2.22)*
Log (TotalAsset)	*0.12*	*0.18**	*0.27***	*0.19***
	(1.18)	*(1.83)*	*(2.47)*	*(2.03)*
State Ownership	*-0.26**	*-0.23*	*-0.11*	*-0.30*
	(-1.69)	*(-1.29)*	*(-1.26)*	*(-1.42)*
OECD Index of Liberalization	*-0.11*	*-0.17****	*-0.11*	*-0.18****
	(-1.60)	*(-3.40)*	*(-1.19)*	*(-3.66)*
Firm Fixed Effect	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummy	*No*	*No*	*No*	*No*
R-squared	*0.25*	*0.26*	*0.25*	*0.27*
N. Obs	*273*	*268*	*294*	*266*
N. Firms	*40*	*41*	*42*	*40*

Panel regressions with firm-specific fixed effects. Robust standard errors are clustered by firms. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return, ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *CAP* is a dummy equal to 1 when the firm is subject to incentive regulation. GDP is the Gross Domestic Product. *State Ownership* is a dummy variable that is 1 when the state has at least 30% the control rights. *OECD Index of Liberalization* indicates the degree of market competition: a high value of this index is associated with a low degree of market competition and liberalization.

Table 14 – CEO level analysis of pay-performance sensitivity: Regulated vs. Unregulated Firms

	Log (CEO Compensation)			
	Regulated vs Unregulated			
	(1)	(2)	(3)	(4)
	Stock Return	*Log(MarketCap)*	*Log(ROA)*	*Log(MTB)*
Performance	*0.18*	*0.18****	*0.10*	*0.33****
	(1.25)	*(2.69)*	*(1.61)*	*(3.19)*
Performance*REG	*-0.33*	*-0.01**	*-0.07*	*-0.25***
	(-2.03)	*(-1.69)*	*(-1.59)*	*(-2.31)*
Tenure	*0.06****	*0.07****	*0.05****	*0.07****
	(3.51)	*(3.55)*	*(2.81)*	*(3.63)*
Log (TotalAsset)	*0.36****	*0.21****	*0.41****	*0.38****
	(11.88)	*(2.79)*	*(13.79)*	*(12.64)*
State Ownership	*-0.52****	*-0.62****	*-0.50****	*-0.62****
	(-3.69)	*(0.14)*	*(-3.16)*	*(-4.41)*
OECD Index of Liberalization	*-0.03*	*-0.08*	*-0.04*	*-0.08*
	(-0.34)	*(-0.92)*	*(-0.43)*	*(-0.92)*
Country Dummies	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummies	*Yes*	*Yes*	*Yes*	*Yes*
R-squared	*0.71*	*0.75*	*0.74*	*0.74*
N. Obs	*355*	*347*	*362*	*345*

Pooled regressions with robust standard errors clustered by CEOs. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return, ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *REG* is a dummy equal to 1 when the firm is regulated. GDP is the Gross Domestic Product. *State Ownership* is a dummy variable that is 1 when the state has at least 30% the control rights. *OECD Index of Liberalization* indicates the degree of market competition: a high value of this index is associated with a low degree of market competition and liberalization.

Table 15 – CEO level analysis of pay-performance sensitivity

Incentive vs. Cost-based regulation

	Log (CEO Compensation) Incentive vs Cost-Based Regulation			
	(1)	(2)	(3)	(4)
	Stock Return	*Log(MarketCap)*	*Log(ROA)*	*Log(MTB)*
Performance	*-0.31**	*0.06*	*-0.01*	*-0.42*
	(-1.80)	*(0.64)*	*(-0.10)*	*(-1.51)*
Performance*CAP	*0.26*	*0.02**	*0.03*	*0.47*
	(1.54)	*(1.67)*	*(0.57)*	*(1.64)*
Tenure	*0.06****	*0.07****	*0.06****	*0.07****
	(3.04)	*(3.41)*	*(2.76)*	*(3.33)*
Log (TotalAsset)	*0.43****	*0.36****	*0.43****	*0.42****
	(12.81)	*(3.16)*	*(11.92)*	*(9.06)*
State Ownership	*-0.45***	*-0.57****	*-0.54****	*-0.60****
	(-2.58)	*(-3.15)*	*(-2.66)*	*(0.19)*
OECD Index of Liberalization	*-0.10*	*-0.10*	*-0.06*	*-0.11*
	(-0.94)	*(-0.94)*	*(-0.59)*	*(-1.02)*
Country Dummies	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummies	*Yes*	*Yes*	*Yes*	*Yes*
R-squared	*0.72*	*0.75*	*0.73*	*0.74*
N. Obs.	*273*	*268*	*294*	*266*

Pooled regressions with robust standard errors clustered by CEOs. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return, ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *CAP* is a dummy equal to 1 when the firm is subject to incentive regulation. GDP is the Gross Domestic Product. *State Ownership* is a dummy variable that is 1 when the state has at least 30% the control rights. *OECD Index of Liberalization* indicates the degree of market competition: a high value of this index is associated with a low degree of market competition and liberalization.

Table 16 – CEO level analysis: Panel regressions

Regulated vs. Unregulated Firms

	Log (CEO compensation) Regulated vs Unregulated			
	(1)	(2)	(3)	(4)
	Stock Return	*Log(MarketCap)*	*Log(ROA)*	*Log(MTB)*
Performance	*0.18****	*0.08*	*0.08*	*-0.06*
	(2.51)	*(0.63)*	*(1.58)*	*(-0.42)*
Performance*REG	*-0.19***	*-0.08*	*-0.09*	*0.13*
	(-2.21)	*(-0.62)*	*(-1.24)*	*(0.86)*
Tenure	*0.06****	*0.05****	*0.06****	*0.04****
	(3.79)	*(2.84)*	*(2.85)*	*(2.81)*
Log (TotalAsset)	*0.07*	*0.15**	*0.10*	*0.17**
	(1.07)	*(1.96)*	*(1.01)*	*(1.84)*
State Ownership	*0.05*	*0.02*	*0.06*	*0.04*
	(1.29)	*(0.45)*	*(1.19)*	*(1.10)*
OECD Index of Liberalization	*-0.06*	*-0.17****	*-0.06*	*-0.17****
	(-0.92)	*(-2.95)*	*(-0.92)*	*(-3.40)*
CEO-Fixed Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummies	*No*	*No*	*No*	*No*
R-squared	*0.43*	*0.20*	*0.50*	*0.54*
N. Obs	*355*	*347*	*362*	*345*
N. CEO	*95*	*101*	*97*	*100*

Panel regressions with CEO-specific fixed effects. Robust standard errors are clustered by CEO. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return, ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *REG* is a dummy equal to 1 when the firm is regulated. GDP is the Gross Domestic Product. *State Ownership* is a dummy variable that is 1 when the state has the 70% of the control rights. *OECD Index of Liberalization* indicates the degree of market competition: a high value of this index is associated with a low degree of market competition and liberalization.

Table 17 – CEO level analysis: Panel regressions

Incentive vs. Cost-based Regulation

	Log (CEO compensation) Incentive regulation vs RoR			
	(1)	(2)	(3)	(4)
	Stock Return	*Log(MarketCap)*	*Log(ROA)*	*Log(MTB)*
Performance	*-0.20***	*-0.04*	*-0.06*	*-0.34****
	(-2.12)	*(-0.55)*	*(-1.06)*	*(-2.70)*
Performance*CAP	*0.25****	*0.02****	*0.09***	*0.41****
	(2.47)	*(2.67)*	*(2.32)*	*(3.61)*
Tenure	*0.04***	*0.03**	*0.05***	*0.04**
	(1.16)	*(1.74)*	*(2.08)*	*(1.91)*
Log (TotalAsset)	*0.12*	*0.15*	*0.16*	*0.14*
	(1.16)	*(1.62)*	*(1.12)*	*(1.40)*
State Ownership	*0.01*	*-0.02*	*0.05*	*-0.03*
	(0.32)	*(-0.50)*	*(0.70)*	*(-0.53)*
OECD Index of Liberalization	*-0.07*	*-0.19****	*-0.03*	*-0.18****
	(-1.17)	*(-3.36)*	*(-0.48)*	*(-3.26)*
CEO-Fixed Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Dummies	*No*	*No*	*No*	*No*
R-squared	*0.54*	*0.34*	*0.54*	*0.49*
N. Obs	*273*	*268*	*294*	*266*
N. CEO	*72*	*77*	*78*	*76*

Panel regressions with CEO-specific fixed effects. Robust standard errors are clustered by CEO. T-statistics are reported in brackets. *, ** and *** denotes significance at 10%, 5% and 1% respectively. Variables are adjusted by inflation. *CEO compensation*, *Stock Return, ROA*, *Market Capitalization, Market-to-book, Tenure* and *Log (Total Asset)* are defined as in Table 1. *CAP* is a dummy equal to 1 when the firm is subject to incentive regulation. GDP is the Gross Domestic Product. *State Ownership* is a dummy variable that is 1 when the state has the 70% of the control rights. *OECD Index of Liberalization* indicates the degree of market competition: a high value of this index is associated with a low degree of market competition and liberalization.