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Accountability in Government and Regulatory Policies: Theory and Evidence

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Summary

This paper analyzes the political economy of regulatory and judicial appointment rules. I study a model of price-setting by a political principal faced with a firm with unknown costs, and endowed with an information-gathering technology whose efficiency rises with the effort exerted by two accountable supervisors (a regulator and a judge). This set-up captures the institutions of several international markets. The model predicts that reforms toward election rather than appointment of regulators are more likely the less efficient is the information-gathering technology, the less stringent are the investment concerns of society, the stronger are regulators' revolving-door motivations, and the closer is political competition. These predictions are consistent with US electric power market data. Moreover, in accordance with the model, electricity rates are lower and respond less to shock in input costs in states that elect their regulators or their High Court judges.

Keywords: Election, Agency, Judges, Regulation, Electricity

JEL Classification: K23, L51, Q43

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1. Introduction

Understanding which institutional settings are more efficient in inducing public officials to act in the public interest is a key issue in political economy. A crucial institution is the procedure of selecting representatives and, in particular, whether to elect or appoint regulators and judges. While the features linked to these two constitutional designs have been considered as independent and analyzed, one at a time, in order to clarify the differences between appointment regimes, there are several markets where regulation is undertaken by the two types of public officials at the same time, and a plurality of selection methods survive.

The US electric power market (along with other US markets) is a case in point. Prices are set by an independent staff at the end of public hearings presided by regulators and judges, who can either be appointed or elected. Such a framework is not unique to the US and, in the aftermath of the recent European and South-American privatizations, a rising need for higher transparency of the regulatory process has exported beyond American boundaries a similar combination of independent staffs and accountable top-level regulators and judges (see Newbery, 2000).[1] This rich institutional design raises three key questions. First, what are the forces driving the adoption of a particular appointment rule? Second, how do the incentives, imposed by selection rules on regulators and judges, interact with each other and with task-specific motivations? Third, what is the overall impact of judicial and regulatory appointment rules on the efficiency of regulatory policies?

[1]The UK is a case in point. The Utilities Act of 2000 entrusted the regulation of electricity and gas to officials (GEMA) appointed by the Secretary of State and supported by an independent staff (Ofgem), which proposes the policy position and is subject to judicial review (OECD, 2002).

This paper lays out a framework for thinking about these issues and explores their empirical implications by using US electricity market data. The model bridges the canonical principal-agent theory of regulation (Laffont, 2000) to a recent body of political economics literature contrasting elected and appointed officials from a normative as well as a positive perspective.[2] I study the price-setting problem of a principal faced with a monopoly with unknown costs. The principal is endowed with an information-gathering technology whose efficiency rises with the effort exerted by a regulator and a judge, whom hereafter I shall call supervisors.

Supervisors respond to implicit (or accountability) incentives and intrinsic (or legacy) motivations. Implicit incentives force supervisors to select effort looking at the ballot box (the preferences of their professional peers) if elected (appointed) but not at the pricing rule selected by the principal. The model predicts that, under a mild condition on the common random ability, elected supervisors exert more effort than appointed ones. This election-driven populist (or pandering) drift is complementary to that proposed by Besley and Coate (2003). The latter claim that, by unbundling policy issues, election reduces the influence of industry interests. Also, the pandering incentives I identify are fuelled (curbed) by judges' fairness motivations (regulators' desire to obtain job offers from the industry).

Increasing the equilibrium effort, election decreases the expected probability that the planner remains uninformed. This leads to lower expected rates. So election is undoubtedly better than appointment from a static efficiency point of view. Yet, if investment concerns enter the picture, the comparison between the two methods

[2] The two most relevant contributions in this literature are the comparison between accountable and nonaccountable public agents proposed by Alesina and Tabellini (2007) and the Maskin and Tirole's (2004) analysis of career and legacy concerns in politics.

becomes uncertain. Indeed, I show that, if the regulatory selection rule is chosen by one of two political parties, investment concerns and the avoidance of the distortions created by the funding of investment aids are complementary in enhancing the likelihood of a reform toward appointment. Besides, the latter is sensitive to the tightness of the political competition.

Consistent with the model's prediction, state-level panel data from the US electric power market confirm that reforms toward election of regulators are associated with less abundant regulatory resources, less expensive generation, and closer political competition. I also find evidence that rates are lower and respond less to cost shocks in states electing their regulators or their High Court judges.

There are three main contributions by this paper. First, following the footsteps of a lively literature on endogenous political institutions (Aghion et al., 2004; Aidt and Giovannoni, 2005), I identify the normative and positive determinants of regulatory regime reforms.[3] To this extent, the evidence confirms the basic idea, proposed by Alesina and Tabellini (2008), that appointment outperforms election if time inconsistency (in this case, in investment) is a real issue.

Second, the empirical analysis adds significantly to the literature about the systematic differences in the policies pursued by appointed and elected officials.[4]

[3] Hanssen (2004a) provides a first empirical and theoretical account of the relation among political strategic dynamics and institutional reforms. Holburn and Vanden Bergh (2006) and Falaschetti (2007) provide some evidence from regulatory data of the relevance of the forces identified in the present paper. Enikolopov (2007) performs the same exercise on US local governments.

[4] Besley and Coate (2003) review a first cross-sectional tradition analyzing the US electric power market, and report, for the first time, panel evidence confirming the idea that states electing their regulators enjoy lower rates. Leaver (2004), Holburn and Spiller (2002), and Fremeth and Holburn (2007) report similar evidence employing panels of rate reviews.

In contrast to previous studies, not only I endogenize the choice of selection rules but I also consider judicial appointment as a possible determinant of prices.[5] To this extent, my results constitute one of the first accounts of the relation between judicial institutions and regulatory policies (see also Besley and Payne, 2005).

Third, the paper is complementary to a recent interesting literature explaining the use of regulation as opposed to independent courts as a function of the incentives faced by judges and regulators themselves (Glaeser et al., 2001).

The remainder of the paper is organized as follows. Section 2 describes the institutions governing the pricing process in the US electric power market as an example of the general setting studied in the model. Section 3 clarifies the effect of supervisors' incentives and motivations on regulated rates. Section 4 studies the efficiency and strategic determinants of regulatory reforms. Section 5 presents the empirical work. Finally, Section 6 concludes. All proofs, tables and a detailed description of the data are gathered in the Appendix.

2. Institutions

Investor-owned electric power utilities (IOUs hereafter) account for over three-fourths of the electricity sales of the US electricity market. While jurisdiction over both interstate transmission and wholesale transactions lies with a federal body—the FERC, retail services are regulated by state public utility commissions (PUCs hereafter). The latter deal with several markets (telecommunications, natural gas,

[5] The empirical test in Falaschetti (2007) is a first attempt to endogenize regulatory rules. Besley and Payne (2005) and Hanssen (2000) show that states appointing judges have respectively fewer discrimination charges and higher litigation rates. Helland and Tabarrok (2002) show that elected judges redistribute wealth from out-of-state businesses to in-state plaintiffs (*i.e.*, voters).

insurance, water, etc.) and perform several tasks (for example, they suggest lines of conduct on service provision, design environmental regulations and so on), among which price-setting is the most relevant. IOUs are not allowed to receive government subsidies and, therefore, regulated two-part tariffs should cover average costs in order to assure the firms' viability. As a consequence, rates have traditionally been linked to those average costs recognized as reimbursable during rate reviews. The latter are generally triggered by utilities in response to cost shocks, and sometimes initiated periodically by the PUC (Friedman, 1991).

Two-tier hearings and supervisors' roles.— Rate reviews follow a precise routine composed of two levels of formal quasi-judicial hearings open to all interested parties (firms; ratepayers, along with their state-funded advocates; PUC staff; interest groups, etc).[6] First, commissioners—the heads of the PUCs—sit on the bench; next, if the filing is not approved or some party finds him/herself mistreated, a High Court judge (usually sitting in a state supreme court) is asked to rule the case. The appeal is on law and fact and "with so much at stake, [judicial review] is a very real possibility" (Gormley, 1983).

A huge body of press testimonies and empirical results highlights the critical and often undervalued relevance of judicial review. As Gormley (1983) reports, the appellate rate of PUC decisions reached between 1974 and 1979 the considerably mean level of 37.4 percent (with a 1976 peak of 52.3 percent),[7] and that the share of partially reversed cases was 43.5 percent. Teske et al. (2004, ch. 15) report

[6] 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 PUCs' websites.

[7] As noticed by Hanssen (2004a), the share of appealed decisions underestimates the "activist" judges' effect, being the likelihood of an appeal itself a function of judges' incentives.

similar figures for the period 1995-1996, when the mean appellate rate was thirty-six percent and the share of partially reversed cases thirty-five percent. During the hearings, the role of commissioners and judges is one of supervision: they examine witnesses and experts, receive the evidence and interpret prevailing precedents and regulations.[8] The final motion to be approved, instead, is proposed *de facto* by the PUC's staff, who act as the jury in a typical Anglo-American adversarial trial—the reason being that decisions should always be reached in "an open and fair manner" (CDRA, 1992).[9] This latter feature, along with the fact that the complete record of the hearings is widely publicized and all interested parties participate, assures that only if "hard" evidence—such that "every interested party can convince himself that [the judgment] corresponds to the true state of the world" (Laffont, 2000)—is obtained does the review end.

Accordingly, I set up a model in which rates are selected by a planner obtaining orthogonal and truthful signals on the firm's technology from the search activity of a regulator and a judge. This fictional planner represents the Coasian bargaining among interested players necessary to make price changes acceptable.

Supervisors' incentives.— Media carefully track the evolution of electricity files, which in turn represent some of the most advertised tasks over which regulators and judges are selected. High (state supreme and circuit) court judges and public

[8] "The judge just listens attentively. If it speaks, it will be to rule, at the request of the party or on his own motion, on the admissibility of a question put to a witness or a party or to ensure adherence to the rules of the game" (Zweigert and Kötz, 1998, pp. 272–273).

[9] Commissioners consider the staff as the most influential hearing actor (Gormley, 1983; Teske et al., 2004, ch. 4). While a part (trial staff) suggests a pre-hearing position, another (advisory staff) proposes the final motion (CDRA, 1992). Furthermore, courts usually examine the staff before issuing the judgment (Gormley, 1983).

utility commissioners are either elected or appointed, and appointment rules are reformed at the state government level. Coherently, I assume that supervisors are rewarded on the basis of the extent of hard information (reported in the docket official papers) they obtain during the hearings. In addition, I model the role of selection rules and of regulatory and judiciary specific motivations in the pricing process. Finally, I also posit that selection rules are chosen by political parties faced with election uncertainty.

3. Accountable Supervisors and Regulated Rates

Building on the institutions introduced above, the model takes its approach from Laffont (2000) and incorporates a (possibly partisan) planner and two implicitly and intrinsically motivated supervisors.

3.1 The Basic Model

Preferences and Information.— The regulated firm produces a variable scale product q, charging a two-part tariff $A+pq$ with q, A and p being strictly positive. Total cost is θq. The marginal cost θ is equal to $\underline{\theta}$ with probability v and to $\overline{\theta}$ with probability $1-v$. Let $\Delta\theta \equiv \overline{\theta} - \underline{\theta} > 0$. Consumers share the same preferences, and the demand is that of a representative consumer. Let $S(q)$, $p = P(q) = S'(q)$, $q = D(p)$ and $R(q) = P(q)q + A$ label the gross surplus, inverse and regular demand functions, and the firm's revenue. Consumers choose q to maximize the net surplus $S(q) - A - pq$ and A is fixed optimally to make them indifferent between buying or not: that is, $A \equiv S(q) - P(q)q$. The firm's utility is

$U = t - \theta q$ and a reservation level of 0 is required. The firm's revenues must cover managerial rewards t and, thus, $A + pq(p) \geq t$.

The planner's problem.— Ex post social welfare W is the sum of the net consumer surplus and of the firm's utility. The firm's budget constraint is evaluated at the shadow price of the managerial rewards $1+\lambda$ and, consequently,

$$W = S(q(p)) - A - pq(p) + U + (1+\lambda)\left[A + pq(p) - t\right]. \quad (1)$$

Let $V(q)$ denotes the social surplus brought about by the production of q. Given that the good is private, V is the sum of the consumers' net surplus plus the firm's revenue, computed at the shadow price $1+\lambda$ (because it helps to fulfill the firm's budget constraint). So, $V(q) = (S(q) - R(q)) + (1+\lambda)R(q) = (1+\lambda)S(q)$ with $V(0) = 0$, $V' > 0$, $V'' < 0$.[10] The strictly concave planner's objective in (1) re-writes as:

$$W = V(q) - (1+\lambda)\theta q - \lambda U. \quad (2)$$

Under complete information about θ the planner achieves the optimal allocation $V'(q^*) = (1+\lambda)\theta$ and no rent is left to the firm (see the Appendix). Instead, under asymmetric information, the planner offers the firm a menu of incentive compatible pairs (t,q) trading off informational rent extraction and allocative distortion.[11] Let $\{(\underline{t},\underline{q},\underline{U}),(\overline{t},\overline{q},\overline{U})\}$ denote managerial rewards, output and utility of

[10] Joskow and Schmalensee (1986) suggest that A here covers a role similar to the governmental transfers in Laffont and Tirole (1993). Thus, my analysis is formally similar to the latter when reimbursement is intended operated through regulated prices. In the present case, the shadow cost of public funds is replaced by the marginal deadweight loss from a rise in the fixed fee.

[11] Incentive compatibility prescribes that the contract designed for firm $\underline{\theta}$ ($\overline{\theta}$) is the one preferred by $\underline{\theta}$ ($\overline{\theta}$) in the menu of (t,q) pairs or: $\underline{t} - \underline{\theta}\underline{q} \geq \overline{t} - \underline{\theta}\overline{q}$ (IC_H) and $\overline{t} - \overline{\theta}\overline{q} \geq \underline{t} - \overline{\theta}\underline{q}$ (IC_L).

the high and low-cost firms. Incentive compatibility and individual rationality implies a binding high cost firm's individual rationality constraint

$$\bar{U} = \bar{t} - \bar{\theta}\bar{q} = 0\,, \qquad (IR\_L)$$

and a binding low cost firm's incentive compatibility constraint

$$\underline{U} = \bar{t} - \underline{\theta}\bar{q} = \bar{U} + \bar{\theta}\bar{q} - \underline{\theta}\bar{q} = \Delta\theta\bar{q}\,. \qquad (IC\_H)$$

Thus, under asymmetric information, expected social welfare is

$$\tilde{W} = v\left[V(\underline{q}) - (1+\lambda)\underline{\theta}\underline{q} - \lambda\Delta\theta\bar{q}\right] + (1-v)\left[V(\bar{q}) - (1+\lambda)\bar{\theta}\bar{q}\right]. \qquad (3)$$

Except for the expected rent $v\lambda\Delta\theta\bar{q}$, the problem is the same as in (2). To assure incentive compatibility, the planner grants an informational rent to the low cost firm (whose allocation is still optimal) and distorts the high cost firm's allocation. Define $\Gamma(x) \equiv x/(1-x)$ with $\Gamma' > 0$. The low cost firm contract is now given by

$$V'(\hat{\bar{q}}) = (1+\lambda)S'(\hat{\bar{q}}) = (1+\lambda)\bar{\theta} + \lambda\frac{v}{1-v}\Delta\theta = (1+\lambda)\bar{\theta} + \lambda\Gamma(v)\Delta\theta\,. \qquad (4)$$

The first term in the equality has the measure of a price. Therefore, expected rents are completely passed through on prices, and all the differences in expected rates with respect to the first best are determined by the high cost firm's allocation.

The supervision technology.— Let me now introduce two supervisors (a regulator and a judge) who, exerting costly effort, produce two independent signals that are observed by the planner. The signals' precision is ξ_l with $l = \{R, J\}$. If $\theta = \underline{\theta}$, with probability ξ_l the planner sees $\underline{\theta}$ and implements the full information contract and with probability $1-\xi_l$ she observes ϕ. If, instead, $\theta = \bar{\theta}$, then she always observes ϕ. The planner assures a reservation utility r to the two supervisors, who always participate in the game and are not allowed to side contract with each other. The regulator moves first. If the planner remains uninformed, the judge

generates an orthogonal signal with the same structure.[12] Supervisors are evaluated on the observable but not contractible ξ_l, whose technology is multiplicative in the random (common) ability $\alpha \in [0,1]$ and in the unobservable effort $e_l \in [0,1]$: that is, $\xi_l = \alpha e_l$.[13]

The parameter α is drawn from a distribution with mean $\bar{\alpha}$, variance σ_α^2 and density f independent of e_l. In order to narrow down the possible cases, I shall concentrate on the class of the canonical, non degenerate, continuous distributions supported on a bounded interval and with hump-shaped density: that is, Beta, generalized Kumaraswamy, raised cosine, inverted U-quadratic, and truncated normal (see Johnson et al., 1994). Moreover, I shall assume that:

A1: When f is truncated normal $\sigma_\alpha \left[\Phi\left((1-\bar{\alpha})/\sigma_\alpha \right) - \Phi\left(-\bar{\alpha}/\sigma_\alpha \right) \right] < 1/\sqrt{2\pi}$, where Φ is the standard normal cumulative function.

The assumption assures that, for all the distribution in the class, the density f is not too flat at the mean, and, in particular, that $f(\bar{\alpha}) > 1$. As a result, the marginal probability of drawing a supervisor with less than average talent is not too low. In the most sensible case, in which there are no extreme types and $f(0) = f(1) = 0$—Beta, generalized Kumaraswamy, raised cosine, and inverted U-quadratic—the

[12] This set-up captures, in the case of the US electricity market, on one side, the nature of the evidence processing (which is *de facto* devolved upon the staff), and, on the other, the nature of judicial reviews (new hearings leading to *de novo* decisions).

[13] The effort has to be correctly considered as net of all the activities intended to hide valuable information. A multiplicative technology avoids the tiresome qualifications that an additive one needs: the choice, however, is immaterial. If the performance is any continuous and increasing function of the precision (*e.g.*, expected social welfare), all the results remain unaffected.

requirement is always met (proofs available from the author).[14] When, instead, this is not the case (truncated normal) the regularity on the measure of completely skilled and unskilled types, contained in A1, is required. Overall, this last assumption has to be considered as an essentially mild one given the high complexity and the fast changing nature of the regulation task.

Supervisors' objective functions.— As suggested by Maskin and Tirole (2004), I suppose that supervisors respond to both implicit incentives and intrinsic motivations: they not only value being in office for its own sake but also wish to leave a legacy. In other words, not only being reappointed or re-elected brings valuable perquisites or satisfies tastes for influence (implicit incentives), but supervisors want to be remembered for great things they have accomplished for society at large, or of a part of it (intrinsic motivations). Therefore, I posit that a supervisor's utility depends on both her identity and the degree of accountability to which she is subjected. Therefore, a generic supervisor's interim (relative to the moment in which she exerts effort) utility function writes as

$$R_{i,l}\left(e_{i,l},S\right)=\left\{1+\left[\left(1-SR\right)G^{i}\left(e_{i,l}\right)-\left(1-\left(1-S\right)J\right)\left(1-K\right)C\left(e_{i,l}\right)\right]\right\}r, \tag{5}$$

where $i=\{A,E\}$ indexes the appointment rule to which she is subjected. $K\in(0,1)$ is an efficiency of the information gathering technology parameter, and the effort cost function is such that $C(0)=0$, $C'>0$, $C'(0)<\infty$, $\lim_{e_{i,l}\to 1}C'\left(e_{i,l}\right)=\infty$, $C''>0$. The term in square brackets represents the non-monetary bonus obtained over and above r. In addition, the shape of the implicit reward function G^{i} differentiates appointed from elected officials and S distinguishes regulators from judges (in

[14] Some non-continuous distributions in the same class (for example, triangular) have the same property. To be hump-shaped, the Beta and Kumaraswamy need to have parameters greater than 1.

particular, it is equal to 1 for a regulator and 0 for a judge). In order to grasp a deeper understanding of nonmonetary incentives, I shall leave aside signalling and money-burning incentives and, consequently, assume that supervisors select effort before knowing their random ability. Then, nature chooses α. Next, the outcomes are observed and the nonmonetary rewards inclusive utility paid.

For what concerns implicit incentives, I embrace the distinction between politicians and bureaucrats proposed by Alesina and Tabellini (2007): while elected officials are held accountable by voters, at election time, those appointed are accountable to their professional peers or to society for the way they fulfill the goals of their organization. In particular, appointed officials want to maximize the conditional perception of their ability. Therefore, if $\mathrm{E}[\cdot]$ denotes the supervisor's unconditional expectation over $\xi_{A,l}$, E the evaluator's expectation over α conditional on $\xi_{A,l}$ and the (correct in equilibrium) evaluator's expectation over effort $e_{A,l}^{\exp}$, then $G^{A}\left(e_{A,l}\right)=\mathrm{E}\left[E\left(\alpha\middle|\xi_{A,l},e_{A,l}^{\exp}\right)\right]$. Turning to voters, they realize that the alternative to the incumbent is an average talented official exerting effort $e_{E,l}^{\exp}$; so, the incumbent is re-elected if the realized performance is greater than $\tilde{\xi}_{E,l}=\bar{\alpha}e_{E,l}^{\exp}$ or $G^{E}\left(e_{E,l}\right)=\Pr\left\{\xi_{E,l}\geq\tilde{\xi}_{E,l}\right\}=\Pr\left\{\alpha\geq\left[\bar{\alpha}e_{E,l}^{\exp}/e_{E,l}\right]\right\}$. Both the market value of talent and office holding are normalized to 1.

Turning to intrinsic motivations, $J\in(0,1)$ and $R\in(0,1)$ measure the "fairness" and the "revolving-door" motivations. Political and legal scholars have assumed that judges try to make the (ex post) correct decision in order to signal their fairness and commitment. For instance, Miceli and Coşgel (1994) envision that judges suffer a utility loss when overturned and gain utility when cited. The disclosure of

the firm's information, instead, is less appealing for officials attracted by future job opportunities in the industry. As Quirk (1981) shows, more pro-industry US federal regulators anticipate enhanced chances of working for the regulated firm (see also Gormley, 1983). So I assume that the judges' cost of effort (regulators' implicit rewards) decreases with J (R). Finally, notice that the revolving-door effect does not seem to exist for judges.

The timing.— The timing of the game is as follows:

1. Society (that is, planner, supervisors and the firm) learns the nature of the regulatory environment (P, $\theta \in \{\underline{\theta}, \overline{\theta}\}$). Next, the firm discovers the value of θ.

2. The planner offers the firm a menu of (t, q) pairs. If it declines, the game ends.

3. The regulator chooses her level of effort; then she discovers the value of α. Next, the planner receives the first signal. If this is informative, the first best is implemented. If the planner remains uninformed, the judge moves.

4. Step 3 is repeated for the judge. If the signal is uninformative, the firm reports its information to the planner.

5. A reward-quantity pair is implemented. Finally, the signals' precisions are revealed and each supervisor is rewarded.

Implicit incentives build into the model a division of power structure: officials care about their evaluators' moves but not about the pricing rule selected by the planner. This has three consequences. First, implicit incentives reduce the scope for side-contracts between the firm and the supervisors, because the former has to reimburse nonmonetary rewards to the latter. Second, if the firm's informational rent is not only a loss, as it is in equation (3), supervisors' and planner's goals can collide. Third, the basic equilibrium can easily be obtained by looking separately

at the supervisors' effort choice and at the planner's pricing rule selection. Before looking in the detail at the first two points, I shall illustrate the last one.

3.2 Implicit Incentives, Intrinsic Motivations and Equilibrium Prices

The solution concept is perfect Bayesian equilibrium. The latter is characterized by a tuple of equilibrium efforts (one for each possible supervisor's type) and a menu of (t,q) pairs contingent on the signals' realizations. Proceeding by backward induction, the solution to the supervisors' problem implies that:

LEMMA 1: *Label the regulators' (judges') selection rule with* i (j)*. Each supervisor's problem has a unique and interior solution. In addition, equilibrium efforts* $\hat{e}_{i,j}$ *are such that, for all* f *in the class considered: (1)* $\partial\hat{e}_{i,R}/\partial R<0\forall i$, $\partial\hat{e}_{j,J}/\partial J>0,\forall j$, $\partial\hat{e}_{i,I}/\partial K>0\forall i,I$ *and* $\partial\hat{e}_{j,I}/\partial K>0\forall j,I$*; (2) under A1,* $\hat{e}_{E,I}>\hat{e}_{A,I},\forall I$.

Point 1 underscores not only the role of a more efficient information-gathering technology but also the effects of opposite legacy goals: the effort exerted by supervisors striving to please the industry (to be ex-post correct) tends to decrease (increase) as the congruency with original tasks fades away. Even more crucially, point 2 states that, when it is not too easy to substitute an incumbent supervisor with a mean-ability one (*i.e.*, if A1 holds), an elected supervisor panders to voters exerting more effort than would an appointed one. Despite the different set up, the result is driven by incentives similar to the pandering ones identified by Maskin and Tirole (2004). Lemma 1 also confirms, under the more realistic asymmetric information assumption, the results obtained by Besley and Coate (2003).[15]

[15] I can easily introduce a bundling incentive here, assuming that appointed regulators have an R greater than the one of elected regulators. This would only reinforce Point 2. Focusing on

At Stage 2 the planner offers the firm a menu of transfers-quantity pairs fully characterized by the supervisors' expected efforts. Let $\bar{\alpha}\hat{e}_{i,R}+\left(1-\bar{\alpha}\hat{e}_{i,R}\right)\bar{\alpha}\hat{e}_{j,J}\equiv\gamma(i,j)$, the planner's posterior belief on $\theta=\underline{\theta}$ conditional on two uninformative signals is

$$\Pr\left\{\theta=\underline{\theta}\middle|\phi,\phi\right\}=v\left(1-\gamma(i,j)\right)\Big/\left[1-v\gamma(i,j)\right],$$

and her optimum problem (indexed by S *i.e.*, supervision) writes as

$$\tilde{W}^{S}=v\gamma(i,j)\underline{W}^{*}+\left[1-v\gamma(i,j)\right]\left\{\frac{v\left[1-\gamma(i,j)\right]}{1-v\gamma(i,j)}\left[V\left(\underline{q}^{S}\right)-(1+\lambda)\underline{\theta}\underline{q}^{S}-\lambda\Delta\theta\overline{q}^{S}\right]+\right.$$

$$\left.+\frac{1-v}{1-v\gamma(i,j)}\left[V\left(\overline{q}^{S}\right)-(1+\lambda)\overline{\theta}\overline{q}^{S}\right]\right\}-2(1+\mu)r,$$

where $\underline{W}^{*}$ is the first-best welfare obtained when at least one signal is informative. The planner evaluates supervisors' monetary perks at the shadow cost of public funds $1+\mu$ and, without loss of generality, does not value implicit incentives. All the novelties in the optimum problem, which has a unique and positive solution, are contained in the expected ex post probability of at least an informative signal $\gamma(i,j)$. The equilibrium high cost firm's allocation is given by:

$$V'\left(\hat{\tilde{q}}^{S}\right)=(1+\lambda)\overline{\theta}+\lambda\Gamma(v)\left[1-\gamma(i,j)\right]\Delta\theta\,. \tag{6}$$

Clearly, the hierarchical hearings structure is useful and the allocative distortion is partially curbed with respect equation (4) (*i.e.*, $\hat{\tilde{q}}<\hat{\tilde{q}}^{S}<q^{*}$). In particular, given that $\gamma(i,j)$ does increase with both $\hat{e}_{i,R}$ and $\hat{e}_{j,J}$, the following holds true:

PROPOSITION 1: *Regulated prices are decreasing with the efficiency of the*

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normally distributed talent observable with noise, Alesina and Tabellini (2007) show that a sufficiently high uncertainty over talent implies patterns opposite to those in Point 2. This is not realistic in the present instance: dockets are widely publicized (so that talent is observed without noise) and supervisors' curricula vitae are consistent one with the other (small ability dispersion).

information-gathering technology K, greater (lower) the stronger regulators' (judges') implicit motivations are and (under A1) lower if supervisors are elected. When the expected probability of informative signals rises, the planner optimally relaxes the allocative distortion, and this, in turn, implies lower expected rates. So complementarities between supervisors' implicit and the firm's explicit incentives endogenously arise from the contractibility of the firm's allocation, as opposed to the noncontractibility of the supervisors' performance (see also Guerriero, 2008). Fairness motivations fuel the pattern while revolving-door concerns limit it.

Remark.— Suppose that, between Stages 1 and 5, an input costs shock hits high and low average costs so that their ex ante expected difference becomes $(1+\eta)\Delta\theta$. Then, Proposition 1 describes, in the same qualitatively way, the determinants of the pass-through of cost-shocks η into prices $\partial V'\left(\hat{\tilde{q}}^{S}\right)\big/\partial\eta = \lambda\Gamma(v)\left[1-\gamma(i,j)\right]\Delta\theta$.

3.3 Robustness: Lobbying and Bribery

The appeal of this result lies not only in the sensibility of the model's premises which bridge nonmonetary incentives to the asymmetry in technological information but also in the realism of their consequences. Studying a similar environment, the new regulatory economics (Laffont and Martimort, 1999; Laffont, 2000) obtains collusion-proof equilibria in which monetary perks equal to the firm's expected stake are given to explicitly interested supervisors to avoid corruption. The pattern matches a consistent evidence on regulatory reforms which has clarified the narrow role of capture (see Gormley, 1983; Teske et al., 2004, ch. 4) but it is completely at odds with any observed regulatory contracts. On the contrary, the above equilibrium not only has similar collusion proofness properties, but also

builds on the observed residual rights nature of supervisors' activities.[16] To clarify the point, I consider the lobbying game proposed by Alesina and Tabellini (2008) and based on the observation that supervisors exert effort in other tasks.

The firms' lobby tries to divert supervisors' effort from information-gathering to the fulfillment of a second task (*e.g.*, to avoid by-passing by non-regulated firms) whose technology is $h_{i,l} = \alpha e^h_{i,l}$, and whose benefits are negligible for consumers and $\kappa h_{i,l}$ ($\kappa > 0$) for the firm. As in Alesina and Tabellini (2008), the planner does not foresee equilibrium capture and cannot condition his choice—*i.e.*, the rule giving price as a function of average costs—on collusive activities. α is truncated normally distributed, and the effort cost function is additive in the effort devoted to the two tasks. Also, the lobby, whose vote is irrelevant, has all the bargaining power and, in Stage 2, can commit to bribes $b_{i,l}$ and/or campaign funds $n_{E,l}$ (to elected supervisors only) to be paid after Stage 5. These influence instruments are contracts contingent on effort, but bribes are illegal. If a supervisor accepts them with probability $\upsilon > 0$ she is caught and pays a fine $M > 0$. If $\tau > 0$ measures the value of implicit rewards relative to illegal bribes, supervisors' utility rewrites as

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

where the index C stands for capture. Implicit rewards are the same as before if appointment is used, but differ if election is employed. Campaign funds lower voters' reservation utility to $\bar{\alpha} e^{\exp}_{E,l} - H\left(n_{E,l}\right)$ with $H(0) = 0$, $H' > 0$, $H'' < 0$. The lobby's indirect utility is $\tilde{U} = v\left[1 - \gamma^C\left(i, j\right)\right]\Delta\theta\hat{\tilde{q}}^{s,C} + \kappa E\left[\alpha\left(\hat{e}^h_{i,R} + \hat{e}^h_{j,J}\right)\right] - \left(\hat{b}_{i,R} + \hat{b}_{j,J}\right) - \left(\hat{n}_{E,R} + \hat{n}_{E,J}\right)$ with hats indicating equilibrium values. The subgame equilibrium of the menu auction

[16] Over the period 1980-1997, for instance, IOUs' average revenues from retail sales were 1.94 billion dollars while commissioners' average salaries were 59,774 dollars.

bribing game and of the lobbying game are jointly optimal for the lobby and the supervisor, given the evaluators' expectations. Tedious algebra (proofs available from the author) shows that, for τ sufficiently large, appointed supervisors never accept bribes, and that the lobby prefers to be ex-ante passive rather than pay bribes if the firm's stake is too narrow or legal systems work efficiently, that is υM is large. Strong (weak) fairness (revolving door) motivations favor capture-free equilibria. Also, full-capture equilibria with positive campaign funds are never optimal because supervisors always lose elections, and the lobby is not willing to offer campaign aids if money is not very effective in swaying votes, *i.e.*, H' is small. So strong implicit incentives and/or an inefficient corruption technology make the equilibrium in Proposition 1 endogenously collusion-proof.

4. Endogenous Regulatory Institutions

So far, the analysis suggests that election should be used whenever the selected performance is sufficiently informative about supervisors' random ability. The picture, however, is incomplete, because the model completely abstracts from the consequences that selection rules have on the firm's investment incentives. From this (dynamic efficiency) point of view, the role of appointment rules is twofold.

On one hand, as the next section shows, the firm's ex post rents and so its incentives to invest rise with supervisors' efforts and so with election. On the other hand, however, ex post rents also worsen the burden of those performance-based aids implemented by governments to encourage investment ex post.[17] In this

[17] These are, for instance, all those incentive regulations "designed to encourage [...] certain investments (*e.g.*, network modernization or energy efficiency [...])" (Basheda et al., 2001).

perspective, regulatory reforms should balance the eventual dynamic inefficiency in investment with the distortions driven by the funding of aids. Moreover, this efficiency trade-off creates also political incentives. Indeed, ex post rents arise a conflict among consumers, if only some of them own the firm's shares. This, in turn, makes regulatory reforms inefficiently sensitive to political competition if ratepayer and shareholder groups have political power.

In the next section I consider the two elements together, assuming that institutions are designed, between Stages 1 and 2 (just before the planner chooses the pricing rule), by one of two political parties—the pro-shareholder R or the pro-consumer D. Each party faces electoral uncertainty and can favor its constituency directly through investment aids and indirectly through regulatory regime reforms.

4.1 Efficiency-Driven and Strategic Appointment Rules Reforms

The analysis applies to both types of public officials. Nevertheless, being judges responsible for several non-regulatory tasks (*e.g.*, anti-discrimination charges), the main focus will be on the method of selecting regulators. For simplicity, I also assume that the planner cannot commit to reimburse investment costs.[18]

The investment game set up.— The appointment rule is selected by the incumbent party *m*. After Stage 2, but before the firm eventually commits to the investment, an election with exogenous winning probabilities x_m is held and the winner selects the size of an investment aid. The aid assumes the form of a subsidy financed from distortionary taxes, equal to a fixed portion $\rho_m - 1$ of the invested

[18] Even if the used and useful doctrine partially assures against non commitment, the hypothesis is the more appropriate in mature markets (such as electricity) where retaliation by the firm could not be very damaging (Newbery, 2000, ch. 2). Under commitment, the main results continue to hold.

capital and paid to the firm after the investment is implemented. The investment requires a fixed monetary cost $I \geq 0$ and has a stochastic return with expected value $\pi \equiv \overline{\pi}\delta + \underline{\pi}(1-\delta) > 0$ with $\overline{\pi} > 0 > \underline{\pi}$, $\delta > 0$. The firm is infinitively risk averse in the range of the ex-post negative utilities. So, in the investment regime (notice the apex I), only the low cost firm invests if $\Delta\theta\hat{\tilde{q}}^{S,I}\rho_{\hat{m}} + \underline{\pi}I \geq 0$ where $\hat{m} = D,R$ indexes the winning party. The latter is the case even if perfect financial markets are available, provided that $-\underline{\pi}I > \Delta\theta\hat{\tilde{q}}^{S,I}(\rho_{\hat{m}} - 1)$.

The reformer's utility.— Each party attaches to the ex-post participation (to the investment game) constraint the weight $o > 0$ and evaluates the expected aid at the shadow price of public funds. The static versus dynamic efficiency trade-off is summarized by Λ, and investment and taxation distortions concerns are balanced by the party specific parameters χ_m and υ_m. While υ_m picks up the party's aversion to impose higher taxes, χ_m captures the party's willingness to leave higher ex post rents to the shareholders constituency.

All in all, the incumbent $\tilde{m}$'s indirect utility writes as a function of $\hat{e}_{i,R}$ only as

$$\Lambda\hat{\tilde{W}}^{S,I}(\hat{e}_{i,R}) + (1-\Lambda)v\left[(o\tilde{x} - \chi_{\tilde{m}}) - (1+\mu)\upsilon_{\tilde{m}}\hat{x}\right]\Psi(\hat{e}_{i,R}) = \Lambda\hat{\tilde{W}}^{S,I}(\hat{e}_{i,R}) + (1-\Lambda)v\Omega_{\tilde{m}}\Psi(\hat{e}_{i,R}),$$

where the first term on the left is the expected ex post expected welfare, $\tilde{x} = \rho_D x_D + \rho_R x_R$, $\hat{x} = (\rho_D - 1)x_D + (\rho_R - 1)x_R$, $\Psi(\hat{e}_{i,R}) \equiv \left[1 - \gamma(i,j)\right]\Delta\theta\hat{\tilde{q}}^{S,I}$.

Finally, I shall impose the following restrictions on the exogenous parameters:

A2: a. $\rho_R > \rho_D = 1$; $\chi_D > o\tilde{x} > \chi_R = 0$; $1 = \upsilon_R > \upsilon_D = 0$; $\dfrac{\max\{\Omega_D, \Omega_R\}}{\min\{\Omega_D, \Omega_R\}} > \max\left\{\dfrac{\hat{\tilde{W}}^{S,I}(\hat{e}_{E,R}) - \hat{\tilde{W}}^{S,I}(\hat{e}_{A,R})}{\Psi(\hat{e}_{E,R}) - \Psi(\hat{e}_{A,R})}\dfrac{\partial\Psi/\partial\hat{e}_{i,R}}{\partial\hat{\tilde{W}}/\partial\hat{e}_{i,R}}, 1\right\}$; b. $o < \dfrac{(\rho_R - 1)x_R(1+\mu)}{1 + (\rho_R - 1)x_R}$; $\Lambda < \overline{\overline{\Lambda}}$.

Interpretation.— In interpreting the foregoing, several observations should be

borne in mind. First, the analysis applies unchanged if the aid is not nonmonetary and μ is replaced by λ, or, generally, by a shadow price of the incumbent party's effort. Second, the fact that the winning party cannot reform the appointment rule captures lags and the commitment periods typical of regulation.[19]

Third, the assumption (A2.a) that the pro-shareholder party selects a higher level of aid and cares more about distortionary taxation and investment inducement is in the spirit of those models of electoral competition in which candidates commit to well-defined policies well ahead of elections and then stick to them (see Persson and Tabellini, 2000, ch. 3). To this extent, the last inequality in Point 1 of A2 simply requires that the platforms of the two parties are sufficiently distant.

Fourth, the idea that distortionary taxation is per se more relevant than investment inducement (first inequality A2.b) captures, in reduced form, the bundling effect advocated by Besley and Coate (2003) and it is a mild restriction to impose when other more salient policies are part of the political platform.

Finally, the last two inequalities in A2.b are extremely natural requirements in the present set up and they simply ask that the inverse demand is inelastic (which is the empirically relevant case for a regulated good which is usually a necessity),[20] and that for each party, despite its ideological motivations, dynamic efficiency concerns are sufficiently relevant with respect to static efficiency ones.

Equilibrium.— The incumbent $\tilde{m}$ prefers election to appointment if:

$$\Lambda\left[\hat{\tilde{W}}^{S}\left(\hat{e}_{E,R}\right)-\hat{\tilde{W}}^{S}\left(\hat{e}_{A,R}\right)\right]>(1-\Lambda)v\left[o\tilde{x}-\chi_{\tilde{m}}-(1+\mu)\gamma_{\tilde{m}}\hat{x}\right]\left[\Psi\left(\hat{e}_{A,R}\right)-\Psi\left(\hat{e}_{E,R}\right)\right]. \quad (7)$$

[19] According to NARUC data, over the period 1974-1990 the mean duration of electricity hearings has been 9 months (see also Friedman, 1991). Moreover, when a regulatory docket is closed, the resulting contract typically specifies a commitment period of five years (Basheda et al., 2001).

[20] Notice, that the opposite always holds true for quadratic and CES (CRRA) utilities.

Applying the envelope theorem to both sides of the inequality, it is easy to see that, as discussed above, the effect of a change in one of the exogenous parameters R, K, x_D, x_R on the likelihood of a reform toward election is twofold. The first effect is driven by static efficiency worries and it goes through the derivative with respect to $\hat{e}_{i,R}$ of the left-hand side. The second effect is related to dynamic efficiency concerns, and goes through the derivative with respect to $\hat{e}_{i,R}$ of the right-hand side. While the first effect is clearly positive, the sign of second is ambiguous. Indeed, Ψ is composed by two terms: the expected probability of two uninformative signals and the ex-post rent. While the latter increases with $\hat{e}_{i,R}$ because more information calls for less allocative distortions, the former falls with the probability of a first informative signal, and so with $\hat{e}_{i,R}$. Yet, as the Appendix shows, $\partial\Psi/\partial\hat{e}_{i,R}$ is unambiguously determined if $\varepsilon_{p,q} \leq -1$.

The following Lemma summarizes the relation among Ψ, R and K:[21]

LEMMA 2: *If* $\varepsilon_{p,q} \leq -1$ *then* $\partial\Psi/\partial\hat{e}_{i,R} > 0$ *and, under A1,* $\Psi(\hat{e}_{E,R}) > \Psi(\hat{e}_{A,R})$, $\partial\Psi(\hat{e}_{E,R})/\partial R - \partial\Psi(\hat{e}_{A,R})/\partial R < 0$ *and* $\partial\Psi(\hat{e}_{E,R})/\partial K - \partial\Psi(\hat{e}_{A,R})/\partial K > 0$.

Lemma 2 brings two main consequences. First, a change in each of the exogenous parameters has impacts different in sign on the static and dynamic efficiency parts of the reformer's utility. Nevertheless, if reformers are sufficiently investment concerned (that is, if $\Lambda < \overline{\overline{\Lambda}}$), it can be shown (see the Appendix) that the total effect is unambiguous, and dynamic efficiency prevails on static one. Second, the finding that $\partial\Psi/\partial\hat{e}_{i,R} > 0$, along with the fact that $\Omega_{\hat{m}}$ is always negative under A2,

[21] Notice the complementarity (substitutability) among the efficiency of the information-gathering technology (revolving-door motivations) and implicit incentives in enhancing efforts.

assures that both parties have an incentive to select appointment, provided that Λ is not too big or $\Lambda < \overline{\Lambda}$. The last inequality in A2 ensures that $\overline{\Lambda} < \overline{\overline{\Lambda}}$; therefore, the determinants of selection rules reforms are completely identified as follows:

PROPOSITION 2: *Provided that A1 and A2 hold and* $\varepsilon_{p,q} \leq -1$, *a* $\underline{\Lambda}$ *does exists, with* $\underline{\Lambda} < \overline{\Lambda} < \overline{\overline{\Lambda}}$*: such that for* $\Lambda < \underline{\Lambda}$ *(*$\overline{\Lambda} < \Lambda < \overline{\overline{\Lambda}}$*) appointment (election) is always preferred, and for* $\underline{\Lambda} < \Lambda < \overline{\Lambda}$ *either one or the other can be chosen. In the last case, the incumbent's preferences toward election (A) rise with* Λ*, are stronger (weaker), the stronger are revolving-door motivations (is the efficiency of the information-gathering technology and (B) the incumbent's hold on power). The incumbent's identity has an ambiguous effect on her preferences toward election.*

Proposition 2 (whose proof is reported in the Appendix) stresses the existence of two determinants of selection rules: a trade-off between dynamic inconsistency and distortionary taxation (A) and a strategic incentive to tie the rival party's hands, coming from election uncertainty (B). The former survives if politics is completely shut down and implies a clear-cut normative result: a reformer worried by dynamic efficiency should opt for election if technological and institutional characteristics render ineffective pandering incentives.

For what concerns the second incentive, a considerable body of political economy literature (see, for example, Alesina and Tabellini, 1990; Hanssen, 2004a) claims that a lack of permanence in office can inspire policymakers to implement institutional reforms either to influence political outcomes or to limit the actions of future incumbents: selection rule reforms are a case in point. In particular, an increase in the probability of being elected and consequently fixing a higher (lower) investment aid fosters party R's (D's) incentives to select appointment in

order to curb the distortions deriving from taxation (being investment concerns lower, in a stochastic sense).

Remark.— If implicit rewards are $\Upsilon G^E + (1-\Upsilon) G^A$, Proposition 2 can be intended as stating the reformer's preferences over the power Υ—in terms of pandering enhancing incentives—of different selection rules.

If A1 and A2 hold and with P and θ held constant, Propositions 1 and 2, along with their related remarks, can be restated as testable predictions, as follows:

TESTABLE PREDICTIONS: *The likelihood of a reform toward more powerful pandering institutions will (1) increase with the strength of revolving-door motivations, (2) falls with the efficiency of the information-gathering technology and with society's investment concerns, and (3) be greater, the weaker is the incumbent hold on power. The effect of the reformer's identity is ambiguous. (4) Both prices and the pass-through of cost shocks will decrease with the efficiency of the information-gathering technology, rise (fall) the stronger are regulators' (judges') implicit motivations, and be lower if supervisors are elected.*

Next, I look first at the determinants of regulatory selection procedures and then examine the endogenous impact of supervisors' implicit incentives on prices.

5. Evidence

To evaluate the model's predictions, I require, first of all, a comparable sample of institutions that vary in their effect on supervisors' pandering incentives. To this extent, I consider the procedure of selecting public utility commissioners and High Court judges, and I rank each rule in terms of pandering incentives. There are seven methods of selecting commissioners: direct election, appointment by

Governor, gubernatorial appointment with approval by the Senate or the executive council,[22] gubernatorial appointment with approval by Legislature, and selection by Legislature/General Assembly. There are five judicial selection rules: partisan and nonpartisan election, appointment by Governor or Legislature, and merit plan.

Ranking pandering incentives.— It is widely accepted that partisan elections turns public officials into politicians: "candidates are chosen in party primaries make campaign speeches, seek political contributions (parties are a major source of campaign funds), and so forth" (Hanssen, 2004a). An equally strong consensus holds that the most independent judges are those subject to the merit plan, which avoids competitive elections or appointment but mandates unopposed retention elections (Hanssen, 2004a).[23] By the same token, regulators selected through the consensus of both houses can be considered the most insulated from political competition, as they are not directly attached to the party of the Governor. The other procedures are less easily ranked in terms of pandering incentives.

Thus I posit that the value of the following two ordered indicators increases with the power (in terms of pandering incentives) of regulatory and judicial selection rules: *Reg_Ord* equal to one if commissioners are selected with the approval of both state houses (*i.e.*, with one of the last three rules listed above), three if direct election is employed and two otherwise; *Jud_Ord* indicator equal to one if the merit plan is used, three if the state uses partisan elections, and two otherwise. In order to evaluate the relation between pandering incentives and prices, I shall use,

[22] This is a state house in New Hampshire, and a board selected by the majority party in Ohio.

[23] Non-partisan judicial election forbids candidates to reveal their party affiliation. Besley and Payne (2005) claim that the merit plan is the more accountability enhancing rule because of the retention procedure, yet, sitting judges almost never lose these elections (see Hanssen, 2004a).

instead, the binaries *Reg_Elec* and *Jud_Elec* which equal one if direct election is employed and 0 otherwise.[24] The analysis considers a panel of forty-nine states for the period 1970-1997.[25] During the sample, some states altered their rules (see Table 1): this provides time-series and cross-sectional variation to exploit.

5.1 Non Random Appointment Rules Selection

In order to fully exploit the three-dimensional variation (over time, across states and across power levels) in pandering enhancing institutions, I estimate two models. Both models aim at explaining the probability of reforms toward more powerful rules.[26]

Empirical strategy.— The first model is the following multinomial logit

$$\Pr\left(y_{i,t}=\tilde{k}\left|z_{i,t}\right.\right)=\exp\left(\beta_{\tilde{k}}'z_{it}\right)\Big/\sum_{k=1}^{3}\exp\left(\beta_{k}'z_{it}\right),$$

where the dependent y_{it} is *Reg_Ord*.[27] The second model is the ordered logit:

$$y_{i,t}=k \text{ if } \tau_{k-1}\le y_{i,t}^{*}<\tau_{k} \text{ for } y_{i,t}^{*}=\beta' z_{it}+\varepsilon_{it} \text{ and } k=1,2,$$

where τ_k are unknown parameters and y_{it} is either *Reg_Ord* or *Jud_Ord*. In both models, z_{it} gathers the eventually time-varying proxies for supervisors' intrinsic motivations, the efficiency of the information-gathering technology, society's

[24] South Carolina and Tennessee changed their rules in 1996. I consider both to be electing given that Tennessee retained its commissioners. My results do not change if I use a different definition.

[25] Because of a lack of data, Nebraska and the District of Columbia are not considered. For the same reason, the period 1960-1969 (included in Besley and Coate, 2003) is not considered. Yet unbalanced panels deliver similar results. The same is true when the switching states are left out.

[26] The strategy embraced is also driven by the lack of within variation in many controls. Yet the coefficients of the time-varying covariates are qualitatively similar if a fixed effects logit is run.

[27] In order to save space, the multinomial logit with dependent *Jud_Ord* is not reported. Its results are qualitatively similar to those of the ordered logit with dependent *Jud_Ord*.

investment concerns and political competition.[28] Next, I introduce these proxies, relating each to the prediction to which it refers.

Measuring the structural determinants of selection rules.— Let me start from the first prediction. Following Teske (2004, ch.4), I use a dummy variable equal to one if there are restrictions on how long a commissioner must wait, after service, before taking a job in the industry (*Rev_Door*). *Rev_Door* can proxy for weaker or stronger pro-industry motivations depending on whether the loss of attractiveness of future job opportunities dominates the incentive to implement more biased and everlasting decisions to signal a revolving door interest or the opposite is true.[29] I also consider whether commissioners can not be of the same party (*Bipartisan*). Such a bipartisanship requirement should counterbalance the Besley and Coate's (2003) bindling effect leading to less pro-shareholder appointed regulators. Thus, the prior is that *Bipartisan* is negatively linked to the likelihood of a reform toward more powerful pandering incentives. For what concerns judicial selection, a wide literature on judicial independence (see Hanssen, 2004a) claims that a longer term of office increases the judges' insulation, diluting, in turn, their reputational concerns. Accordingly, I consider the length of the judicial term (*Jud_Term*) as a measure for less powerful legacy motivations (see Leaver, 2004). Focusing on the second prediction, it is reasonable to assume that more abundant resources and more powerful consumer groups ease information-gathering. The

[28] Lemma 2 does not exclude a role for interacted regressors. If I introduce the latter in a logit model with dependent *Reg_Elec*, they are usually not significant at a probability of the reform level of 0 or 0.5 (the drawbacks linked to this specification are discussed in Ai and Norton, 2003).

[29] Similar crowding effects have been widely documented in environments where implicit and intrinsic motivations interact: Bénabou and Tirole (2006) provide a first full-fledged theory. I thank David Ulph for drawing my attention to this particular point.

proxies I use are: the total budget (in thousands of dollars) available to the PUC's staff (*Budget*) and the share of revenues from sales to industrial users (*Industrial*). Turning to society's investment concerns, I assume that a more costly generation increases society's interest in more efficient cost-reducing technologies. Thus, I include the share of generation from hydroelectric sources (*Gen_Hydro*) and a dummy variable equal to one if *Reg_Elec* has been reformed in state i during the oil crisis period (*Oil_Ref*): that is, 1973-1982. The former (latter) should correlate negatively (positively) with society's investment concerns.

To test the third prediction, I need a measure of political competition. Embracing the strategy proposed by Hanssen (2004a), I employ the share of seats held by the majority party averaged across upper and lower houses (*Majority*) as a proxy for a stronger incumbent's hold on power. I also need a proxy for the incumbent's constituency ideology. Several researchers (see Teske, 2004, ch. 4) hold that the Republican Party historically has been more pro-shareholder: I therefore consider also whether both houses were under the Republicans' control (*Rep*).

Scholars of policy innovation claim that the diffusion of a new policy displays social learning (see Teske, 2004, ch. 4): after a state has adopted a new institution, surrounding states are more likely to follow suit. So I introduce the share of surrounding states electing their regulators (*Ereg_Nei*) or their judges (*Ejud_Nei*).

Yet, US states also differ in other dimensions: namely, their tastes for election and the age of their institutions. While the relevance of the former is self-explanatory, the latter is of empirical importance because mature PUCs and governments might have devised formal and informal rules of conduct easing information-gathering in a way that is not captured by *Budget* or *Industrial*. These dimensions are unobservable, and so I use as proxies the year the PUC was founded

(*PUC_Fou*), the year the state joined the Union (*Join*), and whether state auditors are elected (*Aud_Elec*). Two rule-specific determinants are: whether the PUC was constitutionally formed (*PUC_Con*) which proxies for the saliency of regulation, and whether *Jud_Elec* is changed in the twentieth century (*20th_Jref*) which proxies for the development of new judicial appointment rules (see Hanssen, 2004a). I also control for federal policies using the share of generation from nuclear sources (*Gen_Nucl*). Variables descriptions, means and standard errors are listed in Table 2. The Appendix reports variables sources and construction.

Results: regulatory institutions.— The first panel of Table 3 reports the estimated marginal effects of the multinomial logit with dependent variable *Reg_Ord*. For the most part, the results are consistent with the model's predictions, and the implied effects are large. A reform toward the bipartisanship requirement for appointed regulators reduces the likelihood of direct election by a little more than 18 percent and raises the likelihood of appointment with approval by both houses by 2 percent. A one-percentage-point increase in the size of the majority is associated with a 0.021 percentage-point-increase in the likelihood of reforms toward appointment with approval by both houses.

Focusing on the first two predictions, more abundant resources and those factors fostering society's investment concerns lower the likelihood of more powerful pandering institutions. Only the behaviour of *Industrial* is unexpected and could be driven by the fact that watchdog groups' special interests are limiting in spite of ameliorating the quality of the information-gathering process.

Turning to the third prediction, less powered institutions are found where the political competition is tighter and Republican parties seem to dislike direct election even if the coefficient attached to *Rep* is not statistically significant. The

data also confirm the supposed learning process, and a one-standard-deviation increase (0.271) in *Ereg_Nei* increases the likelihood of direct elections by a little more than 11 percent. Additionally, more mature institutions and a basic taste for election tend to decrease the likelihood of lower-powered institutions and higher values of *Gen_Nucl* push toward higher powered pandering institutions. The ordered logit estimates (listed in column 2) deliver similar results. This time, the proxies for the efficiency determinants are more powerful than those for the strategic dynamics in explaining the reforms toward higher powered institutions.[30]

Results: judicial institutions.— Column 3 lists the estimates of the ordered logit model with dependent *Reg_Ord*. As Hanssen (2004a) shows, using an argument similar to the one devised in Section 4, that the merit plan (partisan election) is linked to a tighter (less tight) political competition and longer terms curb this pattern. Column 3 confirms this prediction. Also, even if the effect of a more efficient information-gathering technology is unexpected, the ordered log-odds of adopting more powerful rules increase with society's investment concerns.

5.2 Regulated Prices and Supervisors' Implicit Incentives

All in all, the distribution of regulatory institutions across American states reflects both efficiency and forward-looking concerns. This non random assignment of reforms not only confirms the model's ideas but also implies that the effect of implicit incentives on regulatory policies can be assessed correctly only when

[30] The results remain very similar if a dummy for state consumer advocate office, the number of PUC employees and commissioners, the commissioners' salary and term of office, state income per capita, population, proportion of young and old citizens, and regional dummies are introduced. Clustering the standard errors does not affect the analysis significantly.

these institutions are treated as endogenous. Indeed, states may self-select into election on the bases of unobserved political and technological shocks fostering investment concerns, as well as of a basic strain in making acceptable the need for investment to electricity users.

If the variation in selection rules used to explain prices is related to these unexplained determinants of policies, the OLS estimator becomes biased.

Empirical methodology.— I conduct two tests: 1. I employ the fixed time and state effects OLS estimator in order to "minimize concerns about the correlation between the regulatory regime and other sources of long-run heterogeneity among the states that drive the selection of the regulatory regime" (Besley and Coate, 2003); and 2. I fully endogenize the effect of supervisors' implicit incentives employing a difference GMM estimator. The basic specification is:

$$y^s_{i,t} = \eta_i + \vartheta_t + \phi_1 c_{i,t} + \phi_2 Reg\_Elec_{i,t} c_{i,t} + \phi_3 Jud\_Elec_{i,t} c_{i,t} + \varphi X_{i,t} + \varepsilon_{i,t}.$$

$y^s_{i,t}$ is a price in state i and year t defined in terms of revenue per electricity sales (cents per Kwh) for customer class s. The classes considered are: residential (*Price_R*), commercial (*Price_C*) and industrial (*Price_I*). η_i are state-fixed effects which proxy for time-invariant features of the regulated environment such as state laws and long-run differences in states' production systems. ϑ_t are year dummies that pick up macro-shocks, industry-wide technological advances and changes in federal policies. $c_{i,t}$ is a fossil fuel costs index devised by Besley and Coate (2003). $X_{i,t}$ is a vector of time-varying controls. It gathers the time-varying determinants of selection rules, state population (*Pop*), shares of population aged between five and seventeen (*Young*) and sixty-five and over (*Old*), and income per capita (*GSP*). Other controls are *Reg_Elec*, *Jud_Elec*, population squared and

income per capita squared. These covariates either lack within variation (*Reg_Elec*, *Jud_Elec*) or, if differenced, are collinear with the other covariates (Pop^2 and GSP^2): thus, they are not considered in the GMM specification.[31]

Finally, another crucial explanatory variable is the dependent variable lagged one period. Hearing lags and the commitment period lead to a certain persistence in the pricing process and state by state partial autocorrelation functions confirm that prices are autoregressive of order one. Yet, even if uncorrelated with the current error term, the dependent lagged is correlated with past errors and with the de-meaned residual $\varepsilon_{i,t} - \overline{\varepsilon}_i$. Therefore an instrument is needed: this is possible only in the GMM specification. The details regarding the instruments used to obtain the moment conditions when this second approach is pursued are discussed further below. The key implications to be tested are that $\phi_2 < 0$, $\phi_3 < 0$, and that the coefficients attached to *Reg_Elec*, *Jud_Elec*, *Budget* and *Industrial* are negative.

Results: OLS.— The basic results obtained using the OLS within estimator with robust standard errors are given in Table 4. Columns 1-3 refer to each of the three categories of provision for the whole sample, and columns 4-6 list the estimates for the Oil crisis period (1970-1983). The key observation is that the coefficients on costs interacted with whether a state elects its regulators or judges are always negative. While ϕ_3 is always significant at 20 percent or better, ϕ_2 is significant in columns 4-6, but only for commercial ratepayers in columns 1-3. These results

[31] Similarly, the impact of *Rev_Door* and *Jud_Term* (which lack within variation) on prices can only be assessed by looking at their effect on the pass-through of cost shocks. When I perform this exercise, *Rev_Door* (*Jud_Term*) tend to increase (decrease) the pass-through. Instead, if I consider a dummy equal to one if both commissioners and judges are elected and zero otherwise, it shows the expected negative sign but is not significant. The other results are always qualitatively similar.

suggest that regulators' pandering incentives are more powerful, both in an absolute sense and with respect to judges, in periods of rising input prices.

This is clearer when the implied effects are evaluated. Focusing on residential rates, the pass-through coefficient for states electing judges rises from roughly one half of the coefficient for appointing states in column 1 to three-fourths in column 4; and the pass-through coefficient for states electing regulators falls from roughly nine-tenth the coefficient for appointing states in column 1 to two-thirds in column 4 (which is coherent with evidence in Besley and Coate, 2003).

A reform toward election also has the general effect of rebalancing rates in favour of residential ratepayers at the expenses of business customers. The effect is stronger in the judicial case and amounts to a net saving of 4 (7) percentage-price points in column 1 (2). Finally, the evidence on *Budget* and *Industrial* is mixed: while the main predictions are met in columns 1-3, opposite patterns arise in columns 4-6. Other controls (not shown) are also often significant but the implied impact varies in a non systematic way across the columns.

The evidence highlights the relevance of both judicial review and the quality of information-gathering in explaining prices. Yet, as seen above, regulatory regimes are selected nonrandomly, and a relevant determinant of regulatory policies is the persistence in pricing choices. Next, I put together these instances and switch to the Arellano and Bond (1991) difference GMM estimator.

Results: GMM difference estimator.— I use the more efficient two-step procedure and always apply the Windmeijer finite-sample correction to the robust standard errors in order to avoid downward bias (see Roodman, 2006). I treat the lagged price as being predetermined and the fossil fuels cost index (whether or not it is interacted with selection rules) as being endogenous. Here, a crucial challenge is

to avoid too many instruments. The instruments count tends to explode with the number of years T, and too many moment conditions can overfit endogenous variables, failing to expunge their endogenous component. Besides, they can also weaken the power of the Hansen test for overidentification restrictions (which is the consistent one when the standard errors are robust) (see Roodman, 2006).

Coherently, I gather into the instrument matrix all pricing equation controls $X_{i,t}$, those determinants of selection rule z_{it} that can be excluded by the pricing process and one (two) lags of the predetermined and endogenous variables when the full sample (the Oil crisis period) is considered in columns 1-3 (4-6). Each moment condition is collapsed into a single column.[32]

The excluded z_{it} are: *Ereg_Nei*, *Ejud_Nei*, *Aud_Elec* and *20th_Jref*. A crystal-clear argument for the exogeneity of the first two is provided by Steiner (2004): while the presence of low prices in reforming neighbouring states could shift support for reform in state i, electricity rates do not adjust until the reform is implemented in state i. For what concerns *Aud_Elec* and *20th_Jref*, there is little reason to expect that a general taste for election or technological innovations in judicial incentive rules design to have—conditional on the proxies for political competition and efficiency of the information-gathering technology—a systematic effect on the pricing process. Less clear is a defence of the proxies for the quality of institutions and the saliency of regulation (see Persson and Tabellini, 2003). Table 5 reports the basic results. The Arellano and Bond (1991) autocovariance

[32] This strategy reduces the instrument count well below the number of cross sections: this insures against a "too many instruments" failure (see Roodman, 2006). The results remain robust when I switch to the one-step estimator or to the system GMM, when I instrument with one more lag of the endogenous and predetermined variables, or consider subgroups of the excluded instruments.

test does not reject a zero second-order correlation in the differenced residuals at a level lower than 0.14, and the Hansen test does not reject the overidentifying restrictions at a level lower than 0.17. This reassures about consistency.

While lagged prices are, over the whole period, the most important covariate, the cost index gains a chief role in the inflationary years (columns 4-6). Coherently, the role of commissioners becomes key when regulation also becomes more salient (because of unexpected cost shocks), and a greater visibility is attached to regulatory office-holding with respect to that of other public officials (like judges). The impact of judicial election, instead, is stable and huge, implying a zero price responsiveness to cost shocks in columns 1-2. Judicial (regulatory) election also leads to significant falls in pass-through in columns 4 (6 and 4 at 40 percent): this confirms, once again, the practice of allowing cross-subsides to residential and commercial users at the expenses of business customers.[33]

6. Concluding Remarks

Regulatory institutions are fundamental to economic development, especially in a period of deregulation and competition enhancing reforms. Yet the determinants of the institutional design of regulated markets are essentially poorly understood: here, I developed and tested a model of endogenous regulatory appointment rules.

[33] A very similar picture arises when I consider the time-varying controls enumerated in footnote 23 or binaries for several public benefit programs and performance-based regulation. 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 the latter case, estimates of the average treatment effect by the Heckman correction or the propensity score confirm the evidence.

Given both the intrinsic motivations of public officials and the technological environment, political reformers not only consider the comparative advantages of different appointment rules but also use them to tie the hands of rival parties.

Consistent with the model, data from the US electric power market suggest that the likelihood of reforms toward regulatory election increases with less abundant resources, cheaper electricity generation and harsher political competition. Also, electricity rates are lower and respond less to shocks in input costs in states electing their top-level regulators or their High Court judges.

My analysis delivers two pieces of advice for constitutional designers.

First, in reforming the design of regulatory regimes, it is crucial to assess the consequence of appointment rules on the firms' investment incentives in the light of the efficiency of the information-gathering technology and the broad set of concerns to which supervisors respond.

Second, the success of regulatory regime reforms is linked to a Constitutional table fully insulated from short-term electoral boosts.

Despite recent waves of deregulation, most US monopolies are still regulated through the settings studied above. Similar institutional designs have recently been exported beyond American boundaries as an answer to the rising demand for a more effective judicial review and a greater transparency of the regulatory process. This institutional trend makes the US lesson an absolutely relevant case study that is especially useful for the harmonization of European markets.

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6. Appendix

6.1 Equilibrium under Perfect Information

Under perfect information, the planner knows θ. Maximizing (2) with respect to U and q, we obtain the following:

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

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

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

$$U = 0 \qquad \text{or} \qquad t^* = \theta q^*. \qquad \blacksquare$$

6.2 Proof of Lemma 1

Let me start from the equilibrium efforts prevailing when supervisors are elected. To this extent, maximizing $R_{E,I}(e_{E,I}, S)$ with respect to $e_{E,I}$ with $e_{E,I}^{\exp}$ taken as given and, then, imposing the equilibrium condition $\hat{e}_{E,I} = e_{E,I}^{\exp}$, equilibrium efforts are defined by

$$LHS\left(\hat{e}_{E,I}\right) \equiv (1-SR) f\left(\bar{\alpha}\right)\bar{\alpha}/\hat{e}_{E,I} - \left[1-(1-S)J\right](1-K)C'\left(\hat{e}_{E,I}\right) \leq 0\,, \qquad (A2)$$

and by the slackness $\left(\hat{e}_{E,I}-1\right)LHS\left(\hat{e}_{E,I}\right)=0$ and $\hat{e}_{E,I}LHS\left(\hat{e}_{E,I}\right)=0$. In the $\left\{\hat{e}_{E,I}, R_{E,I}\left(e_{E,I},S\right)\right\}$ space, the first term in $LHS\left(\hat{e}_{E,I}\right)$ is a rectangular hyperbola centred at $(0,0)$ while the second term is an increasing function. This, along with the fact that $C'(0)<\infty$ and that $\lim_{e_{i,I}\to 1} C'\left(e_{i,I}\right)=\infty$, ensures that $\hat{e}_{E,I}$ exists and it is both interior and unique. Turning to appointed supervisors and following the treatment in Dewatripont et al. (1999), equilibrium efforts are implicitly defined by the following first order condition

$$(1-SR)\mathrm{E}\left[f_{e_{A,I}}\left(\xi_{A,I}\middle|\hat{e}_{A,I}\right)\alpha \middle/ f\left(\xi_{A,I}\middle|\hat{e}_{A,I}\right)\right] \leq \left[1-(1-S)J\right](1-K)C'\left(\hat{e}_{A,I}\right). \qquad (A3)$$

Again $(A3)$ holds as an equality (and thus the slackness conditions are always met).

The marginal density of the observable conditional on effort $f\left(\xi_{A,I}\middle|\hat{e}_{A,I}\right)$ is proportional to $\exp\left[-\left(\xi_{A,I}-\bar{\alpha}e_{A,I}\right)^2 \middle/ 2\left(e_{A,I}^{\exp}\sigma_\alpha\right)^2\right]$ if f is truncated normal and equal to $\hat{e}_{A,I}f(\alpha)$ if f is one of the other distributions in the relevant class. From the equilibrium condition $e_{A,I}=e_{A,I}^{\exp}$, it follows that $\mathrm{E}\left[f_{e_{A,I}}\left(\xi_{A,I}\middle|\hat{e}_{A,I}\right)\alpha \middle/ f\left(\xi_{A,I}\middle|\hat{e}_{A,I}\right)\right]=\bar{\alpha}/\hat{e}_{A,I}$ and $(A3)$ rewrites as

$$(1-SR)\bar{\alpha}/\hat{e}_{A,I} = \left[1-(1-S)J\right](1-K)C'\left(\hat{e}_{A,I}\right). \qquad (A4)$$

Thus, $(A2)$ and $(A4)$ clarify that: 1. elected supervisors exert strictly greater effort than appointed ones if $f\left(\bar{\alpha}\right)>1$ (which is always true under A1); 2. Supervisors' objective functions are strictly concave and the following three global comparative statics apply:

$\partial\hat{e}_{i,R}/\partial R<0,\forall i$; $\partial\hat{e}_{j,J}/\partial J>0,\forall j$; $\partial\hat{e}_{i,R}/\partial K>0,\forall i$, $\partial\hat{e}_{j,J}/\partial K>0,\forall j$. ■

6.3 Proof of Lemma 2

Let me first calculate the conditions under which $\partial\Psi\left(\hat{e}_{i,R}\right)/\partial\hat{e}_{i,R}>0$:

$$\partial\left[1-\gamma(i,j)\right]\Delta\theta\hat{\tilde{q}}^{S,I}/\partial\hat{e}_{i,R} = -\partial\gamma(i,j)/\partial\hat{e}_{i,R}\,\Delta\theta\hat{\tilde{q}}^{S,I} + \left[1-\gamma(i,j)\right]\Delta\theta\,\partial\hat{\tilde{q}}^{S,I}/\partial\hat{e}_{i,R} > 0 \Leftrightarrow$$

$$\frac{\partial\hat{\bar{q}}^{S,I}}{\partial\hat{e}_{i,R}}\frac{1}{\hat{\bar{q}}^{S,I}}>\frac{\partial\gamma(i,j)}{\partial\hat{e}_{i,R}}\frac{1}{1-\gamma(i,j)}=\frac{\bar{\alpha}\left(1-\bar{\alpha}\hat{e}_{j,J}\right)}{\left(1-\bar{\alpha}\hat{e}_{i,R}\right)\left(1-\bar{\alpha}\hat{e}_{j,J}\right)}=\frac{\bar{\alpha}}{1-\bar{\alpha}\hat{e}_{i,R}}. \qquad (A5)$$

Applying the implicit function theorem to (6), the following holds true:

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

Plugging $\partial\hat{\bar{q}}^{S,I}/\partial\hat{e}_{i,R}$ and (6) in $(A5)$, I obtain that:

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

$$\frac{S''\left(\hat{\bar{q}}^{S,I}\right)\hat{\bar{q}}^{S,I}}{S'\left(\hat{\bar{q}}^{S,I}\right)}=\frac{S''\left(\hat{\bar{q}}^{S,I}\right)\hat{\bar{q}}^{S,I}}{S'\left(\hat{\bar{q}}^{S,I}\right)}\equiv\varepsilon_{p,q}<-\frac{\left[\lambda/(1+\lambda)\right]\Gamma(v)\left[1-\gamma(i,j)\right]\Delta\theta}{\bar{\theta}+\left[\lambda/(1+\lambda)\right]\Gamma(v)\left[1-\gamma(i,j)\right]\Delta\theta}.$$

So, provided that $\varepsilon_{p,q}\le-1$, Ψ strictly increases with $\hat{e}_{i,R}$.

Regulatory appointment rules, R and K affect Ψ only through $\hat{e}_{i,R}$. As a result, under A1, $\Psi\left(\hat{e}_{E,R}\right)>\Psi\left(\hat{e}_{A,R}\right)$. Also, from $(A2)$ and $(A4)$, it follows that

$$\frac{\partial\hat{e}_{E,R}}{\partial R}=-\frac{f(\bar{\alpha})\bar{\alpha}/(1-K)}{e_{i,R}C''\left(e_{i,R}\right)+C'\left(e_{i,R}\right)}<-\frac{\bar{\alpha}/(1-K)}{e_{i,R}C''\left(e_{i,R}\right)+C'\left(e_{i,R}\right)}=\frac{\partial\hat{e}_{A,R}}{\partial R},$$

$$\frac{\partial\hat{e}_{E,R}}{\partial R}=\frac{(1-R)f(\bar{\alpha})\bar{\alpha}/(1-K)^2}{e_{i,R}C''\left(e_{i,R}\right)+C'\left(e_{i,R}\right)}>\frac{(1-R)\bar{\alpha}/(1-K)^2}{e_{i,R}C''\left(e_{i,R}\right)+C'\left(e_{i,R}\right)}=\frac{\partial\hat{e}_{A,R}}{\partial R}.$$

Therefore, the following inequalities conclude the proof:

$$\frac{\partial\Psi\left(\hat{e}_{E,R}\right)}{\partial R}-\frac{\partial\Psi\left(\hat{e}_{A,R}\right)}{\partial R}=\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\frac{\partial\hat{e}_{E,R}}{\partial R}-\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\frac{\partial\hat{e}_{A,R}}{\partial R}=\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\left(\frac{\partial\hat{e}_{E,R}}{\partial R}-\frac{\partial\hat{e}_{A,R}}{\partial R}\right)<0,$$

$$\frac{\partial\Psi\left(\hat{e}_{E,R}\right)}{\partial K}-\frac{\partial\Psi\left(\hat{e}_{A,R}\right)}{\partial K}=\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\frac{\partial\hat{e}_{E,R}}{\partial K}-\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\frac{\partial\hat{e}_{A,R}}{\partial K}=\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\left(\frac{\partial\hat{e}_{E,R}}{\partial K}-\frac{\partial\hat{e}_{A,R}}{\partial K}\right)>0. \qquad \blacksquare$$

6.4 Proof of Proposition 2

First, notice that the value of Ω_D and Ω_R are respectively

$$\Omega_D=o\left(x_D+\rho_R x_R\right)-\chi_D \ ,\ \Omega_R\equiv o\left(x_D+\rho_R x_R\right)-(1+\mu)(\rho_R-1)x_R.$$

Under A2, they are both negative. Turning to $\overline{\Lambda}$ and $\underline{\Lambda}$, being $\Gamma' > 0$, it is clear that, from (7), $\overline{\Lambda}$ ($\underline{\Lambda}$) is the minimum (maximum) value such that the first (second) of the following inequalities hold:

$$\left[\hat{\tilde{W}}^S\left(\hat{e}_{E,R}\right)-\hat{\tilde{W}}^S\left(\hat{e}_{A,R}\right)\right]\Gamma(\Lambda) > v\max\{\Omega_D,\Omega_R\}\left[\Psi\left(\hat{e}_{A,R}\right)-\Psi\left(\hat{e}_{E,R}\right)\right],\ \forall R,K\ ;$$

$$\left[\hat{\tilde{W}}^S\left(\hat{e}_{E,R}\right)-\hat{\tilde{W}}^S\left(\hat{e}_{A,R}\right)\right]\Gamma(\Lambda) < v\min\{\Omega_D,\Omega_R\}\left[\Psi\left(\hat{e}_{A,R}\right)-\Psi\left(\hat{e}_{E,R}\right)\right],\ \forall R,K\ .$$

By the same token, the values of Λ for which the impact of a change in R and K has a greater effect on the dynamic efficiency part of the reformer's utility than on the static efficiency bit are the maximum values of Λ such that, respectively:

$$\frac{\partial\hat{\tilde{W}}^S\left(\hat{e}_{E,R}\right)}{\partial\hat{e}_{i,R}}\left(\frac{\partial\hat{e}_{E,R}}{\partial R}-\frac{\partial\hat{e}_{A,R}}{\partial R}\right)\Gamma(\Lambda) < v\min\{\Omega_D,\Omega_R\}\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\left(\frac{\partial\hat{e}_{E,R}}{\partial R}-\frac{\partial\hat{e}_{A,R}}{\partial R}\right),\ \forall R,K\ ;$$

$$\frac{\partial\hat{\tilde{W}}^S\left(\hat{e}_{E,R}\right)}{\partial\hat{e}_{i,R}}\left(\frac{\partial\hat{e}_{E,R}}{\partial K}-\frac{\partial\hat{e}_{A,R}}{\partial K}\right)\Gamma(\Lambda) < v\min\{\Omega_D,\Omega_R\}\frac{\partial\Psi}{\partial\hat{e}_{i,R}}\left(\frac{\partial\hat{e}_{E,R}}{\partial K}-\frac{\partial\hat{e}_{A,R}}{\partial K}\right),\ \forall R,K\ .$$

Clearly enough, $\overline{\overline{\Lambda}}_R = \overline{\overline{\Lambda}}_K = \overline{\overline{\Lambda}}$. Also, $\overline{\Lambda} < \overline{\overline{\Lambda}}$ whenever $\Gamma\left(\overline{\Lambda}\right) < \Gamma\left(\overline{\overline{\Lambda}}\right)$ or

$$-\max\{\Omega_D,\Omega_R\}\left[\Psi\left(\hat{e}_{E,R}\right)-\Psi\left(\hat{e}_{A,R}\right)\right] < -\min\{\Omega_D,\Omega_R\}\frac{\partial\Psi/\partial\hat{e}_{i,R}}{\partial\hat{\tilde{W}}^S\left(\hat{e}_{E,R}\right)/\partial\hat{e}_{i,R}}\left[\hat{\tilde{W}}^S\left(\hat{e}_{E,R}\right)-\hat{\tilde{W}}^S\left(\hat{e}_{A,R}\right)\right]\ \forall R,K\ ,$$

which is always the case under the second inequality in point 2 of A2. The latter also implies that Ω_D and Ω_R are different and, therefore, $\underline{\Lambda} < \overline{\Lambda} < \overline{\overline{\Lambda}}$. Thus, for $\underline{\Lambda} < \Lambda < \overline{\Lambda}$ either appointment or election can be selected and the comparative statics with respect to Λ, R and K hold by inspection of (7) and by Lemma 2 (which, indeed, ensures that $\partial\Psi\left(\hat{e}_{E,R}\right)/\partial R - \partial\Psi\left(\hat{e}_{A,R}\right)/\partial R < 0$ and $\partial\Psi\left(\hat{e}_{E,R}\right)/\partial K - \partial\Psi\left(\hat{e}_{A,R}\right)/\partial K > 0$). Also, because Ω_D and Ω_R are not comparable under the parameter restrictions in A2, the statement about the reformer's identity is true. Finally, a rise in $x_{\tilde{m}}$ makes more difficult that election is preferred because both $\partial\Omega_D/\partial x_D$ and $\partial\Omega_R/\partial x_R$ are negative under A2. Indeed,

$$\partial\Omega_D/\partial x_D = o\left(1-\rho_R\right) < 0,\ \ \partial\Omega_R/\partial x_R = o\left(\rho_R-1\right)-\left(1+\mu\right)\left(\rho_R-1\right) = \left(\rho_R-1\right)\left(o-1-\mu\right) < 0\ .\qquad \blacksquare$$

6.5 Data

The data set gathers observations for 49 states over the period 1970–1997. Only a few data points are available for the District of Columbia, and no IOUs serve Nebraska.

1. Data on regulatory selection rules, revolving-door restrictions on commissioners, bipartisanship requirements, total budget and the year the public utility commission was founded and whether it was constitutionally formed are collected from:

A. PUCs' web pages; B. NARUC, 1970–1997. *Yearbook of Regulatory Agencies*. NARUC, Washington DC; C. Beecher, J. A., 2007. *Historical Names and Dates of the Public Service Commissions*. Mimeo: Michigan State University.

2. Data on judicial selection rules, office terms and the year the state joined the Union are collected from: A. Hanssen (2004b), Table 1; B. Besley and Payne (2005), Table 1.

3. Political preferences are from the CSG (Council of State Governments) yearbooks:

CSG, 1970–1997. *The Book of the States*. CSG, Lexington, KY.

4. Data on sales, revenue, generation shares and the price of fossil fuels (composite) per net Kwh are collected or calculated from the EEI (Edison Electric Institute) yearbook:

A. EEI, 1995. *1960–1992: Historical Statistics of the Electric Utility Industry*; B. EEI, 1993–1997. *Statistical Yearbook of the Electric Utility Industry*. Washington, DC: EEI.

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. EEI reports electric generation and sources of energy for generation in two types of breakdown–that is, by type of prime mover driving the generator and by energy source. The totals from both of these 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.

5. Let s_{ijt} and q_{ijt} be the share and price of input j (coal, gas, oil) used in state i and year t.

So, if $p_{i,t} \equiv \sum_j q_{ijt} p_{ijt} / q_{it}$ is the average (composite) price of fossil fuels per net Kwh for state i in year t, then the cost index is defined as $c_{i,t} \equiv s_{it} p_{it}$.

6. Data on state auditor selection rules come from: Schelker, M., 2007. Public Auditors: Empirical Evidence from the US States. Mimeo, University of Fribourg.

7. State income per capita, population, proportion aged over 65 and proportion aged 5–17 are calculated from a US Census Bureau (UCB) publication:

UCB, 1970-1997. *Population Estimates Program*. Washington DC: UCB.

6.6 Tables

Table 1: History of Appointment Rules, 1970–1997.

Judicial selection rules	
Jud_Elec [21]:	AL[Pe], AR[Pe], GA[Pe/Ne(1984–)], ID[Ne], IL[Pe], KY[Ne], LA[Pe/Ne(1976–)], MI[Ne], MN[Ne], MS[Pe/Ne(1994–)], MT[Ne], NV[Ne], NC[Pe], ND[Ne], OH[Ne], OR[Ne], PA[Pe], TX[Pe], WA[Ne], WV[Pe], WI[Ne]
Jud_App [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/ Ga(1994–)], SC[La], UT[Mp], VT[La/Ga(1984–)], VA[La]
Switching [8]:	AZ[Ne/Mp(1974–)], FL[Pe/Mp(1972–)], MD[Ne/Mp(1976–)],NM[Pe/Mp(1989–)], NY[Pe/Ga(1978–)], SD[Ne/Mp(1981–)], TN[Pe/Mp(1994–)], WY[Ne/Mp(1973–)]
Regulatory selection rules	
Reg_Elec [9]:	AL [E], AZ [E], GA[E], LA[E], MS[E], MT[E], ND[E], OK[E], SD[E]
Reg_App [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/Gas(1981–)], MN[E(1960–1971)/Ga(1972–1975)/ E(1976–1977)/Ga(1978–)], SC[Le/E(1996–)], TN[E/GAa(1996–)], TX[E/Ga(1977–)]

Notes: 1. In the judicial rules panel, the acronimous Pe, Ne, Ga, La and Mp stand for partisan election, nonpartisan election, appointment by Governor, appointment by Legislature, and merit plan.
2. In the regulatory selection rule panel, the acronimous E, Ga, Gas, Gae, Gal, GAa, Le stand for direct election, appointment by Governor, appointment by Governor with confirmation by the Senate, appointment by Governor with confirmation by executive council, appointment by Governor with approval by legislature, selection by general assembly and selection by Legislature.

Table 2: Variables Names and Descriptions.

	Variables	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:	Dummy 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:	Dummy 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]
Supervisors' intrinsic motivations	*Rev_Door*:	Dummy variable taking value 1 if there is a time restriction on commissioners working for the regulated industry once they have left the PUC; 0 otherwise.	0.653 [0.476]
	Bipartisan:	Dummy variable taking value 1 appointed commissioners cannot all be from the same party; 0 otherwise.	0.224 [0.417]
	Jud_Term:	Length of High Court judges' term in years.	8.592 [3.058]
Supervision technology	*Budget*:	PUC's total receipts in thousands of dollars.	12057.37 [26991.38]
	Industrial:	Percentage of total revenue from sales to customers that are industrial.	0.288 [0.097]
Prices	*Price_R*:	Revenue (cents per Kwh) from sales to residential users.	5.918 [2.680]
	Price_C:	Revenue (cents per Kwh) from sales to commercial users.	5.528 [2.435]
	Price_I:	Revenue (cents per Kwh) from sales to industrial users.	3.810 [1.925]
Average costs	*c*:	Cost of fossil fuels (in cents per Kwh) – see Appendix 6.5.	1.096 [0.899]
Society investment concerns	*Gen_Hydro*:	Percentage of total generation from hydroelectric sources.	0.198 [0.317]
	Oil_Ref:	Dummy variable taking value 1 if the state changed the commissioners' appointment rule during the period 1973–1982; 0 otherwise.	0.061 [0.240]
Political competition	*Majority*:	Percentage of seats (averaged across upper and lower houses) held by the majority party.	0.669 [0.129]
	Rep:	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]
Other determinants of appointment rules	*Ereg_Nei*:	Share of neighbouring states electing public utility commissioners.	0.234 [0.271]
	Ejud_Nei:	Share of neighbouring states electing their High Court judges.	0.516 [0.319]
	PUC_Fou:	Year the PUC was founded.	1891.531 [23.011]
	Join:	Year the state joined the Union.	1839.245 [47.598]
	Aud_Elec:	Dummy variable taking value 1 if state auditors are elected; 0 otherwise.	0.327 [0.470]
	PUC_Con:	Dummy variable taking value 1 if the PUC was constitutionally formed; 0 otherwise.	0.163 [0.370]
	20th_Jref:	Dummy variable taking value 1 if *Jud_Elec* has changed during the twentieth century; 0 otherwise.	0.306 [0.461]
Other Controls	*Gen_Nucl*:	Percentage of total generation from nuclear sources.	0.144 [0.194]
	Pop:	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.	12148.88 [7306.264]

Table 3: Determinants of Appointment Rules.

	(1)		(2)	(3)
	Reg_Ord = 3	*Reg_Ord = 1*	*Reg_Ord*	*Jud_Ord*
Rev_Door	0.013 [0.023]	– 0.001 [0.002]	– 0.121 [0.190]	
Bipartisan	– 0.182 [0.017]***	0.020 [0.005]***	– 1.166 [0.149]***	
Jud_Term				– 0.019 [0.018]
Budget	$-2.86e^{-06}$ [0.00000]***	$-7.38e^{-08}$ [0.00000]†	$-4.14e^{-06}$ [$1.55e^{-06}$]***	$5.41e^{-06}$ [$1.97e^{-06}$]***
Industrial	0.335 [0.083]***	– 0.080 [0.012]***	3.880 [0.643]***	1.667 [0.560]***
Gen_Hydro	0.036 [0.027]†	– 0.005 [0.004]†	0.768 [0.195]***	0.839 [0.202]***
Oil_Ref	– 0.077 [0.012]***	– 0.058 [0.009]***	– 0.361 [0.301]	
Majority	0.082 [0.066]	0.021 [0.008]***	– 0.381 [0.563]	2.518 [0.462]***
Rep	– 0.015 [0.015]	0.0003 [0.0015]	– 0.132 [0.125]	0.093 [0.120]
Ereg_Nei	0.415 [0.060]***	0.029 [0.005]***	2.627 [0.372]***	
Ejud_Nei				0.910 [0.156]***
PUC_Fou	0.00005 [0.0003]	0.0004 [0.00006]***	– 0.020 [0.002]***	
Join	0.0003 [0.0002]*	– 0.0001 [0.00003]***	0.006 [0.002]***	– 0.018 [0.002]***
Aud_Elec	– 0.080 [0.014]***	– 0.0063 [0.0015]***	0.081 [0.138]	0.008 [0.132]
PUC_Con	0.190 [0.064]***	0.0002 [0.002]	0.630 [0.258]**	
20th_Jref				– 2.393 [0.200]***
Gen_Nucl	– 0.130 [0.057]**	0.035 [0.006]***	– 3.060 [0.375]***	– 0.267 [0.284]
Estimation	Multinomial Logit		Ordered Logit	Ordered Logit
Number of Observations	1372		1372	1372
Pseudo R^2	0.37		0.18	0.25
PseudoLogLikelihood	– 712.590		– 929.294	– 1061.656

Notes: 1. The entries of the columns in panel (1) are estimated marginal effects;
2. Robust standard errors (z distribution) in parentheses;
3. *** denotes significant at the 1% confidence level; **, 5%; *, 10%; †, 20%.

Table 4: Pass-Through of Cost Shocks, Fixed Effects (Within) Estimator.

	(1)	(2)	(3)	(4)	(5)	(6)
	Price_R	*Price_C*	*Price_I*	*Price_R*	*Price_C*	*Price_I*
Reg_Elec	−0.210	0.312	−0.025	0.114	0.310	0.197
	[0.203]	[0.195]*	[0.157]	[0.162]	[0.185]*	[0.112]*
Jud_Elec	−0.235	−0.362	0.178	−0.140	−0.347	0.120
	[0.175]†	[0.179]**	[0.130]†	[0.144]	[0.164]**	[0.088]†
C	0.502	0.531	0.476	0.857	0.846	0.860
	[0.075]***	[0.073]***	[0.079]***	[0.069]***	[0.074]***	[0.058]***
*Reg_Elec*c*	−0.028	−0.175	−0.038	−0.279	−0.219	−0.180
	[0.083]	[0.081]**	[0.060]	[0.068]***	[0.076]***	[0.058]***
*Jud_Elec*c*	−0.238	−0.189	−0.160	−0.195	−0.100	−0.168
	[0.081]***	[0.077]**	[0.058]***	[0.075]***	[0.078]†	[0.059]***
Budget	$-1.55e^{-06}$	$-1.35e^{-06}$	$-2.88e^{-06}$	$3.79e^{-06}$	0.00001	0.00001
	$[8.27e^{-07}]$*	$[8.34e^{-07}]$*	$[7.28e^{-07}]$***	$[6.51e^{-06}]$	$[5.85e^{-06}]$*	$[4.01e^{-06}]$***
Industrial	−2.523	0.548	0.324	0.556	2.480	2.755
	[0.629]***	[0.681]	[0.496]	[0.667]	[0.679]***	[0.591]***
Other Controls	*Majority*, *Rep*, *Gen_Hydro*, *Gen_Nucl*, *Pop*, *Pop*^{2}, *Old*, *Young*, *GSP*, *GSP*^{2}, *time dummies*.					
Estimation	Fixed time and state effects (within) estimator.					
Number of Observations	1372	1372	1372	686	686	686
R^2 (within)	0.91	0.90	0.89	0.95	0.93	0.95

Notes: 1. Robust standard errors in parentheses;
2. *** denotes significant at the 1% confidence level; **, 5%; *, 10%; †, 20%.

Table 5: Pass-Through of Cost Shocks, Difference GMM Estimator.

	(1)	(2)	(3)	(4)	(5)	(6)
	Price_R	*Price_C*	*Price_I*	*Price_R*	*Price_C*	*Price_I*
Lagged Dependent	0.898	0.672	0.952	0.221	−0.092	0.198
	[0.141]***	[0.185]***	[0.283]***	[0.182]^	[0.270]	[0.265]
C	0.300	0.530	0.143	1.240	1.473	1.071
	[0.290]^	[0.444]^	[0.812]	[0.204]***	[0.563]***	[0.273]***
*Reg_Elec*c*	0.133	0.038	0.110	−0.354	−0.343	−0.346
	[0.187]	[0.256]	[0.376]	[0.407]	[0.397]	[0.318]^
*Jud_Elec*c*	−0.334	−0.513	−0.168	−0.300	−0.285	−0.017
	[0.185]*	[0.260]**	[0.185]	[0.290]^	[0.434]	[0.316]
Budget	$6.11e^{-07}$	$-9.71e^{-07}$	$5.49e^{-07}$	0.00001	$4.81e^{-07}$	$3.02e^{-06}$
	$[2.34e^{-06}]$	$[2.26e^{-06}]$	$[1.72e^{-06}]$	$[6.03e^{-06}]$*	$[9.76e^{-06}]$	$[8.75e^{-06}]$
Industrial	1.701	2.560	4.665	0.936	1.539	2.836
	[1.187]†	[1.542]*	[2.748]*	[1.118]	[1.377]^	[2.418]^
Other Controls	*Majority*, *Rep*, *Gen_Hydro*, *Gen_Nucl*, *Pop*, *Old*, *Young*, *GSP*, *time dummies*.					
Estimation	Fixed time and state effects twostep difference GMM.					
Predetermined	*Lagged dependent variable*.					
Endogenous	*One lag of predetermined and endogenous, c, Reg_Elec*c, Jud_Elec*c.*			*Two lags of predetermined and endogenous, c, Reg_Elec*c, Jud_Elec*c.*		
Instruments (collapsed)	*Ereg_Nei*, *Ejud_Nei*, *Aud_Elec*, *20th_Jref*.					
Instruments count	44	44	44	34	34	34
Autocov. of order 2	0.21	0.83	0.14	0.14	0.79	0.39
Hansen Test for Overid. Restrict.	0.55	0.17	0.31	0.67	0.32	0.66
Number of Observations	1274	1274	1274	588	588	588

Notes: 1. Windmeijer corrected robust standard errors in parentheses;
2. *** denotes significant at the 1% confidence level; **, 5%; *, 10%; †, 20%; ^, 30%.

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