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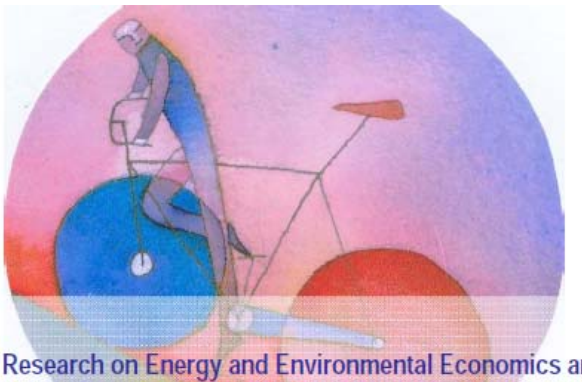

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Accountability in Government and Regulatory Policies: Theory and Evidence.*

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Abstract

A key aspect of institutional design is the degree of accountability to which the officials involved in regulation are subjected. Elected officials strive for re-election, appointed ones are career-concerned. Provided that the effort exerted to uncover the firm's unknown cost is sufficiently efficient in swaying votes, elected officials produce more information than appointed ones do. As a result, both prices and ex post rents are higher under appointment, and society will prefer this last institution whenever investment inducement is sufficiently relevant or shareholders are sufficiently more powerful than consumers. Data on electricity prices and costs, and the methods of selecting top-level regulators and High court judges for a panel of forty-nine U.S. states confirm the model's predictions.

Keywords: Election; Regulation; Judges; Electricity.

JEL classification: H11; L51; K40; Q40.

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1 Introduction

Understanding which institutional design is more efficient in making public officials accountable and, in particular, whether to elect or appoint regulators and judges is a key issue in economics. Even if these settings are considered as unrelated, there are markets where both regulators and judges participate to the regulatory process and a plurality of appointment rules survive: the U.S. electricity market is a case in point. Prices are set at the state level at the end of public quasi-judicial hearings presided first by a regulator and then eventually by a judge, and these officials are either elected or appointed. This structure is not unique to the U.S.A. and, in the aftermath of recent privatization waves, several countries have reformed their utility markets institutions entrusting the regulatory policy making power to accountable regulators whose decisions are subject to the control of accountable high courts judges (see Newbery, [2000]).[1] This trend raises two general questions. First, what are the determinants of the adoption of a particular appointment rule? Second, what is the endogenous impact of these institutions on regulatory policies?

This paper lays out a theoretical framework for thinking about these issues, and explores its empirical implications using U.S. electricity market data. In the model, I keep the complete contracting approach typical of the new theory of regulation (Laffont and Tirole, 1993; Laffont, 2000), recognizing however the different incentives faced by elected and appointed officials and the opposite political concerns moving pro-consumer and pro-shareholder parties when designing these institutions. The pricing rule is chosen by a

[1] For instance, after the Utilities Act of 2000, the regulation of the UK power market has been entrusted to a board of three officials—GEMA—appointed by the Secretary of State and subject to a strict transparency requirement providing "the hook for judicial review" (OECD, 2002). Also, several recent antitrust cases have focused the interest of European countries on the "gate-keeper" role of judges (Breyer, 2009).

planner—who is a fiction for the Coasian bargaining necessary to make price changes acceptable, and it is contingent on two orthogonal signals on the firm's unobserved cost produced by a regulator and a judge. Each signal's precision rises with the effort exerted by the official and with her random ability. As in Maskin and Tirole (2004), public officials respond to implicit incentives—i.e., they are either elected or appointed—and to intrinsic motivations—i.e., they want to be remembered for great things accomplished in favor of society or of a part of it. In particular, while elected officials strive for reelection, appointed ones are career-concerned (see Alesina and Tabellini, [2007]); besides, while judges wish to be fair, regulators aim at leaving open a "revolving door" to the industry.

The model predicts that: 1. If effort sways enough votes, elected officials exert more effort than appointed ones; 2. While "fairness" motivations foster pro-consumer incentives, "revolving door" motivations curb them; 3. The possibility of either diverting effort from information gathering to a less socially relevant task or manipulating the signal in exchange for bribes does not affect public officials behaviors provided that the value of office holding is sufficiently high. As a main consequence, election should be preferred to appointment if only static efficiency is relevant. On the other hand, however, it can also be shown that, whenever the demand is sufficiently inelastic, election depresses ex post rents and, in turn, the firm's incentives to invest. In this perspective, appointment works as an imperfect constraint on the expropriation of the firm's sunk investments, and it is preferred to election if society's investment concerns are sufficiently strong. Finally, if investment boosts more the firm's profits than the consumers' welfare, a tension between consumers and shareholders arises and the likelihood that appointment is chosen is higher the stronger is the political power of shareholders.

In order to test these predictions, I look at the electricity prices, costs and institutions for a panel of forty-nine U.S. states spanning the years between 1970 and 1997. Consistent with the model, the probability of a state adopting election is higher when cheaper generation technologies are available and lower when the reformer is Republican. I also show that elected regulators and judges are associated to significantly lower rates and are less likely to pass through cost changes into prices. This last set of result holds whether or not an instrumental variables estimator is used.

The paper most closely related to mine is Besley and Coate (2003), who propose the following bundling argument to explain why election of regulators should lead to more pro-consumer policies. Being regulation bundled with more salient policies at elections of politicians, the latter have electoral incentives and no costs to appoint pro-shareholder regulators. When instead regulators are elected, pro-consumer candidates have a higher chance of winning. Yet, even if elegant, the idea is neither robust to the possibility that public officials can be bribed after being selected nor suggestive of which technological or political dimension determines the choice of one institution and not the other. In this perspective, this paper brings three main contributions. First, it provides the first fully developed theoretical explanation of why direct election leads to more pro-consumer policies despite the eventuality of capture. Second, following the footsteps of a lively literature on endogenous institutions (Aghion, Alesina and Trebbi, [2004]; Guerriero, [2009a] and [2009b]), I formalize and test a property rights theory of the selection of different accountability structures. Finally, the empirical analysis adds significantly to the literature about the systematic differences in the policies pursued by appointed and elected officials. In contrast to previous studies, not only I endogenize the choice of these

institutions,[2] but I also highlight the role of judicial appointment rules.[3] To the latter extent, the paper is complementary to a recent line of research explaining the use of either regulation or courts as a function of the incentives faced by the enforcers themselves (Glaeser, Johnson, and Shleifer, 2001). The rest of the paper is organized as follows. Section 2 describes the institutions governing the pricing process in the U.S. electricity market as an example of the setting studied in the model. Section 3 first assesses the effect of implicit incentives on prices, and then identifies the determinants of regulatory regimes. Section 4 states the predictions which are tested in section 5; section 6 concludes. All proofs, tables and a detailed description of the data are gathered in the appendix.

2 Institutions

Public officials, politicians and the pricing process.—Investor-owned utilities accounted in 1997 for over three-fourths of the sales of the U.S. electricity market (EEI, 1997). These firms are not allowed to receive governmental subsidies. Thus, in order to assure their viability, rates have been traditionally linked to those average costs recognized as reimbursable during rate reviews. The latter are composed by two levels of quasi-judicial hearings open to all interested parties: i.e., firms, state-funded consumer advocates, shareholders' lobbies, and the media. First, the public utility commissioners, who are the heads of the state Public Utility Commission—PUC hereafter, sit on the bench; next, if the filing is not approved or it is appealed, a High Court judge, usually sitting in a state supreme

[2]Duso (2005), Holburn and Vanden Bergh (2006) and Falaschetti (2008) provide evidence but no theoretical justification of the relevance in explaining regulatory reforms of the forces discussed below.

[3]Besley and Coate (2003) employ, for the first time, panel data to confirm the basic idea that states electing their regulators enjoy lower rates. Leaver (2009) and Fremeth and Holburn (2009) corroborate these results using rate reviews. Hanssen (2000) (Besley and Payne, 2006) show that states appointing High courts judges have higher litigation rates (fewer discrimination charges).

court, is asked to rule the case.[4] The appeal is on law and fact and "with so much at stake, [judicial review] is a very real possibility" (Gormley, 1983). For instance, Gormley (1983) reports that the mean of the appellate rate of the PUC decisions between 1974 and 1979 is equal to 37.4 percentage points with a share of partially reversed cases of 43.5 percentage points. Teske (2004) finds similar figures for the years 1995 and 1996.

During the hearings, commissioners and judges have an information-gathering role: i.e, they examine witnesses and experts and receive the evidence. The final motion to be approved is proposed *de facto* by the PUC's staff who acts as the jury in the American adversarial trial: the justification is that decisions should be reached in "an open and fair manner" (CDRA, 1992).[5] Media carefully track the evolution of the hearings as determined by the activity of commissioners and judges; as a result, the latter is among the key tasks over which these officials are selected (Gormley, 1983). Commissioners and High court judges are either elected or appointed, and these appointment rules are chosen by the state government (see NARUC, [1997]; Hanssen, [2004a]).

From institutions to theory.—Building on these institutions, I set up a model in which the pricing rule is selected by a planner maximizing an utilitarian welfare function. This assumption captures the need of a wide consensus among interested parties and it is a mild one—see section 3.2. The rule is contingent on two signals obtained from the activity of a regulator and a judge. The signals are orthogonal and truthful. While the former hypothesis matches the appeal's structure and can be relaxed at the cost more cumbersome algebra (see Laffont [2000]), the latter reflects the role of the staff and can

[4]Here, I follow Friedman (1991, pp. 92-98), CDRA (1992, pp. 52-68) and Gormley (1983, pp. 92-98) whose overviews are highly consistent with those available on the PUSc' websites.

[5]Commissioners consider the staff as the most influential hearing actor (Gormley, 1983; Teske, 2004). Besides, courts usually examine the staff before issuing the final judgment (Gormley, 1983).

be relaxed as well—see section 3.3. Public officials are either elected or appointed on the basis of the observable signal's precision.[6] These accountability rules are designed by a Constitutional table which is a fiction for the state government. The latter non only attaches to the firm's utility a weight higher than one as society does but also a weight reflecting the preferences of her constituency. This last detail incorporates into the model the idea that while dynamic efficiency is salient for society at whole (Ajodhia and Hakvoort, 2005) the pricing process has been historically directed in order to keep "nominal prices from increasing" (Joskow, [1974], pp. 298).

3 Theory

The model builds on Laffont and Tirole (1993) and Laffont (2000). First, I shall assess the impact of appointment methods on the pricing rule selected by the planner. Next, I shall evaluate whether my conclusions change when the officials can collude with the firm. Finally, I will establish the relation between accountability rules and the firm's investment incentives: this exercise will clarify how the institutional design phase is affected by the Constitutional table's investment concerns and by her constituency's preferences.

3.1 *Implicit Incentives, Intrinsic Motivations and Equilibrium Prices*

Preliminaries.—The regulated firm produces a variable scale product q, charging a two-part tariff $A + pq$ with q, A and p strictly positive. Total cost is θq. The marginal cost θ equals $\underline{\theta}$ with probability v and $\bar{\theta}$ with probability $1 - v$. Let $\Delta\theta \equiv \bar{\theta} - \underline{\theta} > 0$. Consumers share the same preferences. Let $S(q)$, $p = P(q) = S'(q)$, $q(p)$ and $R(q) = P(q)\,q + A$

[6] When the precision is unobservable, evaluators have also to disentangle the activity of one official from that of the other. The characterization of this scenario is left as an avenue for future research.

label the gross surplus, inverse and regular representative consumer's demand functions, and the firm's revenue; besides, $P' < 0$ and $q' < 0$. Consumers choose q to maximize the net surplus $S(q) - A - pq$ with A optimally fixed to make them indifferent between buying or not so that $A \equiv S(q) - P(q)q$.[7] The firm's utility is $U = t - \theta q$ where t label the managerial rewards. In order to ensure that the firm participates it must be the case that $U \geq 0$ and that the firm's revenues cover managerial rewards or $A + pq(p) \geq t$. While the planner maximizes the sum of the net consumer surplus, the firm's utility and the firm's budget constraint evaluated at the shadow price of managerial rewards $1 + \lambda$

$$W = S(q(p)) - A - pq(p) + U + (1 + \lambda)[A + pq(p) - t], \tag{1}$$

society is also interested in the dynamic efficiency of the market—i.e., the level of investment, and attaches an extra weight to the firm's utility as discussed in section 3.3.[8] W is a strictly concave function of q. Let $V(q)$ denote the social surplus which is the sum of the consumers' net surplus plus the firm's revenue which is evaluated at the shadow price $1 + \lambda$ because helps to fulfill the budget constraint. The equation in (1) rewrites as $W = V(q) - (1 + \lambda)\theta q - \lambda U$ with $V(q) = (S(q) - R(q)) + (1 + \lambda)R(q) = (1 + \lambda)S(q)$, $V(0) = 0$, $V' > 0$, $V'' < 0$. The planner always observes q. Under full information on total costs, she implements the first best allocation pinned down by the type dependent marginal cost pricing rule $p^* = \theta$ which implies $U = 0$—see the appendix. If, instead,

[7] The analysis is substantially similar when the planner offers a menu of price and marginal costs pairs as in Armstrong and Sappington (2007) or when the price is linear. In this last case the pricing rule is of the Ramsey type: yet, despite the more cumbersome algebra, the message of the model remains unchanged.

[8] Joskow and Schmalensee (1986) suggest that the fixed fee covers a role similar to the governmental transfers in Laffont and Tirole (1993). To this extent, if reimbursement is intended to be operated through prices and the shadow cost of public funds is replaced by the marginal deadweight loss due to a rise in the fixed fee, my analysis is formally similar to the one proposed by Laffont and Tirole (1993).

total costs are unobservable, the following timing arises:

1. The planner and the firm learn the nature of the regulatory environment—i.e., $q(\cdot)$ and $\theta \in \left\{\underline{\theta}, \bar{\theta}\right\}$. Next, the firm only discovers the realization of θ.

2. Exploiting the revelation principle (Myerson, 1979) the planner offers the firm a menu of (t, q) pairs conditional on its report of θ. If the firm refuses, the game ends.

3. The selected contract is executed.

Let $\left\{\left(\underline{q}, \underline{t}, \underline{U}\right), \left(\bar{q}, \bar{t}, \bar{U}\right)\right\}$ denote output, managerial rewards and utility of the low and high cost firms. In equilibrium it must be the case that $\underline{U} = \underline{t} - \underline{\theta}\underline{q} \geq \bar{t} - \underline{\theta}\bar{q}$ in order to have that the firm truthfully reports its low marginal cost and that $\bar{U} = \bar{t} - \bar{\theta}\bar{q} \geq 0$ in order to assure individual rationality when the marginal cost is high. Because the planner's utility falls as the rent increases, $\bar{U} = 0$ and $\underline{U} = \underline{t} - \underline{\theta}\underline{q} = \bar{t} - \underline{\theta}\bar{q} = \bar{U} + \bar{\theta}\bar{q} - \underline{\theta}\bar{q} = \Delta\theta\bar{q}$.[9] All in all, the planner's objective function under asymmetric information is

$$\tilde{W} = v\left[V\left(\underline{q}\right) - (1+\lambda)\,\underline{\theta}\underline{q} - \lambda\Delta\theta\bar{q}\right] + (1-v)\left[V\left(\bar{q}\right) - (1+\lambda)\,\bar{\theta}\bar{q}\right]. \tag{2}$$

Differentiating expression (2) with respect to $\bar{q}$ reveals that the planner distorts the type $\bar{\theta}$'s allocation in order to limit the informational rent $v\lambda\Delta\theta\bar{q}$ accruing to the firm when $\theta = \underline{\theta}$. With $\Gamma(x) \equiv x(1-x)^{-1}$ and $\Gamma' > 0$, the equilibrium low type quantity $\hat{\bar{q}} < \bar{q}^*$ is

$$V'\left(\hat{\bar{q}}\right) = (1+\lambda)\,\bar{\theta} + \lambda v(1-v)^{-1}\Delta\theta \leftrightarrow \hat{\bar{p}} = \bar{\theta} + \lambda(1+\lambda)^{-1}\Gamma(v)\,\Delta\theta, \tag{3}$$

[9] In the background, I also assume that $v < \bar{v}$ where $\bar{v}$ is the threshold such that for v larger than $\bar{v}$ the planner finds optimal to give up production by the $\bar{\theta}$ type and offer a contract with no rent to the $\underline{\theta}$ type. Clearly, $\bar{v}$ is implicitly defined by $(1-\bar{v})\,V\left(\bar{q}(\bar{v})\right) - (1-\bar{v})(1+\lambda)\,\bar{\theta}\bar{q}(\bar{v}) = \bar{v}\lambda\Delta\theta\bar{q}(\bar{v})$.

There is no value in distorting the firm's activities when it reports $\underline{\theta}$. As a result, all the differences in ex ante expected rates with respect the first best are determined by $\hat{\hat{p}}$.

The supervision technology.—Let me now consider the following information gathering technology. In $t = 2$ the planner offers the firm a menu of transfers-quantity pairs conditional not only on the firm's report but also on orthogonal signals produced by the activity of a regulator and a judge. The signal's observable but not contractible precision is ξ_l with $l = \{R, J\}$. If $\theta = \underline{\theta}$, with probability ξ_l the planner sees $\underline{\theta}$ and achieve the first best and with probability $1 - \xi_l$ she remains uninformed. If $\theta = \bar{\theta}$, the signal is always uninformative.[10] The precision has technology $\xi_l = \alpha e_l$ where $e_l \in [0, 1]$ is official l's unobservable effort and $\alpha \in [0, 1]$ is the common—to both officials—talent distributed independently of e_l with mean $\bar{\alpha}$, variance σ_α^2, and density f whose properties are discussed below.[11] The planner pays a reservation wage $w > 0$ to the officials who always participate to the game and are not allowed to side contract between each other: this last detail can be relaxed—see section 3.2. In order to focus on appointment rules, as Alesina and Tabellini (2007) I leave aside signaling incentives looking at this modified timing:

3'. The regulator chooses the effort; next, she privately observes α. Then, the planner sees the signal which leads to the first best if informative. If the planner remains uninformed, the judge chooses her level of effort; then, she also discovers the random ability draw. Next, the planner sees the second signal which leads to the first best if informative. If this is not the case, the planner asks the firm to report θ.

[10] Under different information technologies, the power of the contract can fall with the precision (see Boyer and Laffont, [2003]). Yet, only the one used matches the institutions of the market studied below: here, the hearings are aimed at proving that the firm has low costs and a price adjustment is unnecessary.

[11] If the technology is additive, the results are similar (see Alesina and Tabellini, [2007]). This is also the case if the performance is any continuous and increasing function of the precision: e.g., social welfare.

4. The contract is executed, the precisions revealed and the officials rewarded.

Along with Maskin and Tirole (2004), I assume that public officials respond to implicit incentives—i.e., they are either elected or appointed—and intrinsic motivations—i.e., they want to be remembered for great things achieved in favor of society or of a part of it. In particular, if $i = \{E, A\}$ indexes implicit incentives, a regulator's objective function is

$$P_{i,R}\left(e_{i,R}\right) = \left\{1 + \left[\left(1 - R\right) G^{i}\left(e_{i,R}\right) - C\left(e_{i,R}\right)\right]\right\} w, \tag{4}$$

and a judge's objective function is

$$P_{i,J}\left(e_{i,J}\right) = \left\{1 + \left[G^{i}\left(e_{i,J}\right) - \left(1 - J\right) C\left(e_{i,J}\right)\right]\right\} w, \tag{5}$$

with the effort cost such that $C\left(0\right) = 0$, $C' > 0$, $C'\left(0\right) < \infty$, $C'' > 0$, $\lim_{e_{i,l} \to 1} C'\left(e_{i,l}\right) = \infty$.[12] The terms in square brackets are the net perquisites in monetary terms obtained over and above the wage w from implicit incentives and intrinsic motivations.

Looking first at intrinsic motivations, a wide legacy of political economics and legal studies has been claiming that a discriminating characteristic of the judicial task *vis—à—vis* the regulatory one is that judges wish to be correct and regulators aim at leaving open a "revolving door" to the industry.[13] In order to capture this pattern in a crystal clear way, I posit that the costs for a judge of exerting effort fall with the relevance of the "fairness" motivations $J \in [0, 1)$ and that the implicit rewards gained by a regulator decrease with

[12] The following results are not affected if the effort costs or implicit rewards are not multiplied for w.

[13] Gennaioli and Shleifer (2008) assume that judges want to minimize type one and two errors. Information gathering is less appealing for officials attracted by jobs in the industry (see the evidence on U.S. federal regulators by Quirk, [1981]); yet, 'revolving door" motivations could foster investments (Salant, 1995).

the strength of the "revolving door" motivations $R \in [0, 1)$. Turning to implicit incentives, I embrace the distinction proposed by Alesina and Tabellini (2007): elected officials are held accountable by voters at elections and want to maximize the probability of being re-elected, appointed ones are accountable to the society at whole and wish to maximize the conditional perception of their talent. This means that, if $\mathrm{E}[\cdot]$ denotes the appointed official's unconditional expectation over $\xi_{A,l}$, E the expectation of society over α and $e_{A,l}^{\exp}$ society's expectation over effort then $G^A(e_{A,l}) = \mathrm{E}\left[E\left(\alpha \left| \xi_{A,l}, e_{A,l}^{\exp}\right.\right)\right]$. At public officials' elections, instead, voters realize that the alternative to the incumbent is an average talented official exerting effort $e_{E,l}^{\exp}$. The incumbent is re-elected if the performance level is higher than $\tilde{\xi}_{E,l} = \bar{\alpha} e_{E,l}^{\exp}$ and thus $G^E(e_{E,l}) = \Pr\left\{\xi_{E,l} \geq \tilde{\xi}_{E,l}\right\}$. The market value of talent and the value of office holding equal both w.

Clearly enough, due to implicit incentives, public officials choose effort taking into consideration their evaluators' decisions and not social welfare. Two are the key consequences. First, implicit incentives reduce the scope for side-contracts between the firm and the officials, because the former has to reimburse non-monetary rewards to the latter. Second, the goals of the officials and the one of society can collide. Before illustrating the points, let me detail the features of the equilibrium pricing rule.

Equilibrium.—The solution concept is perfect Bayesian equilibrium. In order to analyze the two key cases in which the measures of extreme types—$f(0)$ and $f(1)$—are equal or different from zero, I maintain that talent is distributed according to one of the following non degenerate and continuous hump-shaped distributions supported on a bounded interval—because of the peculiarity of the public officials' choice set: Beta and generalized Kumaraswamy with parameters greater than 1, raised cosine, inverted U-quadratic, and

truncated normal (see Johnson, Kotz, and Balakrishnan, [1994]). For the latter, which is the only distribution with a positive measure of extreme types, I also assume that, when $\Phi(\cdot)$ label the standard normal cumulative function:

A.1: $\sqrt{2\pi}\left[\Phi\left(\left(1-\bar{\alpha}\right)\sigma_{\alpha}^{-1}\right)-\Phi\left(-\bar{\alpha}\sigma_{\alpha}^{-1}\right)\right]<1$ *if* α *is truncated normally distributed.*[14]

The assumption assures that in the truncated normal case $f(\bar{\alpha})>1$; for all the other distributions I consider this is always the case—proofs available from the author. As further discussed in the appendix, the solutions of problems (4) and (5) are such that:

Lemma 1: *Each public official's problem has a unique and interior solution such that* $\partial\hat{e}_{i,R}/\partial R<0$ *and* $\partial\hat{e}_{i,J}/\partial J>0$ *for all* i*. Besides, when A.1 holds,* $\hat{e}_{E,l}>\hat{e}_{A,l}$ *for all* l*.*

In equilibrium the marginal cost of effort and its marginal value are equalized: the latter equals, for $R=0$, $\bar{\alpha}/\hat{e}_{A,l}$ if the official is appointed and $f(\bar{\alpha})(\bar{\alpha}/\hat{e}_{E,l})$ if she is elected.[15] In other words, for a given $\hat{e}_{i,l}$, evaluators estimate α as $\xi_{i,l}/\hat{e}_{i,l}$ which implies that a rise in $\hat{e}_{i,l}$ delivers marginal benefits $\bar{\alpha}/\hat{e}_{i,l}$. Yet, if election is used, this return is also weighted by the effect of a rise of the expected precision on the probability that the official is re-elected: this marginal effect is $f(\bar{\alpha})$. The higher is the latter the more effective is effort in swaying votes and assuring a higher probability of re-election. When, moreover, $f(\bar{\alpha})$ is sufficiently high—i.e., bigger than 1—elected officials exert an effort higher than appointed ones do. In the most realistic case in which there are no extreme types $f(\bar{\alpha})$ is always bigger than 1; when the latter is not the case, the mild condition in A.1 is needed. Finally, while a stronger desire of being correct raises equilibrium effort, stronger "revolving door" motivations have an opposite effect.

[14] A.1 holds if the talent distribution is not too disperse. This is a mild requirement in the regulation environment discussed later. Here, public officials' biographies are highly consistent (Gormley, 1983).

[15] The equilibrium is unique because these values fall with effort (Dewatripont, Jewitt, and Tirole, 1999).

In $t = 2$ the planner's posterior belief on $\theta = \underline{\theta}$ conditional on two uninformative signals is $v\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\left[1-v\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]^{-1}$ where $\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right) \equiv \bar{\alpha}\hat{e}_{r,R} + \left(1-\bar{\alpha}\hat{e}_{r,R}\right)\bar{\alpha}\hat{e}_{j,J}$ and the indexes r and j are used in spite of the generic i to indicate the appointment rule used for regulators and the one used for judges respectively: this notation highlights the fact that different rules can be used for officials moved by different intrinsic motivations. Let $\underline{W}^*$ label the first-best value of W obtained if at least one signal is informative and let S index the supervision regime quantities. The planner maximizes the function

$$\tilde{W}^s = v\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\underline{W}^* + v\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\left[V\left(\underline{q}^S\right) - \left(1+\lambda\right)\underline{\theta}\underline{q}^S - \lambda\Delta\theta\bar{q}^S\right] + \\ + \left(1-v\right)\left[V\left(\bar{q}^S\right) - \left(1+\lambda\right)\bar{\theta}\bar{q}^S\right] - 2\left(1+\mu\right)w,$$

and evaluates the reservation wages at the shadow cost of public funds $1+\mu$ where $\mu > 0$ accounts for the distortions created by the non lump-sum taxes used to raise the fund. The high cost firm's allocation is now pinned by the following rule:

$$\hat{\bar{p}}^S = V'\left(\hat{\bar{q}}^S\right)\left(1+\lambda\right)^{-1} = \bar{\theta} + \lambda\left(1+\lambda\right)^{-1}\Gamma\left(v\right)\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta. \tag{6}$$

The supervision technology partially curbs the allocative distortion—i.e., $\hat{\bar{q}} < \hat{\bar{q}}^S < \bar{q}^*$; and, given that $\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)$ increases with both $\hat{e}_{r,R}$ and $\hat{e}_{j,J}$, the following holds true:

Proposition 1: *Equilibrium expected prices fall with the strength of the "fairness" motivations and increase with the strength of the "revolving door" ones; moreover, if A.1 holds, they are higher when public officials are appointed in spite of being elected.*

As the extent of asymmetric information falls, the planner optimally raises the high cost firm's allocation; as a main consequence, expected rates are lower if public officials are

elected. Even if qualitatively similar to the "selection" effect proposed by Besley and Coate (2003), this "incentive" effect is more general and applies also to those officials—notably the judges, whose election does not unbundle regulation from the other tasks—like anti-discrimination charges—they are accountable for. Furthermore, differently from the equilibrium discussed by Besley and Coate (2003), the present one survives if the firm can bribe or lobby the officials. Next section discusses this property which nicely backs consistent evidence documenting the narrow role of capture in the U.S. electricity market (see, for instance, the analysis on electricity pricing by Ka and Teske [2002] and Leaver [2009], and that on the introduction of state regulation by Knittel [2006]).

3.2 *Endogenous Collusion Proofness*

Public officials exert effort in other tasks like suggesting lines of conduct on service provision, ruling on environmental policies and so on. Following Alesina and Tabellini (2008), I assume that an official $\{i,l\}$'s performance in the second task is described by the technology $h_{i,l} = \alpha e^h_{i,l}$ where $e^h_{i,l}$ is the task specific effort. The benefit linked to this second activity is $\kappa h_{i,l}$—with $\kappa > 0$—for the firm and negligible for the consumers; thus, public officials will not exert effort in the second task except when side contracts with a lobby representing the regulated firm have been signed.[16] The planner cannot condition the pricing rule upon side contracts because—as it is likely—they are unobservable. As in Alesina and Tabellini (2008), I also maintain that: 1. α is truncated normally distributed; 2. the effort cost function is additive; 3. the lobby, whose vote is irrelevant, has all the

[16] Provided that information gathering is sufficiently more relevant, I obtain essentially similar results when the second task is valuable for consumers and consequently affects public officials' implicit incentives.

bargaining power and, before each official's move, commits to bribes $b_{i,l}$ or campaign contributions $n_{E,l}$ to be paid in $t = 4$ once the precisions become observable.[17]

Both $b_{i,l}$ and $n_{E,l}$ are contingent on the efforts exerted in the two tasks; yet, while bribes are illegal and with probability $\upsilon > 0$ a bribed official is caught and pays a fine $M > 0$, campaign contributions are legal and turn the voters' outside option into $\tilde{\xi}^C_{E,l} = \bar{\alpha} e^{\exp}_{E,l} - H(n_{E,l})$ with $H(0) = 0$, $H' > 0$, $H'' < 0$. If $\tau > 0$ measures the value of implicit rewards relative to illegal bribes, a generic public official's utility rewrites as

$$P^C_{i,l}(e^C_{i,l}, e^h_{i,l}, S) = \left\{1 + \tau \left[(1 - SR) G^i\left(e^C_{i,l}\right) - (1 - (1 - S) J) C\left(e^C_{i,l} + e^h_{i,l}\right)\right]\right\} r + b_{i,l} - \upsilon M,$$

with C labeling the collusion regime and S equal to 1 for a regulator and to 0 for a judge. The lobby's indirect utility is defined by the following equation

$$\tilde{U} = v\left[1 - \gamma\left(\hat{e}^C_{r,R}, \hat{e}^C_{j,J}\right)\right] \Delta\theta \hat{\bar{q}}^C + \kappa E\left[\alpha\left(\hat{e}^h_{r,R} + \hat{e}^h_{j,J}\right)\right] - \left(\hat{b}_{r,R} + \hat{b}_{j,J}\right) - (\hat{n}_{E,R} + \hat{n}_{E,J}).$$

As usual, a subgame perfect equilibrium of either the bribing or the lobbying game has to be jointly optimal for the lobby and the public official, given the evaluators' expectations. The proofs of what is discussed as follows are available from the author upon request.

Discussion.—Proposition 1 always stands under collusion because public officials in order to maintain their implicit incentives will never exert effort only in the second task. Also, if the official is appointed: 1. for τ sufficiently high it does not exist an equilibrium with a positive second task effort because the loss of implicit incentives more than overcomes the extra firm's rent; 2. the lobby will not offer any bribe if her stake is too narrow or the expected punishment is sufficiently large. When the official is elected, instead, the lobby will not propose campaign contributions if money is not effective in swaying votes—i.e.,

[17] Alternatively the firm could bribe the planner; this has the same effect of a higher weight on the firm's utility or, alternatively, of a less myopic planner. Provided that this rise is weakly lower than λ—because of for instance a well-functioning legal system, all the results of the paper will continue to stand.

H' is small. Clearly enough, this collusion proofness property extends also to the scenario in which the officials can sign contracts with each other or they observe directly a signal with fixed precision and are re-appointed only if they report an informative draw.[18]

3.3 *Endogenous Regulatory Institutions*

The main normative insight coming from the previous sections is that election should be used whenever effort is sufficiently efficient in swaying votes and the level of rates is the only relevant welfare dimension. Yet, this prescription is inadequate if also dynamic efficiency is taken into consideration. Indeed, a sharp tension between rent extraction and investment inducement arises in industrial policy and the equilibrium pricing rule can envision ex post expropriation of sunk investments (see Laffont and Tirole [1993], ch. 1). In this section, I shall prove that institutions fostering the most public officials' pro-consumer incentives worsen such time inconsistency, and thus appointment could be preferred to election if investment inducement is sufficiently salient.

I shall maintain throughout that appointment rules are chosen just before the firm observes its marginal cost by a Constitutional table deciding on the bases of a function—further illustrated below—of the social surplus and a mean zero pro-election shock ν publicly observed in $t = 1$ and distributed with cumulative Λ on $[-\infty, \infty]$. The shock makes the probability of adopting appointment continuous in the exogenous parameters and captures the existence of idiosyncratic preferences for a particular rule. The Constitu-

[18] Here, provided that implicit incentives are sufficiently relevant, the report will be truthful. In a similar environment, the new regulatory economics (Laffont and Martimort, 1999) obtains collusion proof equilibria prescribing that a wage equal to the firm's collusion stake should be left to the officials in order to avoid corruption. This feature does not even come close to any observed institutional arrangement exactly because the residual rights nature of supervision is not considered.

tional table is a fiction for the state government, and I shall assume that she is benevolent when cost-reducing costs are analyzed and partisan when pure rent-enhancing investments are considered. While the first exercise identifies the relation between the dynamic inconsistency in investment and the design of appointment rules, the second clarifies that regulatory reforms become a function of the political competition between pro-consumer and pro-shareholder parties when investments favor the latter over the former.

For sake of simplicity, I shall assume that the planner cannot commit to reimburse investment costs. Even if the used and useful U.S. doctrine partially assures against non-commitment, the hypothesis is the most appropriate in a technologically mature market like electricity where the firm's retaliation could not be very damaging (Newbery, 2000). In any case, it can be proved that the results discussed below hold even if the planner can write long run contract on the firm's investment decision.[19] I focus on the appointment rule used for regulators: all the results immediately extend to the one used for the judges.

A benevolent Constitutional table.—Consider the following investment game proposed by Laffont and Tirole (1993). Just after the Constitutional table has designed regulatory institutions but before learning θ, the firm commits an investment of cost $\zeta(I) \geq 0$ raising the ex ante probability of being a high type to $\tilde{v}(I) = v(1+I)$. The cost function is increasing and convex. In a pure strategy Nash equilibrium the planner anticipates the equilibrium investment $\hat{I}$ implementing the rule defined in (6) for a probability of $\underline{\theta}$ type of $\tilde{v}\left(\hat{I}\right)$. The firm chooses $\hat{I}$ so as to maximize ex post rent minus investment costs

[19] Provided that the planner always ensures the firm a positive ex post utility, investments will continue to be suboptimal whether contractible or not. In the former case, the failure is produced by a more favorable types' distribution fostering rent extraction; in the latter, the analysis goes on unchanged but the pricing rule will also be a function of the moral hazard in investment constraint (see Laffont and Tirole, [1993]).

$$\hat{I} \in \arg\max_{I \geq 0} \left\{ \tilde{v}(I) \left[1 - \gamma\left(\hat{e}_{r,R}, \hat{e}_{j,J}\right)\right] \Delta\theta \hat{\bar{q}}^{I}\left(\hat{I}\right) - \zeta(I) \right\}, \tag{7}$$

where the apex I indexes the investment regime.[20] A glance to (7) it is enough to see that the relation between $\hat{I}$ and $\hat{e}_{r,R}$ has the same sign of the derivative of the expected ex post rent $\Psi\left(\hat{e}_{r,R}\right) = v\left[1 - \gamma\left(\hat{e}_{r,R}, \hat{e}_{j,J}\right)\right] \Delta\theta \hat{\bar{q}}^{I}\left(\hat{I}\right)$ with respect to $\hat{e}_{r,R}$. On one hand, $\Psi\left(\hat{e}_{r,R}\right)$ falls with the effort exerted by the regulator because this decreases the ex ante expected probability of two uninformative signals $1 - \gamma\left(\hat{e}_{r,R}, \hat{e}_{j,J}\right)$; on the other hand, $\Psi\left(\hat{e}_{r,R}\right)$ increases with $\hat{e}_{r,R}$ because a more limited extent of asymmetric information calls for a more limited allocative distortions which means a higher $\hat{\bar{q}}^{I}\left(\hat{I}\right)$. Yet, the comparison between the two effects is univocally determined under the following mild assumption:

A.2: *The demand function is such that* $-\varepsilon_{p,q} = S''(q)\, q / S'(q) < -\bar{\varepsilon}_{p,q} < -1$.[21]

As the appendix shows, in the empirically relevant case for a necessary good—when the elasticity of the inverse demand is sufficiently high and A.2 holds, a rise in the information gathering effort has a proportional effect on the probability of two uninformative signals and a less than proportional effect on demand. Thus, the expected ex post rent falls with the effort exerted by the regulator and, in turn, when she is elected; in particular:

Lemma 2: *Under A.2,* $\partial\Psi\left(\hat{e}_{r,R}\right)/\partial\hat{e}_{r,R} < 0$*; under A.1 and A.2,* $\Psi\left(\hat{e}_{A,R}\right) > \Psi\left(\hat{e}_{E,R}\right)$.

Partially insuring the firm against profit expropriation, appointment assures stronger ex ante investment incentives. This, along with the fact that under similar hypotheses the firm invests less than is socially optimal, implies that the choice between appointment and

[20] In the background I am also assuming that the cost function is increasing at a rate high enough to avoid that $\tilde{v}(I)$ reaches $\bar{v}$ or $\lim_{I \to \bar{I}} \zeta'(I) > v\left[1 - \gamma\left(\hat{e}_{r,R}, \hat{e}_{j,J}\right)\right] \Delta\theta \hat{\bar{q}}^{I}$ with $\bar{I} = (\bar{v} - v)\, v^{-1}$ and $\bar{v}$ implicitly defined this time by $(1 - \bar{v})\, V\left(\bar{q}(\bar{v})\right) - (1 - \bar{v})(1 + \lambda)\, \bar{\theta}\bar{q}(\bar{v}) = \bar{v}\left[1 - \gamma\left(\hat{e}_{r,R}, \hat{e}_{j,J}\right)\right] \lambda \Delta\theta \bar{q}(\bar{v})$.

[21] This is a mild assumption: Espey and Espey (2004) conclude that the median of previous estimates of the long run residential price elasticity of demand is 0.81. The expression for $\bar{\varepsilon}_{p,q}$ is found in the appendix.

election can be seen a trade-off between dynamic and static efficiency.[22] Formally, I assume that the "benevolent" Constitutional table maximizes social welfare and thus attaches an extra—with respect the planner's objective function—weight $1+o>1$ to the firm's rent; o rises with society's investment concerns. As stressed above, this assumption incorporates into the model the idea that while dynamic efficiency is key for society at whole it could be not salient for the Coasian bargaining selecting the pricing rule. Appointment is chosen with probability $\Lambda\left(\tilde{W}^S\left(\hat{e}_{A,R}\right)-\tilde{W}^S\left(\hat{e}_{E,R}\right)+(1+\sigma)\left[\Psi\left(\hat{e}_{A,R}\right)-\Psi\left(\hat{e}_{E,R}\right)\right]\right)$ and thus:

Proposition 2: *Provided that A.1 and A.2 hold, the probability that appointment is selected increases with society's investment concerns—i.e., o.*

This last result belongs to a series of other findings showing that institutions directly or indirectly curbing rent-extraction are optimal if expropriation of sunk investments is a real issue.[23] Yet, investment concerns could also distort institutional design away from efficiency when the firm's expenses favour shareholders over consumers and both groups can influence the planner's decision. A striking example of these expenses are those not strictly related to service provision *per se*—e.g., marketing, diffusion of smart-metering technologies, and so forth. Yet, the idea extends at the cost of more cumbersome algebra to those investment opportunities that benefit both groups but asymmetrically.

In order to clarify the point in the sharpest way, I shall focus on ex post expenses whose returns are negligible for consumers but accrue to the firm's rents. I shall also suppose that the firm is infinitively risk averse in the range of negative ex post utilities.

[22] The appendix shows that this is the case when the price elasticity of the regular demand is lower than 1.

[23] While Sappington (1986) looks at rules that hinder information gathering, Salant (1995) focuses on "revolving door" motivations. Knittel (2006) shows that the probability of a reform from a municipal regulation with its typical hold-up problems to a state regulation assuring a fair rate of return on investment were higher where capacity shortages were more severe and residential penetration rates lower.

A partisan Constitutional table.—This time, I assume that appointment rules are chosen in $t = 1$ by the incumbent $\tilde{m}$ between the pro-shareholder party R and the pro-consumer D. Also, the following two periods are added to the timing studied in section 3.1:

5. The incumbent faces an election with exogenous winning probabilities $x_{\tilde{m}}$; next, the winner m implements a fixed aid $\rho_m > 0$ proportional to the firm's rent and paid out to the firm if the investment is committed. Ex post rents become $(1 + \rho_m) U$.

6. The firm eventually commits an investment of fixed cost $\bar{\bar{I}} > 0$. The net expected value of the investment is $\pi \bar{\bar{I}}$, with $\pi \equiv \bar{\pi}\delta + \underline{\pi}(1 - \delta) > 0$ and $\bar{\pi} > 0 > \underline{\pi}$. In words, the investment is stochastic and leads to a loss with probability $1 - \delta > 0$.

Clearly enough, only the low cost firm invests whenever

$$(1 + \rho_m) \Delta\theta \hat{\tilde{q}}^I (\hat{e}_{r,R}) + \underline{\pi} \bar{\bar{I}} \geq 0. \tag{8}$$

A partisan Constitutional table of type $\tilde{m}$ attaches to the ex-post participation—to the investment game—constraint (8) the shadow price $1 + \chi_{\tilde{m}} > 1$ and to the investment aid $\rho_m \Delta\theta \hat{\tilde{q}}^I (\hat{e}_{r,R})$ the shadow cost of public fund $1 + \mu$. The parameter $\chi_{\tilde{m}}$ captures the incumbent's willingness to incentivize ex post investments. Define $\tilde{x} \equiv \rho_D x_D + \rho_R x_R$ and assume that the following restrictions on the exogenous parameters hold:

A.3: $\rho_R > \rho_D$; $\chi_R > \mu > \chi_D$.

All in all, the probability that appointment is selected in spite of election is:

$$\Lambda \Big(\tilde{W}^S (\hat{e}_{A,R}) - \tilde{W}^S (\hat{e}_{E,R}) + \\ + v \left[1 - \gamma (\hat{e}_{r,R}, \hat{e}_{j,J}) \right] \left[(1 + \chi_{\tilde{m}})(1 + \tilde{x}) - (1 + \mu)\tilde{x} \right] \left[\Psi (\hat{e}_{A,R}) - \Psi (\hat{e}_{E,R}) \right] \Big).$$

In interpreting the foregoing, several observations should be borne in mind. First, the set up formalizes the existence of huge transfers from the federal and state governments to IOUs financed out of distortionary taxes and aimed to solve energy externalities—e.g., air pollution, roadway congestion. As reported by Metcalf (2008), the energy-related tax expenditures for major fuel categories investments and the production tax credits for renewable and advanced coal-based power sources reached in fiscal year 2008 the 3.46 billion dollars. Second, the exogeneity of $x_{\tilde{m}}$ captures the basic idea, proposed by Besley and Coate (2003), that regulation is bundled at election of politicians with more salient policies. Third, the fact that the pro-shareholder party is more willing to incentivize ex post investment incorporates into the model politicians' strategic incentives to propose and implement extremist platforms in order to either empower their own supporters (see Glaeser, Ponzetto, and Shapiro, [2004]) or buy votes through the money of campaign contributors (Alesina and Holden, 2008). Thus, the set up could also be interpreted as the reduced form of a two step game in which a pro-consumer and a pro-shareholder lobby try to influence first the planner and then the state government. As the appendix shows, if $-\varepsilon_{p,q} \leq -1$—which is a condition milder than that imposed by assumption A.2, $\Psi(\hat{e}_{r,R})$ is again lower if the regulator is elected. The latter implies the following:

Proposition 3: *Under A.1, A.2 and A.3, the probability that appointment is chosen is higher the higher is the incumbent's hold on power $x_{\tilde{m}}$ and if she is pro-shareholder.*

This pattern originates from the mix between the asymmetry in the parties' preferences and the uncertainty of elections and it is similar to the strategic dynamic proposed by a lively political economy tradition (Persson and Svensson, 1989; Alesina and Tabellini, 1990; Hanssen, 2004a), claiming that a lack of permanence in office can inspire policymak-

ers to implement reforms in order to influence political outcomes or limit the actions of future incumbents. A higher probability of being re-elected and fixing a larger (smaller) aid pushes the pro-shareholder (pro-consumer) party to select a rule enhancing the most the officials' pro-consumer incentives in order to assure higher profits to her constituency (to curb allocative distortion). Hence, the tension between consumers and shareholders could lead to inefficient rules being chosen.[24] Next, I test the theory developed above.

4 Empirical Implications

Two are the basic ideas of the theory: 1. under reasonable conditions, electing public officials leads to more pro-consumer regulatory outcomes; 2. provided that the demand is sufficiently inelastic, election curbs investment incentives and thus the probability that it is adopted falls with the saliency of investment inducement and the political strength of shareholders. Yet, these two sets of results are more general. Starting from the second one, it applies in general to the choice of the power of the pro-consumer incentives brought by different appointment rules. To see this, suppose that the Constitutional table can also fix a shifter of the value of talent $T \in [1, f(\bar{\alpha}))$: clearly, the statements that in propositions 2 and 3 are true for election will hold now for the relative power of different appointment rules with election still being the rule fostering the most pro-consumer incentives. Thus, the first prediction refers to the probability that a particular appointment rules is chosen

[24]For instance, for $\beta = 0$ and χ_R much greater than μ, a strong party R could prefer appointment even if this institution produces inefficiently high rates and distortionary aids. The argument continues to go on: 1. if the government can act as a sponsor increasing the ex post firm's rent without monetary aids, provided that $\chi_R > -1 > \chi_D$; 2. if the investment activities are cost reducing and the state government can decrease the cost of investment, provided that the effect of increased dynamic efficiency concerns more than outweighs that of more urgent rent extraction needs.

and can be stated as follows:

Prediction 1: *The likelihood that election and, in general, rules fostering the most officials' pro-consumer incentives are chosen will be lower the stronger society's investment concerns and the reformer's hold on power are and if reformer is pro-shareholder.*

Turning to the first set of results, consider a shock η with mean $\bar{\eta}$ and density $g(\eta)$ hitting both types between $t = 2$ and $t = 3'$ and such that the ex ante expected difference between the two types' costs is $(1 + \bar{\eta})\Delta\theta$. Clearly, what is true in proposition 1 for $\hat{\bar{p}}^S$ holds now for the pass-through of cost-shocks $\partial\hat{\bar{p}}^S/\partial\bar{\eta} = \lambda(1+\lambda)^{-1}\Gamma(v)[1-\gamma(\hat{e}_{r,R},\hat{e}_{j,J})]\Delta\theta$ as well. On top of this, the second prediction deals with regulatory outcomes and read as:

Prediction 2: *Both the regulated prices and the pass-through of cost shocks into prices are lower when the state elects in spite of appointing regulators or judges.*

The theory developed above cannot be immediately extended to the selection of the power of intrinsic motivations and, therefore, I shall leave a full-fledged empirical analysis of the latter as an agenda for future research.[25]

5 Evidence

This section takes a look at the evidence on the two empirical predictions.

5.1 *Measuring Public Officials' Pro-consumer Incentives*

In order to construct a comparable sample of institutions that vary in their effects on public officials' pro-consumer incentives, I shall consider the procedure of selecting U.S.

[25] While Teske (2004) claims that "revolving door" boosts are lower where commissioners have to wait before accepting a job from the industry, Hanssen (2004b) notices that longer judicial terms weaken reputational concerns. These variables are—sometime significantly and—positively related to the prices level and to a higher pass-through of cost shocks. This pattern is not surprising because the incentive to implement more biased decisions could dominate the loss of attractiveness of future job opportunities.

states public utility commissioners and High Court judges. Seven are the procedures used to select commissioners: direct election, appointment by the Governor, appointment by the Governor with approval by either the executive council or the Legislature or the Senate, and appointment by the General Assembly or the Legislature.[26] There are five methods of selecting High court judges: partisan and nonpartisan election, appointment by the Governor or the Legislature, and merit plan.

It is widely accepted that direct elections turns public officials into politicians. Also, an equally strong consensus holds that the most independent judges are those subject to the merit plan, which indeed mandates unopposed retention elections in which campaigning is forbidden by law: this "vastly reduces a judge's need to seek support from other officials or political Parties" (Hanssen, 2004a).[27] Similarly, regulators whose appointment requires the approval by both houses can be considered the most insulated from the preferences of the voters, exactly because a consensus from the widest possible majority should be obtained. The other procedures are less easily ranked in terms of pro consumer incentives. Thus, I consider two sets of dependent variables. The first one will serve to compare election versus appointment and comprehends the following two dummies: *Reg_Elec* is equal to one if commissioners are elected and zero otherwise; *Jud_Elec* equals one if High Court judges are elected and zero otherwise. The second aims at explaining the choice of the power of the appointment rule and gathers the following two ordered indicators: *Reg_Ord* equals one if commissioners are selected with the approval of both state houses, three if direct election is employed and two otherwise; *Jud_Ord* equals one if the merit

[26]The executive council is a state house (a board chosen by the majority party) in New Hampshire (Ohio).
[27]Besley and Payne (2006) claim that the merit plan is the rule fostering the most judges' pro-voters incentives because of the retention rule; yet, sitting judges almost never lose elections (Hanssen, 2004a).

plan is used, three if the state uses partisan elections, and two otherwise. Using slightly different definitions—e.g. having *Jud_Ord* assuming value three whatever type of election is in use, does not affect the qualitative message of the analysis. I shall consider a panel of 49 states spanning the years from 1970 to 1997: for this sample, I have sufficient data on prices, institutions and political competition. Several states altered their institutions: the switches are reported in table 1.[28] I will first tackle prediction 1.

5.2 *Non Random Appointment Rules Selection*

The empirical strategy.—In order to exploit the three-dimensional variation—over time and across states and power levels—of appointment rules, I use a logit with dependent either *Reg_Elec* or *Jud_Elec* and an ordered logit with dependent *Reg_Ord* or *Jud_Ord*. For what concerns the latter, let $y^*_{s,t}$ be the unobserved preference of reformer in state s at time t driving the choice of a rule among the three possible $y_{s,t}$. In particular, $y_{s,t} = k \Leftrightarrow \vartheta_{k-1} \leq y^*_{s,t} \leq \vartheta_k$ where $k = 1, 2, 3$ and ϑ_k are unknown thresholds to be estimated. The related structural model is $y^*_{s,t} = \theta' \mathbf{z}_{s,t} + \nu_{s,t}$, where $\nu_{s,t}$ is the error term and $\mathbf{z}_{s,t}$ is the vector gathering the determinants of appointment rules.[29] Thus, the odds ratio of state s adopting a more powerful rule at time t—i.e., $y_{s,t} > k$ is given by:

$$\Delta_{s,t}\left(y_{s,t} > k\right) = P\left[y_{s,t} > k\right] / P\left[y_{s,t} \leq k\right] = \left[1 - \Lambda\left(\vartheta_k - y^*_{s,t}\right)\right]\left[\Lambda\left(\vartheta_k - y^*_{s,t}\right)\right]^{-1} \forall k, \quad (9)$$

[28] South Carolina and Tennessee changed the rule used to select commissioners in 1996. I consider both as electing given that the switches became effective in 1997. A different strategy does not affect the qualitative message of the empirical section; the latter is also unaffected if switching states are left out or if I turn to an unbalanced panel defined over the sample 1960-1997 used by Besley and Coate (2003).

[29] Lemma 2 does not exclude a role for interaction terms. If I introduce them in the logit, they are usually not significant for the groups whose probability of having election is either 0 or 0.5 (Ai and Norton, 2003).

where Λ is the c.d.f. of ν which I assume to be logistic. The linear log-odds obtained taking the logarithm of both sides of (9) characterize the ordered logit model, which is straightforwardly estimated by Maximum Likelihood. I focus on two easily interpretable pieces of output: the exponentiated coefficients and the marginal effects for the highest value of $y_{s,t}$ evaluated at the mean value of the regressors—i.e., $dP\left[y_{s,t}=3\,|\bar{\mathbf{z}}_{s,t}\right]/d\mathbf{z}_{s,t}$. The interpretation of the former is that for a one unit change in the predictor variable the odds that a state adopts an appointment rule more powerful than k versus one at most as powerful as k are the exponentiated coefficient times larger. Instead, the marginal effects give the percentage variation in the likelihood of the outcome considered when the control rises by one percentage point. I shall report only the marginal effects of the logit model. Before discussing the estimates, I shall introduce the proxies gathered in $\mathbf{z}_{s,t}$.

Measuring dynamic efficiency concerns and political preferences.—Creating meaningful proxies for society's investment concerns is a challenging task. My strategy is to assume that structural characteristics of the generation technology inducing systematically higher average costs—subsequently passed through prices, enhance the saliency of investment inducement. I consider two proxies: 1. the dummy *Embargo* equal to one if *Reg_Elec* has been reformed in state s during the oil crisis period 1973-1982 and zero otherwise; 2. the share of generation from hydroelectric sources—*Gen_Hydro*. The latter (former) is linked to steadily lower (higher) generation costs. Besides, differently from other expenses strictly linked to the firm's cost reducing effort, both of these proxies are orthogonal to unobserved state or federal technological and policy innovations affecting prices as well. To the last extent, if I exclude *Embargo* and I switch to a fixed effects logit, the coefficients attached to the other variables follow patterns similar to the one discussed below. I also

obtain similar results when the errors, which are "robust" to generic heteroskedasticity or serial correlation, are clustered at the state level or when I use different proxies of dynamic efficiency concerns—i.e., different measures of average costs, past prices or the mean of past prices and costs in neighboring states.[30]

Turning to political competition, Hanssen (2004a) proposes the share of seats held by the majority party averaged across upper and lower houses—*Majority*—as a proxy of the strength of the incumbent hold on power. For what instead concerns the identity of the reformer's constituency, a broad political science literature claims that Republicans have been historically nearer to the shareholders' interests (see Teske, [2004]). Therefore, I introduce a binary equal to one if both houses were under the Republicans' control—*Republican*. If, as Besley and Coate (2003) suggest, regulation is not salient for the majority of voters at politicians' election, the two proxies are orthogonal to unobserved technological and policy-driven determinants of investment concerns.

Finally, scholars of policy innovation (Teske, 2004) claim that the diffusion of a new institution displays peculiar learning features: the introduction of a more pro-consumer rule in one state could shift support for the particular reform in neighboring states without affecting their prices until the reform is implemented (Steiner, 2004). In order to capture this exogenous imitation process, I shall introduce either the share of surrounding states for which *Reg_Elec* is one—*Ereg_Nei*—or the share of surrounding states for which *Jud_Elec* is one—*Ejud_Nei*. Variables descriptions and basic statics are listed in table 2; the data sources and the variables constructions are instead explained in the appendix.

[30]The results that follow remain qualitatively similar if I also consider: incentive regulation or restructuring dummies; whether there is a state consumer advocate or other officials are elected; the number of PUC employees; the number, salary and term of office of commissioners; the PUC budget, and its age, the year the state joined the Union; regional dummies; those controls that I use in the pricing equations below.

Empirical results.—The first three columns of table 3 report the evidence regarding regulatory appointment rules, the last three the one regarding the methods of selecting judges. For the most part, the results are consistent with the model's predictions, and the implied effects are large. A one-standard-deviation rise in the share of generation from hydro sources—0.2—is associated with a 1.8-percentage-point increase in the likelihood of elections of regulators and a little less than five percent increase in the likelihood of partisan elections of judges—see columns (1) and (4) respectively. Also, the odds that a state relying only on hydro sources chooses a more powerful appointment rule for her regulator (judges) is twice (1.4 times) the one of a state with Gen_Hydro equal to zero. These estimates are statistically significant at five percent or better. A similar pattern is true for $Embargo$, even if this variable is insignificant in columns (4), (5) and (6).

For what concerns political competition, if the reformer is Republican the likelihood of elections of commissioners falls by 3.3 percentage points and that of electing judges decreases by almost eight percent. More mixed is the evidence on the strategic dynamics. Indeed, the strength of the incumbent hold on power does not explain the rules used for commissioners and is significantly positively related with more pro-consumer judicial institutions. Yet, this second pattern is perfectly in tune with the results obtained by Hanssen (2004a) who claims that more independent judges—i.e., those appointed—make policy changes more difficult and are optimal for an incumbent afraid of losing power. Finally, the data confirm the idea that institutional change could be produced by shocks to society's preferences for election due to the decisions of surrounding states.

All in all, the distribution of regulatory institutions across American states is not random but reflects both efficiency and strategic political incentives. This non random

assignment of reforms not only confirms the model's ideas but also implies that the effect of appointment rules on regulatory outcomes can be correctly evaluated only when these institutions are treated as endogenous. If, indeed, the variation in appointment rules used to explain prices is related to unobserved shocks affecting contemporaneously the cost structure and the saliency of investments, the OLS estimator becomes biased.

5.3 *Price Levels, Pass-through and Endogenous Appointment Rules*

In order to test prediction 2, I follow Besley and Coate (2003) and I first examine whether prices are lower in those states that elect their public officials and, then, whether prices are less sensitive to cost shocks in electing states.

Price levels.—To accomplish the first task I focus on the effect of appointment rules on the fixed effects α_s saved after running the following panel data regressions

$p^r_{s,t} = \alpha_s + \beta_t + \phi' \mathbf{x}_{s,t} + \omega_{s,t}$

where $p^r_{s,t}$ is the average price in cents per kilowatt hour for ratepayer class r—i.e., residential, commercial and industrial—in state s and year t; β_t is a year dummy picking up sector-level technological innovations, macroeconomic shocks and changes in federal policy; the vector $\mathbf{x}_{s,t}$ gathers the state population—*Population*, population squared, the proportion aged over 65—*Old*, the one aged 5-17—*Young*, the state income per capita—*GSP*, the income per capita squared. To control for differences in production structures across states, I include among the regressors *Gen_Hydro*. Yet, differently from Besley and Coate (2003), I do not consider neither the time varying fossil fuel costs index which they devise—$c_{s,t}$, nor the share of generation from fossil fuel sources—*Gen_Fuel*. In-

deed, "while fuel inputs are varied in response to real-time dispatching and operational changes, other inputs [labor, materials, and capital] to a plant's production are determined in advance of output realizations" (Fabrizio, Rose and Wolfram, [2007], pp. 1255). Thus, *Gen_Hydro* and $c_{s,t}$ are determined simultaneously to regulatory institutions and therefore they should be treated as endogenous variables: this is further discussed below.

Panel A (B) of table 4 reports the coefficients obtained from an OLS (instrumental variables) regression of α_s on *Reg_Elec*, *Jud_Elec* and a constant term. In order to assure identification of the instrumental variables equation, I use the first stage controls which are the most "relevant" because more correlated with the regressors that are endogenous; in particular, these are Republican, *Ereg_Nei*, *Ejud_Nei*.[31] The results not only confirm the evidence already proposed by Besley and Coate (2003) and according to which rates are lower in states electing their commissioners, but they also show that electing High court judges produces more pro-consumer regulatory outcomes. All the differences are significant at a ten percent or better whether I consider the full sample—columns (1) to (3)—or the oil crisis years 1970-1983 only—columns (4) to (6).

Furthermore, OLS underestimate the coefficients attached to *Reg_Elec* and *Jud_Elec*. When endogeneity is taken into account, a reform from appointment to election of regulators produces a price fall over the whole sample of about the thirty percent, and a switch from appointed to elected High court judges implies a price reduction of nearly ten percentage points. These estimates are highly reliable and, in fact, I cannot reject the overidentifying restrictions at a level nowhere lower than the eleven percent. Moreover,

[31] I obtain very similar results when $\mathbf{x}_{s,t}$ includes also $c_{s,t}$ and *Gen_Fuel* but a GMM system approach, similar to the one discussed below, is used to account for their endogeneity. Also, if considered, a dummy equal to one if both commissioners and High court judges are elected tends to be collinear with *Reg_Elec* and *Jud_Elec* making the estimates discussed in this section less stable but qualitatively similar.

the rank test developed by Kleibergen and Paap (2006)—not shown—rejects always at the one percent that the estimated equations are underidentified.

Pass-through.—Turning to the pass-through of cost shock, I run the following equations:

$$p^r_{s,t} = \alpha_s + \beta_t + \phi c_{s,t} + \delta' \mathbf{i}_{s,t} c_{s,t} + \gamma' \mathbf{w}_{s,t} + \varepsilon_{s,t}, \tag{10}$$

where $\mathbf{i}_{s,t}$ is a vector of institutions—i.e., *Reg_Elec* and *Jud_Elec*. I estimate (10) with robust standard errors using first OLS and then a system GMM further discussed below: only this second estimator fully accounts for the endogeneity of both appointment rules and the demand of fossil fuels. All the time-varying controls—i.e., *Gen_Hydro*, *Gen_Fuel*, *Population*, $Population^2$, *Old*, *Young*, *GSP*, GSP^2—are included in $\mathbf{w}_{s,t}$ when OLS are used; instead, I do not include $Population^2$ and GSP^2 when using GMM in order to avoid multicollinearity.[32]

Table 5 lists the OLS estimates; columns (1) to (3) refer to the whole sample and columns (4) to (6) to the Oil crisis years. The key observation is that the coefficients on costs interacted with whether a state elects its regulators or judges are almost always negative; but, while those attached to *Jud_Elec* are significant at five percent or better for residential and commercial rates, among the coefficients attached to the election of commissioners only the one for the Oil crisis residential rates is highly significant. These results is in striking contrast with those discussed by Besley and Coate (2003) who find a significant negative effect of *Reg_Elec* on all the pass-through coefficients. A clear-cut explanation to these differences is that, given the opposite intrinsic motivations moving

[32]Because of hearing lags and the regulatory contracts commitment period, lagged rates are another key variable: when I introduce also the lagged dependent variable in (10), the main results remain unaffected.

regulators and judges, the rule used to make the former accountable makes a difference only when they attach a very high value to office holding, which is when input prices are rising. This story is confirmed by the implied effects. Focusing on residential rates, when I switch from the whole sample to the Oil crisis years, while the pass-through coefficient for states electing judges rises from one half to three-fourths of the same coefficient for appointing states, the pass-through coefficient for states electing commissioners falls from six-seventh to three-fourth of the coefficient for appointing states.

The estimates produced by the system GMM estimator emphasize the pattern. I treat as endogenous the fossil fuel cost index whether or not interacted with appointment rules and the share of generation from fossil fuels, and I use a two-step procedure. Here, the challenge is to avoid too many instruments because the instruments count tends to explode with the number of years and too many moment conditions can fail to expunge the endogenous component of the endogenous variables, weakening also the power of the overidentification restrictions test (see Roodman, [2009]). To accomplish the task, I use as instruments all the regressors except the endogenous ones, those determinants of appointment rule that can be excluded by the pricing process and one (two) lag of the endogenous variables when using the full sample (the Oil crisis one). The choice is guided by the study of the relevant autocorrelation functions. The excluded instruments are: *Embargo*, *Majority*, *Republican*, *Ereg_Nei*, *Ejud_Nei*. Each moment condition is collapsed into a single column.[33] The results are given in table 6: columns (1) to (3) look at the whole sample, columns (4) to (6) to the Oil crisis. Again, there are three

[33]The instrument count is always below the number of cross sections: this should assure that "too many instruments" are not considered (see Roodman, [2009]). The results remain robust if I switch to the one-step estimator, or if I estimate the model in differences, or if I include among the instrument one more lag of the endogenous variables, or if I consider subgroups of the excluded instruments.

key observations: 1. the impact of commissioners is crucial only when their office holding is very valuable due to unexpected shocks; 2. OLS underestimate the anti-inflationary effect of more pro-consumer institutions;[34] 3. the only statistically significant coefficients are attached to the pass through of cost shocks into residential rates.[35] Indeed, while the election of High court judges makes the pass-through of cost shocks into residential prices naught over the whole sample; in the Oil crisis years, the pass-through coefficient for states electing commissioners was just one third of the one for appointing states. Finally, the Hansen test, which is the consistent one with robust standard errors, does not reject the overidentifying restrictions at a level nowhere lower than ten percent.

6 Concluding Comments

The relevance of regulatory institutions to economic development is key especially in a period of deregulation and liberalization.Yet, the determinants of these settings are still poorly understood: here, I developed and tested a property rights theory of "endogenous regulatory institutions" (see also Guerriero, [2009a] and [2009b]), focusing on the accountability structures put in place to select the officials directly involved in regulation.

Rather than reviewing my results, I close by highlighting several avenues for further research. One is to collect data on investment levels in order to test the impact of appointment rules on the industry's dynamic efficiency. Such an exercise is of first order relevance if we want to evaluate the overall welfare properties of different institutional

[34]The same can be said of ϕ which now implies that fossil fuel input shocks are passed through one to one.

[35]A very similar picture arises when I consider the time-varying controls enumerated in footnote 30. The evidence also remains qualitatively the same when I run separate cross-sectional regressions. For the year 1996 more detailed measures of average cost are available. In this last case, estimates of the average treatment effect by the Heckman correction or the propensity score confirm the evidence.

designs. Another key aspect to be clarified is the optimal mix of the rules used for regulators and judges. Election makes "fairness" motivated judges more pro-consumer than elected regulators; yet, there are cases—e.g, the pass-through of cost shocks into prices—in which elected judges produce significantly more pro-consumer outcomes than appointed ones only when regulators are not willing to exert a sufficiently high effort because the value of their office holding is low. Also, being judges responsible for other tasks as employment discrimination charges (Besley and Payne, 2006), in their case the choice of the optimal rule should be guided not only by the static versus dynamic efficiency trade off identified in this paper but also by the relative relevance of the regulatory task among the different missions that society entrust them (see Dewatripont, Jewitt, and Tirole, [1999]). Finally, an important question related to the choice of the power in terms of pro-consumer incentives of different appointment rules is the selection of institutions affecting intrinsic motivations. In order to address the issue, one needs a richer model where different incentives and motivations are inferred from the official's choices. Here, choosing an institution magnifying the pro-consumer effects of intrinsic motivations could depress the power of the pro-consumer implicit incentives instilled by the appointment rule (see Bénabou and Tirole, [2006]).

Appendix

Equilibrium under Perfect Information

Under perfect information, the planner recovers θ from the observation of total costs and q. The first best contract, obtained maximizing (2) with respect to U and q, prescribes that:

1. The marginal value of output and its marginal cost are equalized:

   $V'(q^*) = (1+\lambda) S'(q^*) = (1+\lambda)\theta$ or $S'(q^*) = p^* = c$;

2. Given the existence of the shadow cost of rewards, no rent is left to the firm:

   $U = 0$ or $t^* = \theta q^*$.

A fixed price contract gives the firm the right incentives for cost reduction. The planner tailors the fixed charge in $t^*(C^*) = T + (S(q) - S^*)$ to fully extract the firm's rent: i.e., $T \equiv \theta q^*$ and $S^* \equiv S(q^*)$. The firm, which is left as residual claimant of its cost savings—i.e., maximizes $T + (S(q) - S^*) - \theta q$ with respect to q, chooses q^*. □

Proof of Lemma 1

Let me first characterize the effort exerted in equilibrium by elected public officials. Maximizing $P_{E,l}(e_{E,l})$ with respect to $e_{E,l}$ with $e_{E,l}^{\exp}$ taken as given and, then, imposing the equilibrium condition $\hat{e}_{E,l} = e_{E,l}^{\exp}$, such effort is defined by

$$LHS(\hat{e}_{E,l}) \equiv (1 - SR)\bar{\alpha} f(\bar{\alpha}) (\hat{e}_{E,l})^{-1} - [1 - (1-S) J](1-K) C'(\hat{e}_{E,l}) \leq 0, \tag{A1}$$

and by the slackness conditions $(\hat{e}_{E,l} - 1) LHS(\hat{e}_{E,l}) = 0$ and $\hat{e}_{E,l} LHS(\hat{e}_{E,l}) = 0$ with $S = 1$ if the public official is a regulator and $S = 0$ if she is judge. While the first term in $LHS(\hat{e}_{E,l})$ is a rectangular hyperbola centered in $(0,0)$, the second one is a function increasing with $\hat{e}_{E,l}$. This, along with the fact that $C'(0) < \infty$ and $\lim_{e_{i,l} \to 1} C'(e_{i,l}) = \infty$, assures that $\hat{e}_{E,l}$ exists and is both interior and unique. Turning to appointed officials and following Dewatripont, Jewitt and

Tirole (1999), the equilibrium effort is implicitly defined by the first order condition

$$(1-SR)\,\mathrm{E}\left[\alpha f_{e_{A,l}}\left(\xi_{A,l}|\,\hat{e}_{A,l}\right)f^{-1}\left(\xi_{A,l}|\,\hat{e}_{A,l}\right)\right]\leq\left[1-(1-S)\,J\right]C'\left(\hat{e}_{A,l}\right). \tag{A2}$$

$(A2)$ holds as an equality and the slackness conditions are met. The marginal density of the observable conditional on effort is proportional to $\exp\left[-(1/2)\left(\xi_{A,l}-\bar{\alpha}e_{A,l}\right)^2\left(e_{A,l}^{\exp}\sigma_\alpha\right)^{-2}\right]$ if f is the truncated normal and equal to $\hat{e}_{A,l}f(\alpha)$ if f is one of the other distributions considered. From the equilibrium condition $\hat{e}_{A,l}=e_{A,l}^{\exp}$, it follows that $\mathrm{E}\left[\alpha f_{e_{A,l}}\left(\xi_{A,l}|\,\hat{e}_{A,l}\right)f^{-1}\left(\xi_{A,l}|\,\hat{e}_{A,l}\right)\right]=\bar{\alpha}\left(\hat{e}_{A,l}\right)^{-1}$ and $(A2)$ can be rewritten as

$$\bar{\alpha}\left(1-SR\right)\left(\hat{e}_{A,l}\right)^{-1}=\left[1-(1-S)\,J\right]C'\left(\hat{e}_{A,l}\right). \tag{A3}$$

By inspection of equations $(A1)$ and $(A3)$, it follows that: 1. Being the officials' objective functions strictly concave, the following three global comparative statics apply: $\partial\hat{e}_{i,l}/\partial K>0$ for all i and l, $\partial\hat{e}_{i,R}/\partial R<0$ and $\partial\hat{e}_{i,J}/\partial J>0$ for all i; 2. Elected public officials exert a strictly greater effort than appointed ones if $f(\bar{\alpha})>1$, which is true under A.1. □

Underinvestment When the Planner Cannot Commit

The socially optimal level of investment I^* is the solution of the following program:

$$I^*=\arg\max_{I\geq 0}v\left(1+I\right)\left[V\left(\underline{q}^*\right)-(1+\lambda)\,\underline{\theta}\underline{q}^*\right]+\left[1-v\left(1+I\right)\right]\left[V\left(\bar{q}^*\right)-(1+\lambda)\,\bar{\theta}\bar{q}^*\right]-\zeta\left(I\right),$$

where $\underline{q}^*$ and $\bar{q}^*$ are the full information quantity for the low cost and high cost firm respectively. It is straightforward to see that the first best I^* is implicitly defined by

$$v\left[V\left(\underline{q}^*\right)-V\left(\bar{q}^*\right)+(1+\lambda)\left(\bar{\theta}\bar{q}^*-\underline{\theta}\underline{q}^*\right)\right]=\zeta'\left(I^*\right). \tag{A4}$$

The binding first order condition to (7) implies, instead, that $\hat{I}$ is implicitly defined by

$$v\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\hat{\bar{q}}^{I}=\zeta'\left(\hat{I}\right). \tag{A5}$$

Thus, a sufficient condition to have $I^{*}>\hat{I}$ for every $\lambda\geq 0$ and $\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)>0$ is that

$$S\left(\underline{q}^{*}\right)-S\left(\bar{q}^{*}\right)+\left(\bar{\theta}\bar{q}^{*}-\underline{\theta}\underline{q}^{*}\right)>\Delta\theta\bar{q}^{*}+\bar{\theta}\bar{q}^{*}-\underline{\theta}\underline{q}^{*}>\left(\bar{\theta}-\underline{\theta}\right)\underline{q}^{*}=\Delta\theta\underline{q}^{*}>\Delta\theta\hat{\bar{q}}^{I},$$

where the last inequality is always true and implies that the left hand side of $(A4)$ is strictly greater than the left hand side of $(A5)$. The penultimate inequality, instead, is true whenever $-q'\left(p\right)\left(p/q\left(p\right)\right)<1$. In this case, indeed, a fall in price from $\bar{\theta}$ to $\underline{\theta}$ entails that:

$$\bar{\theta}\left(\underline{q}^{*}-\bar{q}^{*}\right)\left(\Delta\theta\bar{q}^{*}\right)^{-1}<1\leftrightarrow\left(2\bar{\theta}-\underline{\theta}\right)\bar{q}^{*}>\bar{\theta}\underline{q}^{*}. \qquad \square$$

Proof of Lemma 2

Totally differentiating the first order condition of problem (7), I have that

$$\left\{\frac{v^{2}\lambda}{1+\lambda}\frac{\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]^{2}}{\left[1-v\left(1+\hat{I}\right)\right]^{2}}\left(\Delta\theta\right)^{2}\frac{\partial\hat{\bar{q}}^{I}}{\partial p}-\zeta''\left(\hat{I}\right)\right\}d\hat{I}+v\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta d\hat{\bar{q}}^{I}=0,$$

which entails that $d\hat{I}\Big/d\hat{\bar{q}}^{I}>0$ because $q'\left(p\right)<0$ and $\zeta''>0$. By the same token, being

$$\left\{\frac{v^{2}\lambda}{1+\lambda}\frac{\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]^{2}}{\left[1-v\left(1+\hat{I}\right)\right]^{2}}\left(\Delta\theta\right)^{2}\frac{\partial\hat{\bar{q}}^{I}}{\partial p}-\zeta''\left(\hat{I}\right)\right\}d\hat{I}+\frac{\partial\Psi\left(\hat{e}_{r,R}\right)}{\partial\hat{e}_{r,R}}d\hat{e}_{r,R}=0,$$

$d\hat{I}\Big/d\hat{e}_{r,R}$ has the sign of $\partial\Psi\left(\hat{e}_{r,R}\right)/\partial\hat{e}_{r,R}$, which is negative whenever:

$$\frac{\partial\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\hat{\bar{q}}^{I}}{\partial\hat{e}_{r,R}}=-\frac{\partial\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)}{\partial\hat{e}_{r,R}}\Delta\theta\hat{\bar{q}}^{I}+\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\frac{\partial\hat{\bar{q}}^{I}}{\partial\hat{e}_{r,R}}<0\Leftrightarrow$$

$$\frac{\partial\hat{\bar{q}}^{I}}{\partial\hat{e}_{r,R}}\frac{1}{\hat{\bar{q}}^{I}}<\frac{\partial\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)}{\partial\hat{e}_{r,R}}\frac{1}{1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)}=\frac{\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)}{\left(1-\bar{\alpha}\hat{e}_{r,R}\right)\left(1-\bar{\alpha}\hat{e}_{j,J}\right)}=\frac{\bar{\alpha}}{1-\bar{\alpha}\hat{e}_{r,R}}. \tag{A6}$$

Applying the implicit function theorem to (6) I obtain that

$$\left\{V''\left(\hat{\bar{q}}^{I}\right)-\frac{\lambda v}{\left[1-v\left(1+\hat{I}\right)\right]^{2}}\frac{\partial\hat{I}}{\partial\hat{\bar{q}}^{I}}\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\right\}d\hat{\bar{q}}^{I}+$$
$$+\left\{\lambda\Gamma\left(\tilde{v}\left(\hat{I}\right)\right)\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)\Delta\theta-\frac{\lambda v}{\left[1-v\left(1+\hat{I}\right)\right]^{2}}\frac{\partial\hat{I}}{\partial\hat{e}_{r,R}}\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\right\}d\hat{e}_{r,R}=0$$

This last expression implies that a sufficient condition such that $(A6)$ holds is that:

$$\frac{\bar{\alpha}}{1-\bar{\alpha}\hat{e}_{r,R}}>-\frac{\lambda}{1+\lambda}\frac{\Delta\theta}{S''\left(\hat{\bar{q}}^{I}\right)\hat{\bar{q}}^{I}}\left\{\Gamma\left(\tilde{v}\left(\hat{I}\right)\right)\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)-\frac{v}{\left[1-v\left(1+\hat{I}\right)\right]^{2}}\frac{\partial\hat{I}}{\partial\hat{e}_{r,R}}\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\right\}\leftrightarrow$$
$$\frac{S''\left(\hat{\bar{q}}^{I}\right)\hat{\bar{q}}^{I}}{S'\left(\hat{\bar{q}}^{I}\right)}\equiv-\varepsilon_{p,q}<-\frac{\lambda/(1+\lambda)}{S'\left(\hat{\bar{q}}^{I}\right)}\Gamma\left(\tilde{v}\left(\hat{I}\right)\right)\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\left\{1-\frac{\left(1+\hat{I}\right)^{-1}}{1-v\left(1+\hat{I}\right)}\frac{\partial\hat{I}}{\partial\hat{e}_{r,R}}\frac{1-\bar{\alpha}\hat{e}_{r,R}}{\bar{\alpha}}\right\}=$$

$$-\varepsilon_{p,q} < -\frac{[\lambda/(1+\lambda)]\Gamma\left(\tilde{v}\left(\hat{I}\right)\right)\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta}{\bar{\theta}+[\lambda/(1+\lambda)]\Gamma\left(\tilde{v}\left(\hat{I}\right)\right)\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta}\left\{1-\frac{\left(1+\hat{I}\right)^{-1}}{1-v\left(1+\hat{I}\right)}\frac{\partial\hat{I}}{\partial\hat{e}_{r,R}}\frac{1-\bar{\alpha}\hat{e}_{r,R}}{\bar{\alpha}}\right\} \equiv -\bar{\varepsilon}_{p,q} < -1.$$

This last inequality implicitly defines the value $\bar{\varepsilon}_{p,q}$ in A.2. Under A.1 $\hat{e}_{E,R} > \hat{e}_{A,R}$ and, thus, under A.1 and A.2 it follows that $\Psi\left(\hat{e}_{E,R}\right) < \Psi\left(\hat{e}_{A,R}\right)$. Building on a similar argument it is easy to show that $\partial\Psi\left(\hat{e}_{j,J}\right)/\partial\hat{e}_{j,J} < 0$ and that under A.1 and A.2 $\Psi\left(\hat{e}_{E,J}\right) < \Psi\left(\hat{e}_{A,J}\right)$. □

Proof of Proposition 3

First, let me prove that, in the case of ex post investments, $-\varepsilon_{p,q} \leq -1$ is a sufficient condition to have $\partial\Psi\left(\hat{e}_{r,R}\right)/\partial\hat{e}_{r,R} < 0$. In particular, the following has to hold true:

$$\frac{\partial\left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\hat{\tilde{q}}^{I}}{\partial\hat{e}_{r,R}} = -\frac{\partial\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)}{\partial\hat{e}_{r,R}}\Delta\theta\hat{\tilde{q}}^{I} + \left[1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)\right]\Delta\theta\frac{\partial\hat{\tilde{q}}^{I}}{\partial\hat{e}_{r,R}} < 0 \Leftrightarrow$$

$$\frac{\partial\hat{\tilde{q}}^{I}}{\partial\hat{e}_{r,R}}\frac{1}{\hat{\tilde{q}}^{I}} < \frac{\partial\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)}{\partial\hat{e}_{r,R}}\frac{1}{1-\gamma\left(\hat{e}_{r,R},\hat{e}_{j,J}\right)} = \frac{\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)}{\left(1-\bar{\alpha}\hat{e}_{r,R}\right)\left(1-\bar{\alpha}\hat{e}_{j,J}\right)} = \frac{\bar{\alpha}}{1-\bar{\alpha}\hat{e}_{r,R}}. \tag{A7}$$

Applying the implicit function theorem to (6), I have that $\partial\hat{\tilde{q}}^{I}/\partial\hat{e}_{r,R} =$

$$-\lambda\Gamma\left(v\right)\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)\Delta\theta\left[V''\left(\hat{\tilde{q}}^{I}\right)\right]^{-1} = -\left[\lambda/(1+\lambda)\right]\Gamma\left(v\right)\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)\Delta\theta\left[S''\left(\hat{\tilde{q}}^{I}\right)\right]^{-1}.$$

This last expression implies that $(A7)$ can be rewritten as:

$$\frac{\bar{\alpha}}{1-\bar{\alpha}\hat{e}_{r,R}} > -\frac{\lambda}{1+\lambda}\frac{\Gamma(v)\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)\Delta\theta}{S''\left(\hat{\tilde{q}}^{I}\right)\hat{\tilde{q}}^{I}} \Leftrightarrow \frac{S''\left(\hat{\tilde{q}}^{I}\right)\hat{\tilde{q}}^{I}}{S'\left(\hat{\tilde{q}}^{I}\right)} \equiv -\varepsilon_{p,q} < -\frac{\lambda}{1+\lambda}\frac{\Gamma(v)\left(1-\bar{\alpha}\hat{e}_{r,R}\right)\left(1-\bar{\alpha}\hat{e}_{j,J}\right)\Delta\theta}{S'\left(\hat{\tilde{q}}^{I}\right)},$$

which is true because (6) entails that: $-\varepsilon_{p,q} \leq -1 < -\frac{[\lambda/(1+\lambda)]\Gamma(v)[1-\gamma(i,j)]\Delta\theta}{\theta+[\lambda/(1+\lambda)]\Gamma(v)[1-\gamma(i,j)]\Delta\theta}$. The derivative of the probability of reforming toward appointment with respect to $\Psi\left(\hat{e}_{A,R}\right) - \Psi\left(\hat{e}_{E,R}\right)$ rises with $\chi_{\tilde{m}}$: this implies that party R chooses appointment more often than party D does. The same probability rises with $\tilde{x}\left(\chi_{\tilde{m}} - \mu\right)$. Thus, the following derivatives conclude the proof: $\partial\tilde{x}\left(\chi_R - \mu\right)/\partial x_R = \left(\chi_R - \mu\right)\left(\rho_R - \rho_D\right) > 0$; $\partial\tilde{x}\left(\chi_D - \mu\right)/\partial x_D = \left(\chi_D - \mu\right)\left(\rho_D - \rho_R\right) > 0$. □

Data Sources

The data set gathers observations for 49 states over the period 1970-1997. The district of Columbia is excluded because of availability of a limited amount of data; Nebraska, instead, is not considered because it is not served by any IOUs.

1. Data on judicial appointment rules are collected from: A. Hanssen (2004b), Table 1; B. Besley and Payne (2006), Table 1.

2. Data on regulatory appointment rules are collected from: A. PUCs' webpages; B. NARUC (1970-1997); C. Beecher, Janice A., 2007. Historical Names and Dates of the Public Service Commissions, Unpublished mimeo. Michigan State University.

3. Data on sales, revenues and generation shares are collected from the Edison Electric Institute yearbooks: A. EEI, 1995. *Historical Statistics of the Electric Utility Industry*, 1960-1992. EEI: Washington, DC; B. EEI (1993-1997). EEI refers to the source of data for its yearbooks to various places including DOE, EIA, Federal Power Commission and FERC. EEI reports annual revenues in dollar terms and sales in Kwh by state and class of service. Residential, commercial and industrial users account for 95 percent of revenues in 1996. EEI reports electric generation and sources of energy for generation by type of prime mover driving the generator and by energy source. The totals from the two of them are consistent. I used the second one, except for generation by hydro (see also Besley and Coate, [2003]). Prices are calculated from revenues and sales in terms of cents per Kwh.

4. In order to construct the fossil fuel cost index for state s in year t, let $s_{j,s,t}$ be the share of input j—coal, gas, oil—used in state s and year t, and let $p_{j,t}$ be the price of fossil fuels composite per BTU. Data on the latter come from: EIA, 1998. *Annual Energy Review.* EIA: Washington, DC, Table 3.1. The index is defined as $c_{s,t} \equiv \sum_j s_{j,s,t} p_{j,t}$.

5. Political preferences are from the Council of State Governments yearbooks: CSG, 1970-1977. *The Book of the States.* CSG: Lexington, KY.

6. State income per capita, population, proportion aged over 65 and proportion aged 5-17 are calculated from two U.S. Census Bureau publications: A. UCB, 1970-1997. *Population*

Estimates Program. UCB: Washington, DC; B. UCB. 1970-1997. *Statistical Abstract of the United States*. UCB: Washington, DC.

References

Aghion, Philippe, Alesina, Alberto, Trebbi, Francesco, 2004. Endogenous Political Institutions. *Quarterly Journal of Economics* 119, 565-611.

Ai, Chunrong, Norton, Edward C., 2003. Interaction Terms in Logit and Probit Models. *Economics Letters* 80, 123-129.

Aidt, Toke S., Giovannoni, Francesco, 2005. Critical Decisions and Constitutional Rules. CWPE Working Paper 0523.

Ajodhia, Virendra, Hakvoort, Rudi, 2005. Economic Regulation of Quality in Electricity Distribution Networks. *Utilities Policy* 13, 211-221.

Alesina, Alberto, Holden, Richard, 2008. Extremism and Ambiguities in Two-Candidate Elections. NBER working paper no. 14143.

Alesina, Alberto, Tabellini, Guido, 1990. A Positive Theory of Fiscal Deficits and Government Debt. *Review of Economic Studies* 57, 403-414.

Alesina, Alberto, Tabellini, Guido, 2007. Bureaucrats or Politicians? Part I: A Single Policy Task. *American Economic Review* 97, 169-179.

Alesina, Alberto, Tabellini, Guido, 2008. Bureaucrats or Politicians? Part II: Multiple Policy Tasks. *Journal of Public Economics* 92, 426-447.

Armstrong, Mark, Sappington, David S., 2007. Recent Development in the Theory of Regulation. In: Armstrong, Mark, Porter, Robert (Eds.), *Handbook of Industrial Organization*, vol. 3, chapter 27. North-Holland, Amsterdam.

Bénabou, Roland, Tirole, Jean, 2006. Incentives and Prosocial Behavior. *American Economic Review* 96, 1652-1678.

Besley, Timothy, Coate, Stephen, 2003. Elected versus Appointed Regulators: Theory and Evidence. *Journal of the European Economic Association* 1, 11761206.

Besley, Timothy, Payne, Abigail A., 2006. Implementation of Anti-discrimination Policy: Does Judicial Selection Matter? Unpublished Mimeo. LSE, London, UK.

Boyer, Marcel, Laffont, Jean-Jacques, 2003. Competition and the Reform of Incentive Schemes in the Regulated Sector. *Journal of Public Economics* 87, 1353-1381.

Breyer, Stephen, 2009. Economic Reasoning and Judicial Review. *Economic Journal* 99, 123-135.

Colorado Department of Regulatory Agencies (CDRA), 1992. *1992 Sunset Review of the Colorado Public Utilities Commission*. Denver: CDRA.

Dewatripont, Mathias, Jewitt, Ian, Tirole, Jean, 1999. The Economics of Career Concerns, Part II: Application to Missions and Accountability of Government Agencies. *Review of Economic Studies* 66, 199-217.

Duso, Tomaso, 2005. Lobbying and Regulation in a Political Economy: Evidence from the U.S. Cellular Industry. *Public Choice* 122, 251-276.

EEI, 1993-1997. *Statistical Yearbook of the Electric Utility Industry*. EEI: Washington, DC.

Espey, James A., Espey, Molly, 2004. Turning on the Lights: A Meta-analysis of Residential Electricity Demand Elasticities. *Journal of Agricultural and Applied Economics* 36, 65-81.

Fabrizio, Kira, Rose, Nancy, Wolfram, Catherine, 2007. Do Markets Reduce Costs? Assessing the Impact of Regulatory Restructuring on U.S. Electric Generation Efficiency. *American Economic Review* 97, 1250-1277.

Falaschetti, Dino, 2007. Electoral Accountability and Consumer Monopsonists: Evidence from Elected vs. Appointed Regulators. Unpublished Mimeo. Hoover Institution, Stanford, CA.

Fremeth, Adam, Holburn, Guy L. F., 2009. Information Asymmetries and Regulatory Decision Costs: Evidence from Electric Utility Rate Reviews 1980-2000. Unpublished Mimeo. University of Western Ontario, Canada.

Friedman, Lee S., 1991. Energy Utility Pricing and Customer Response. In: Richard J. Gilbert (Eds.), *Regulatory Choices: A Perspective on Developments in Energy Policy*. University of California Press, Berkeley, 92-98.

Gennaioli, Nicola, Shleifer, Andrei, 2008. Judicial Fact Discretion. *Journal of Legal Studies* 37, 1-36.

Gibbons, Robert, Murphy, Kevin M., 1992. Optimal Incentive Contracts in the Presence of Career Concerns: Theory and Evidence. *Journal of Political Economy* 100, 468-505.

Glaeser, Edward L., Johnson, Simon, Shleifer, Andrei, 2001. Coase Versus the Coasian. *Quarterly Journal of Economics* 120, 853-899.

Glaeser, Edward L., Ponzetto, Giacomo A., Shapiro, Jesse M., 2005. Strategic Extremism: Why Republicans and Democrats Divide on Religious Values? *Quarterly Journal of Economics* 120, 1283-1330.

Gormley, William T., 1983. *The Politics of Public Utility Regulation.* University of Pittsburgh Press: Pittsburgh, PA.

Guerriero, Carmine, 2009a. The Political Economy of Incentive Regulation: Theory and Evidence from U.S. States. Unpublished mimeo. University of Amsterdam, the Netherlands.

Guerriero, Carmine, 2009b. The Political Economy of Deregulation: Theory and Evidence from U.S. States. Unpublished mimeo. University of Amsterdam, the Netherlands.

Hanssen, Andrew F., 2000. Independent Courts and Administrative Agencies: an Empirical Analysis of the States. *Journal of Law, Economics and Organization* 16, 534571.

Hanssen, Andrew F., 2004a. Is There a Politically Optimal Level of Judicial Independence? *American Economic Review* 94, 712-729.

Hanssen, Andrew F., 2004b. Learning about Judicial Independence: Institutional Change in the State Courts. *Journal of Legal Studies* 33, 431-474.

Holburn, Guy L. F., Vanden Bergh, Richard, 2006. Consumer Capture of Regulatory Institutions: the Creation of Public Utility Consumer Advocates in the United States. *Public Choice* 126, 45-73.

Johnson, Norman L., Kotz, Samuel, Balakrishnan, Narayanaswamy, 1994. *Continuous Univariate Distributions*, Vols. 1-2, 2^{nd} ed. John Wiley: New York, NY.

Joskow, Paul, 1974. Inflation and Environmental Concern: Structural Change in the Process of Public Utility Regulation. *Journal of Law and Economics* 17, 291327.

Joskow, Paul, Schmalansee, Richard, 1986. Incentive Regulation for Electric Utilities. *Yale Journal of Regulation* 4, 1-49.

Ka, Sangjoon, Teske, Paul, 2002. Ideology and Professionalism: Electricity Regulation and Deregulation Over Time in the American States. *American Politics Research* 30, 323-343.

Kleibergen, Frank, Paap, Richard, 2006. Generalized Reduced Rank Tests Using the Singular Value Decomposition. *Journal of Econometrics* 133, 97-126.

Knittel, Christopher R., 2006. The Adoption of State Electricity Regulation: the Role of Interest Groups. *Journal of Industrial Economics* 54, 201-222.

Laffont, Jean-Jacques, 2000. *Incentives and Political Economy.* Oxford University Press: Oxford.

Laffont, Jean-Jacques, Tirole, Jean, 1993. *A Theory of Incentives in Procurement and Regulation.* MIT Press: Cambridge MA.

Laffont, Jean-Jacques, Martimort, David, 1999. Separation of Regulators Against Collusive Behavior. *Rand Journal of Economics* 30, 232-262.

Leaver, Clare, 2009. Bureaucratic Minimal Squawk Behavior: Theory and Evidence from Regulatory Policy. *American Economic Review* 99, 572-607.

Lee, Carroll R., Hill, Richard C., 1995. Evolution of Maines Electric Utility Industry, 1975-1995. *Maine Policy Review* 4, 17-27.

Maskin, Eric, Tirole, Jean, 2004. The Politician and the Judge: Accountability in Government. *American Economic Review* 94, 1034-1054.

Metcalf, Gilbert E., 2008. Using Tax Expenditures to Achieve Energy Policy Goals. *American Economic Review* 98, 9094.

Myerson, Roger B., 1979. Incentive Compatibility and the Bargaining Problem. *Econometrica* 47, 6173.

NARUC, 1982-1997. *Yearbook of Regulatory Agencies*. NARUC Press: Washington, DC.

Newbery, David M., 2000. *Privatization, Restructuring and Regulation of Network Utilities*. Walras-Pareto Lectures. 1995. MIT Press: Cambridge MA.

OECD, 2002. *Regulatory Reform in Gas and Electricity and the Professions*. OECD Press: Paris, France.

Persson, Torsten, Svensson, Lars E. O., 1989. Why a Stubborn Conservative Would Run a Deficit: Policy with Time-Inconsistent Preferences. *Quarterly Journal of Economics* 105, 325-345.

Quirk, Paul J., 1981. *Industry Influence in Federal Regulatory Agencies*. Princeton University Press: Princeton, NJ.

Roodman, David M., 2009. How to do Xtabond2: an Introduction to "Difference" and "System" GMM in Stata. *Stata Journal* 9, 86-136.

Salant, David J., 1995. Behind the Revolving Door: A New View of Public Utility Regulation. *Rand Journal of Economics* 26, 362-377.

Sappington, David E. M., 1986. Commitment to Regulatory Bureaucracy. *Information Economics and Policy* 2, 243-258.

Steiner, Faye, 2004. The Market Response to Restructuring: a Behavioural Model. *Journal of Regulatory Economics* 25, 59-80.

Teske, Paul, 2004. *Regulation in the States*. Brookings Institution: Washington, DC.

Tables

Table 1: History of Appointment Rules — 1970-1997

	Distribution of Public Utility Commissioners Appointment Rules Across States
Electing [9]:	AL [E], AZ [E], GA[E], LA[E], MS[E], MT[E], ND[E], OK[E], SD[E].
Appointing [35]:	AK[Gal], AR[Ga], CA[Gas], CO[Gas], CT[Gal], DE[Gas], HI[Gas], ID[Gas], IL[Gas], IN[Ga], IA[Ga], KS[Gas], KY[Ga], ME[Gas], MD[Gas], MA[Ga], MI[Gas], MO[Ga], NV[Ga], NH[Gae], NJ[Gas], NM[Ga], NY[Gas], NC[GA], OH[Gas], OR[Ga], PA[Gas], RI[Gas], UT[Gas], VT[Ga], VA[Le], WA[Gas], WV[Gas], WI[Gas], WY[Gas].
Switching [5]:	FL[E(1980)/Gas], MN[E(1960-1971)/Ga(1972-1975)/E(1976-1977)/Ga], SC[Le(1996)/E], TN[E(1996)/GAa], TX[E(1976)/Ga].
	Distribution of High Court Judges Appointment Rules Across States
Electing [21]:	AL[Pe], AR[Pe], GA[Pe(1983)/Ne], ID[Ne], IL[Pe], KY[Ne], LA[Pe(1975)/Ne], MI[Ne], MN[Ne], MS[Pe(1993)/Ne], MT[Ne], NV[Ne], NC[Pe], ND[Ne], OH[Ne], OR[Ne], PA[Pe], TX[Pe], WA[Ne], WV[Pe], WI[Ne].
Appointing [20]:	AK[Mp], CA[Ga], CO[Mp], CT[Ga], DE[Ga], HI[Mp], IN[Mp], IA[Mp], KS[Mp], ME[Ga], MA[Ga], MO[Mp], NH[Ga], NJ[Ga], OK[Mp], RI[La(1993)/Ga], SC[La], UT[Mp], VT[La(1983)/Ga], VA[La].
Switching [8]:	AZ[Ne(1973)/Mp], FL[Pe(1971)/Mp], MD[Ne(1975)/Mp],NM[Pe(1988)/Mp], NY[Pe(1977)/Ga], SD[Ne(1980)/Mp], TN[Pe(1993)/Mp], WY[Ne(1972)/Mp].

Notes 1. In panel A, the acronimous Pe, Ne, Ga, La and Mp stand for partisan election, nonpartisan election, Gubernatorial appointment, appointment by Legislature, and merit plan. In panel B, the acronimous E, Ga, Gas, Gae, Gal, GAa, Le stand for direct election, Gubernatorial appointment, Gubernatorial appointment with confirmation by the Senate, Gubernatorial with confirmation by executive council, Gubernatorial appointment with approval by Legislature, selection by general assembly and selection by Legislature.

Table 2: Variables Names and Descriptions — Full Sample

	Variables Name	Variable Description	Mean (Standard deviation)
Supervisors' implicit incentives:	*Reg_Elec*:	Dummy variable taking value 1 if public utility commissioners are elected; 0 otherwise.	0.220 (0.414)
	Reg_Ord:	Indicator variable taking value 3 if commissioners are elected by voters; 1 if they are appointed with the approval by both houses; 2 otherwise.	2.118 (0.555)
	Jud_Elec:	Dummy variable taking value 1 if High Court judges are elected; 0 otherwise.	0.485 (0.500)
	Jud_Ord:	Indicator variable taking value 3 if High Court judges are selected through partisan election; 1 if the merit plan is in use; 2 otherwise.	1.937 (0.697)
Investment concerns:	*Gen_Hydro*:	Percentage of total generation from hydroelectric sources.	0.198 (0.317)
	Embargo:	Dummy variable taking value 1 if *Jud_Elec* has changed value over the years 1973 to 1982; 0 otherwise.	0.061 (0.240)
Political competition:	*Majority*:	Percentage of seats held by the majority party and averaged across upper and lower houses.	0.669 (0.129)
	Republican:	Dummy variable taking value 1 if both houses are controlled with the absolute majority of seats by the Republican party; 0 otherwise.	0.351 (0.477)
Prices:	*Residential*:	Revenue from sales to residential users in cents per Kwh.	5.918 (2.680)
	Commercial:	Revenue from sales to commercial users in cents per Kwh.	5.528 (2.435)
	Industrial:	Revenue from sales to industrial users in cents per Kwh.	3.810 (1.925)
Average costs:	*c*:	Cost of fossil fuels in cents per Kwh	1.096 (0.899)
Other Controls:	*Gen_Fuel*:	Percentage of total generation from fossil fuels sources.	0.663 (0.329)
	Ereg_Nei:	Share of neighboring states electing their public utility commissioners.	0.234 (0.271)
	Ejud_Nei:	Share of neighboring states electing their High Court judges.	0.516 (0.319)
	Population:	State population.	4,744,061 (5,050,415)
	Old:	Percentage of population aged 65 and over.	0.110 (0.031)
	Young:	Percentage of population aged 5-17.	0.204 (0.049)
	GSP:	Gross state product per capita in dollars.	12,148.88 (7,306.264)

Table 3: Determinants of Appointment Rules — Logit and Ordered Logit

	(1)	(2)	(3)	(4)	(5)	(6)
	The dependent variable is:					
	Reg_Elec	*Reg_Ord*	*Reg_Ord* = 3	*Jel_Elec*	*Jud_Ord*	*Jud_Ord* = 3
Gen_Hydro	0.093	2.195	0.118	0.237	1.376	0.048
	(0.028)***	(0.361)***	(0.025)***	(0.054)***	(0.217)**	(0.023)**
Embargo	- 0.118	0.387	- 0.109	0.100	0.818	- 0.029
	(0.022)***	(0.112)***	(0.024)***	(0.081)	(0.253)	(0.042)
Majority	0.126	1.281	0.037	0.195	52.135	0.597
	(0.093)	(0.706)	(0.083)	(0.102)*	(23.802)***	(0.071)***
Republican	- 0.033	0.830	- 0.028	- 0.078	1.082	0.012
	(0.020)*	(0.102)	(0.016)*	(0.033)**	(0.124)	(0.018)
Ereg_Nei	0.588	23.015	0.472			
	(0.044)***	(7.031)***	(0.048)***			
Ejud_Nei				0.716	1.402	0.051
				(0.057)***	(0.224)**	(0.024)**
Other Controls	*Constant, Population, Old, Young, GSP*					.
Estimation	Logit	Ordered Logit	Ordered Logit	Logit	Ordered Logit	Ordered Logit
Number of Obs.	1372	1372	1372	1372	1372	1372
Pseudo R^2	0.26	0.14	0.14	0.17	0.09	0.09
Pseudo-Log-Likelihood	- 533.43	- 975.09	- 975.09	- 788.42	- 1283.59	- 1283.59

Notes: 1. Robust standard errors–z distribution–in parentheses;
2. The entries are marginal effects; those in columns (2) and (4) are calculated with respect to choice 3;
3. *** denotes significant at the 1% confidence level; **, 5%; *, 10%.

Table 4: Price Levels – OLS and IV

PANEL A						
	(1)	(2)	(3)	(4)	(5)	(6)
	Residential	*Commercial*	*Industrial*	*Residential*	*Commercial*	*Industrial*
Reg_Elec	- 0.853	- 0.714	- 0.494	- 1.053	- 0.953	- 0.727
	(0.105)***	(0.103)***	(0.073)***	(0.125)***	(0.127)***	(0.100)***
Jud_Elec	- 0.459	- 0.388	- 0.287	- 0.606	- 0.341	- 0.338
	(0.109)***	(0.107)***	(0.076)***	(0.133)***	(0.135)**	(0.098)***
Estimation	OLS.					
Adjusted R^2	0.06	0.04	0.04	0.12	0.08	0.10
PANEL B						
	(1)	(2)	(3)	(4)	(5)	(6)
	Residential	*Commercial*	*Industrial*	*Residential*	*Commercial*	*Industrial*
Reg_Elec	- 1.550	- 1.759	- 0.853	- 0.905	- 1.488	- 1.129
	(0.369)***	(0.377)***	(0.253)***	(0.497)*	(0.461)***	(0.394)***
Jud_Elec	- 0.621	- 0.565	- 0.496	- 2.260	- 1.308	- 1.016
	(0.318)**	(0.321)*	(0.223)**	(0.576)***	(0.569)**	(0.410)**
Estimation	IV.					
Excluded Instr.	*Republican, Ereg_Nei, Ejud_Nei* .					
Hansen Test for Overid. Restr.	0.14	0.76	0.11	0.33	0.48	0.50

Notes: 1. The dependent variables in columns (1) to (6) gathers the fixed effects obtained as explained in section 5.2 for the customer class reported just below the number of the column;
2. The sample used to obtain the results in columns (1) to (3) spans the years 1970 to 1997; the one used for columns (4) to (6) covers, instead, the period 1970-1983;
3. In each of the columns a constant term is always considered;
4. Robust standard errors in parentheses;
5. *** denotes significant at the 1% confidence level; **, 5%; *, 10%.

Table 5: Pass-Through of Cost Shocks – Fixed State and Time Effects OLS

	(1)	(2)	(3)	(4)	(5)	(6)
	The dependent variable is the average price for customer class:					
	Residential	*Commercial*	*Industrial*	*Residential*	*Commercial*	*Industrial*
c	0.702	0.709	0.604	0.973	0.964	0.958
	(0.088)***	(0.090)***	(0.103)***	(0.054)***	(0.067)***	(0.057)***
*Reg_Elec*c*	- 0.115	0.012	- 0.038	- 0.217	- 0.023	- 0.072
	(0.104)	(0.094)	(0.072)	(0.068)***	(0.073)	(0.059)
*Jud_Elec*c*	- 0.358	- 0.378	- 0.051	- 0.214	- 0.198	- 0.070
	(0.109)***	(0.100)***	(0.092)	(0.087)**	(0.093)**	(0.072)
Other Controls	*Gen_Fuel*, *Gen_Hydro*, *Population*, *Population*^{2}, *Old*, *Young*, *GSP*, *GSP*^{2}, *time dummies.*					
Estimation	Fixed state and time effects.					
Number of Obs.	1372	1372	1372	686	686	686
R^2 (within)	0.91	0.91	0.89	0.95	0.93	0.94

Notes: 1. The sample used to obtain the results in columns (1) to (3) spans the years 1970 to 1997; the one used for columns (4) to (6) covers, instead, the period 1970-1983;
2. Robust standard errors in parentheses;
3. *** denotes significant at the 1% confidence level; **, 5%; *, 10%.

Table 6: Pass-Through of Cost Shocks – Fixed State and Time Effects System GMM

	(1)	(2)	(3)	(4)	(5)	(6)
	The dependent variable is the average price for customer class:					
	Residential	*Commercial*	*Industrial*	*Residential*	*Commercial*	*Industrial*
c	1.184	1.108	1.084	1.251	1.204	1.151
	(0.254)***	(0.264)***	(0.276)***	(0.221)***	(0.193)***	(0.094)***
*Reg_Elec*c*	- 0.674	0.092	- 0.0008	- 0.490	- 0.295	- 0.116
	(0.748)	(0.789)	(0.630)	(0.237)**	(0.302)	(0.263)
*Jud_Elec*c*	- 1.159	- 0.910	- 0.580	- 0.404	- 0.260	- 0.178
	(0.561)**	(0.574)	(0.372)	(0.373)	(0.277)	(0.216)
Other Controls	*Gen_Fuel*, *Gen_Hydro*, *Population*, *Old*, *Young*, *GSP*, *time dummies.*					
Estimation	Fixed state and time effects two-step system GMM.					
Endogenous	*c*, *Reg_Elec*c*, *Jud_Elec*c*, *Gen_Fuel.*					
Excluded Instruments	*One lag of predetermined and endogenous*, *Embargo*, *Majority*, *Republican*, *Ereg_Nei*, *Ejud_Nei.*			*Two lags of predetermined and endogenous*, *Embargo*, *Majority*, *Republican*, *Ereg_Nei*, *Ejud_Nei.*		
Instruments count	46	46	46	36	36	36
Hansen test for Overid. restrict.	0.20	0.26	0.10	0.28	0.34	0.49
Number of obs.	1372	1372	1372	686	686	686

Notes: 1. The sample used to obtain the results in columns (1) to (3) spans the years 1970 to 1997; the one used for columns (4) to (6) covers, instead, the period 1970-1983;
2. Robust standard errors in parentheses;
3. *** denotes significant at the 1% confidence level; **, 5%; *, 10%.