Elected versus Appointed Regulators: Theory and Evidence*

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Revised: March 2003

Abstract

This paper contrasts direct election with political appointment of regulators. When regulators are appointed, regulatory policy becomes *bundled* with other policy issues the appointing politicians are responsible for. Because voters have only one vote to cast and regulatory issues are not salient for most voters, there are electoral incentives to respond to stakeholder interests. If regulators are elected, their stance on regulation is the only salient issue so that the electoral incentive is to run a pro-consumer candidate. Using panel data on regulatory outcomes from U.S. states, we find new evidence in favor of the idea that elected states are more pro-consumer in their regulatory policies.

*The authors are grateful to Yun Ho Chung, Tarcisio DaGraca, Heather Tookes, Silvia Pezzini and Imran Rasul for valuable research assistance, to Doug Jones and Dick Schuler for guidance on the literature and institutions, and to Sharon Tennyson for many useful discussions. We also thank two anonymous referees, Richard Boylan, Anne Case, Dan Cohen-Vogel, Mike Conlin, Rich Gilbert, Alfred Kahn, Larry Kenny, Roger Noll, Torsten Persson, Steve Puller, David Sappington, Tim Vogelsang and numerous seminar participants for helpful comments. STICERD provided financial support for the project.

1 Introduction

A key issue in political economy concerns the accountability structures put in place to select public officials. While the principle that legislators are to be elected is now a defining feature of modern democracies, there are some offices where a plurality of selection methods survive. A key example is the case of regulators. Typically, heads of regulatory agencies are appointed by politicians, creating an insulating layer between citizens and regulators. However, a number of U.S. states have injected a degree of populism into the regulatory process by requiring that the heads of their independent regulatory commissions be directly elected.[1]

For students of political economy the existence of these two methods of regulator selection raises two key questions. First, can we develop a satisfactory theoretical understanding of the likely differences between regimes? Second, does the data from the U.S. states yield robust lessons that square with the theory? This paper contributes to answering both of these questions. It provides the first fully developed theoretical explanation of why direct election should lead to more consumer-orientated policies. It then uses a new panel data set on electricity rates from the U.S. states to investigate the validity of this theoretical prediction.

On any first encounter with the idea of popular election of regulators, one is drawn to the proposition that consumer interests might be served more intently by elected regulators since they are more likely to have their eye on the ballot box. Indeed, a number of contributions to the literature begin with the observation that this is self-evident. However compelling this claim might seem, further thought reveals it to be inconsistent with the view that representative democracy yields median policy outcomes. Since those who appoint the regulators are themselves elected, then they would surely have as much interest in promoting consumer interests as directly elected regulators? Hence, we might expect either regime to track the median voter's wishes on regulatory policy and authors including Baron [1988, 1995] and Laffont [1996] have modeled things this way.

[1]The regulation of public utilities in the United States is undertaken by state level public utility commissions. Each commission is run by a group of "commissioners", assisted by a professional staff. In states where commissioners are not directly elected, they are typically appointed by the state governor. Phillips (1988) chapter 4 provides a good discussion of the institutional details. Insurance regulation has a similar structure with several states also electing their insurance commissioners.

The key to our explanation is recognizing that when regulators are appointed, regulation becomes *bundled* with other issues. While the likely importance of bundling has been mentioned by numerous authors,[2] the theoretical argument has not previously been developed. We study a model in which a majority of the population are consumers and a minority are stakeholders in a regulated industry. Political parties are organized along some dimension other than regulation – in our specific model this is public spending. When regulators are appointed, parties may be tempted to field candidates who would appoint pro-stakeholder regulators to further their interests in the public spending dimension. We give two conditions for this to be the case. *Either*, stakeholders view regulation as the main salient issue and will deviate to vote for whichever candidate promises them a better regulatory outcome *or* there is an organized pro-stakeholder special interest whose campaign support can be used to attract impressionable voters. The result is a sort of "regulatory capture" (Stigler (1971)) that emerges endogenously through the electoral process because of diffuse costs and concentrated benefits. By contrast, if regulators are elected, their stance on regulation is the only salient issue so that the electoral incentive is to run a pro-consumer candidate.

The empirical analysis begins by looking at the long-run (conditional) mean electricity prices for three types of tariff (residential, commercial and industrial) for a panel of 40 states that did not change their regulatory regime between 1960 and 1997. We find that residential prices are significantly lower in states that elect their regulators – the point estimates amount to around \$60 per year for the average household at 1992 prices.[3] We also show that states with elected regulators are less likely to pass through cost changes into prices. Both of these are consistent with the idea that elected regulators are more pro-consumer in their outlook.

The remainder of the paper is organized as follows. The next section explains how the paper relates to the literature. Section 3 presents the model. Section 4 explains why direct elections are more likely to produce pro-consumer regulators than appointed regimes. Section 5 discusses the robustness of the theoretical argument to modeling assumptions. Section 6 draws out the empirical implications of the theory and section 7 presents the

[2]See, for example, Hagerman and Ratchford (1978), Boyes and McDowell (1989), Navarro (1982), Smart (1994), and Fields, Klein and Sfiridis (1997).

[3]The conditioning variables, detailed below, are year fixed effects, a state specific fossil fuel cost index, and a number of time varying demographic and economic variables.

empirical work. A brief conclusion is contained in Section 8. The appendix contains the proof of the main proposition as well as a detailed description of the data and sources that we use.

2 Related Literature

The paper contributes to two literatures. As a contribution to political economics, it adds to the growing body of work investigating theoretically and empirically the implications of constitutional differences. There is now a sizeable literature on this from the U.S. states (see Besley and Case (2003)) and across countries (Persson and Tabellini (2003)). Interest in this area is explained by the fact that constitutional rules are a key policy lever. While the analysis is developed for the case of regulators, it has implications for any public office in which officials might reasonably be appointed or elected. This includes judges, school boards, or even directors of public broadcasting corporations!

The theoretical approach taken here can be seen as part of the post-Downsian agenda to modeling political economy issues. The Downsian approach of parties who commit to policy platforms up front and care solely about winning, has a hard time generating insights about constitutional differences and, more generally, in generating predictions in multi-dimensional policy settings. The modeling approach builds on two distinct strands of work: (i) the citizen-candidate approach to political competition due to Osborne and Slivinski (1996) and Besley and Coate (1997); and (ii) voting models that allow for "noise" voters that can be swayed by campaign advertising as in Baron (1994) and Grossman and Helpman (1996).

The paper also contributes to the empirical literature on regulation. There is a large body of work investigating the difference between elected and appointed regulatory regimes empirically using data from the U.S. states. The earliest studies include Berry [1979], Boyes and McDowell [1989], Costello [1984], Crain and McCormick [1984], Harris and Navarro [1983], Navarro [1982], and Primeaux and Mann [1986], each of which looks at the evidence from a different perspective. Some of these contributions looked at rate setting, while others have studied broader indicators of how favorable is the regulatory climate within a state.[4] Costello [1984]'s review of the early evi-

[4]In a influential paper, Joskow (1974) has argued, that price regulation is ultimately the tool that influences the rate of return that the industry enjoys.

dence concludes that "In summary, it probably makes little difference to the average ratepayer whether a PUC is elected or appointed." (page 104).

More recent evidence suggests that elected regulators do produce more pro-consumer policies than those that are appointed. Formby, Mishra and Thistle [1995] find this in their examination of electric utility bond ratings. Using data from 1979-1983 on a selection of investor-owned utilities, they find that election of public utility regulators has a negative effect on bond ratings, consistent with a squeeze on margins due to more pro-consumer choices. Fields, Klein and Sfiridis [1997] find evidence that elected insurance regulators are more pro-consumer. They report that the market value of life insurance companies doing business in California declined sharply following the passage of Proposition 103, which changed the method of selection of the insurance commissioner from appointment to election. Using data from 1985, Smart [1994] reports that telephone rates are lower in states that elect their public utility regulators.[5]

Our empirical analysis significantly strengthens this more recent evidence that elected regulators favor consumers. In contrast to previous studies of electricity prices, we use panel data. This allows us to look at the long run conditional mean differences in prices rather than at a single cross-section. Moreover, we use measures of production costs that have typically been omitted from previous studies. In addition, we exploit a very different source of identification in the tests based on the pass through of costs into prices where we interact the regulatory regime and a time-varying variable (production costs). This gets away from identification based purely on cross-sectional differences and hence minimizes concerns about the correlation between the regulatory regime and other sources of long-run heterogeneity among the states.

3 The model

We develop the simplest possible model to illustrate why elected regulators are likely to be more pro-consumer than appointed regulators. To incorporate the idea of policy bundling, there are two issues: public spending and

[5]To explain the difference between this and the older studies note that the three studies conducted in the 1990s were looking either at different kinds of regulation (Fields, Klein and Sfiridis [1997] and Smart [1994]) or at very different outcome measure (Formby, Mishra and Thistle [1995]).

regulation. Policies are selected by policy-makers chosen by the voters in elections. Candidates in these elections are put forward by two policy-motivated parties.

Our basic notion is that there are two types of voters with respect to regulatory issues. One group are stakeholders in the regulated firms. These could be owners of capital, or workers if they are able to capture some of the rent. Stakeholders want higher profits and hence prefer higher prices. The remainder of voters have no financial stake in the regulated industry and always prefer low prices. However, getting those prices is less important to them than having their preferred public spending outcome.

3.1 Government policies

The government has two functions: choosing the level of public spending and regulating a monopoly. On public spending, citizens have two preference types indexed by $k \in \{L, R\}$ where L denotes "left wing" and R "right wing". A citizen of spending preference type k obtains a net benefit $b(g; k)$ from public spending level g, where $b(\cdot; k)$ is single peaked with interior maximum $g^*(k)$. Left-wingers have a higher demand for spending, so that $g^*(L)$ exceeds $g^*(R)$.

The monopoly produces good x with cost function $c(x)$, where $c(\cdot)$ is increasing and twice continuously differentiable. The price of good x, denoted p, is determined by the government and the monopoly is required to meet all consumer demand at this price, subject to it not making a loss.[6] Each citizen has an identical demand function for good x, denoted $x(p)$. Letting N denote the size of the population, aggregate demand is $X(p) = Nx(p)$. The regulated firm's profits are $\pi(p) = pX(p) - c(X(p))$ and these are equally shared by a group of stakeholders. Thus, with respect to their relationship to the regulated monopoly, there are two types of citizens - "consumers" who

[6] In the case of electricity, discussed below, the assumption of a price setting regulator seems a reasonable approximation, although things are more complicated than this in practice. As Joskow (1974) observes "The *statutes* establishing most regulatory agencies are usually quite vague. Regulatory agencies are normally mandated to insure that rates charged by regulated firms are "reasonable and non-discriminatory" and that service of the "good quality" is maintained." page 296 (emphasis original). In practice rates should be set to allow stockholders a fair rate of return. However, Joskow (1974) notes that "Contrary to the popular view, *it does not* appear that regulatory agencies have been concerned with regulating returns per se. The primary concern of regulatory commissions has been to keep *nominal prices from increasing*." page 298 (emphasis original).

only consume the good and "stakeholders" who have some interest in the firm's profits. We index these two types by $t \in \{C, S\}$.

The fraction of citizens of type (k, t) is denoted γ_t^k. We let $\gamma^k = \gamma_C^k + \gamma_S^k$ denote the fraction of the population with public good preference k and $\gamma_t = \gamma_t^L + \gamma_t^R$ the fraction with relationship to the monopoly t. We assume throughout that stakeholders are a minority group in the sense that γ_S is smaller than either γ^L or γ^R.

Let $r(p, t)$ denote the monopoly-related payoff that a citizen of type $t \in \{C, S\}$ gets at price p. A consumer's payoff is his consumer surplus, while a stakeholder's payoff includes his profit share. Thus, $r(p, C) = \int_0^p x(\rho)d\rho - px(p)$ and $r(p, S) = r(p, C) + \frac{1}{\gamma_S}\pi(p)$. Let $p^*(t)$ denote the optimal price from the perspective of a type t; i.e., that which maximizes $r(p, t)$ subject to the constraint of non-negative profits.[7] The optimal consumer price is the lowest price at which the regulated firm does not make a loss, implying that $p^*(C)$ equals average cost at output $X(p^*(C))$. The optimal stakeholder price also takes into account the firm's profits. We assume that it exceeds the optimal consumer price in which case it satisfies the first order condition $p^*(S) = c'(X(p^*(S)))/[1 - \frac{1-\gamma_S}{\varepsilon(p^*(S))}]$ where $\varepsilon(p)$ is the price elasticity of demand.[8]

Public spending is assumed to be more important to consumers than regulation in the sense that for both public spending types $k \in \{L, R\}$, $\Delta r(C)$ is less than $\Delta b(k)$ where $\Delta r(C) = r(p^*(C), C) - r(p^*(S), C)$ and $\Delta b(k) = b(g^*(k), k) - b(g^*(-k), k)$.[9] This means that it is more important to consumers to get their preferred level of public spending than their preferred regulatory outcome. Public spending is therefore the more *salient* issue for consumers. However, for the stakeholders, we assume that regulation is the more salient issue in the sense that for both public spending types $k \in \{L, R\}$, $\Delta r(S)$ exceeds $\Delta b(k)$ where $\Delta r(S) = r(p^*(S), S) - r(p^*(C), S)$. This reflects the fact that the regulated price directly impacts the livelihood

[7] We assume that there exists a price p which will yield positive profits.

[8] There is no general guarantee that $p^*(S) > p^*(C)$. A sufficient condition is that

$$1 - \gamma_S > \varepsilon(p^*(C))[1 - \frac{c'(X(p^*(C)))}{p^*(C)}].$$

Since $p^*(C) = \frac{c(X(p^*(C)))}{X(p^*(C))}$, this condition is satisfied if the monopoly's average costs are increasing at output level $X(\ p^*(C))$. If its average costs are decreasing at $X(\ p^*(C))$ the condition requires either that demand be relatively inelastic or that the fraction of stakeholders in the population is small.

[9] The notation $-k$ refers to the opposite type to k. For example, $-k = R$ when $k = L$.

of the stakeholders.

3.2 Policy determination

The level of public spending is chosen by an elected governor and the regulated price by a regulator. We compare two methods of regulator selection: appointment and election. Under the former, the governor appoints the regulator. Under the latter, the regulator is directly elected along with the governor. Under both regimes, the governor and regulator are citizens and hence characterized by their types (k, t).

Candidates in gubernatorial and regulator elections are selected by two political parties, denoted L and R. Each party is comprised of member citizens bound together by their views on public spending. Thus, all members of Party L are left-wingers and all members of Party R are right-wingers. Both parties contain a mixture of stakeholders and consumers. Parties chose the candidate that a majority of their members prefer and we assume that the majority of each party's members are consumers.[10]

If the regulator is appointed, each party selects a candidate for the gubernatorial race. There are four possible types of candidate: (L, C), (R, C), (L, S), and (R, S).[11] No ex-ante policy commitments are possible, so that, when in office, a type (k, t) candidate chooses a public good level $g^*(k)$ and appoints a regulator who shares his type t. This regulator then selects a price $p^*(t)$.

If the regulator is elected, each party selects two candidates: one for the gubernatorial race and one for the regulator race. While candidates are still characterized by their types (k, t), only one dimension of their type is relevant for their policy-making roles. Thus, if elected governor, a type (k, t) candidate chooses a public good level $g^*(k)$ and, if elected regulator, a type (k, t) candidate chooses a price $p^*(t)$.[12]

[10] We have in mind a primary process by which parties select candidates. One could alternatively assume that party members select candidates via some type of bargaining process whose outcome maximizes a weighted sum of party members' utilities.

[11] We do not require that a party must select a candidate from the ranks of its members. However, under the assumptions on preferences we make, parties have no incentive to select from outside their membership in equilibrium.

[12] The idea of regulators choosing regulatory policy to maximize their own personal gain from the regulated industry should not be taken too literally. Indeed, there are laws that prevent regulators having any direct stake in the industry that they are regulating. The reality that we are trying to capture is that some regulators are more sympathetic

There are two types of voters.[13] A fraction μ are *rational voters* who anticipate the policy outcomes each candidate would deliver and vote for the candidate whose election would produce their highest policy payoff. Thus, if the regulator is appointed, a rational voter of type (k,t) who is faced with gubernatorial candidates of types (k_L,t_L) and (k_R,t_R) will vote for Party L's candidate if $b(g^*(k_L),k)+r(p^*(t_L),t)$ exceeds $b(g^*(k_R),k)+r(p^*(t_R),t)$. Rational voters indifferent between two candidates abstain.

The remaining fraction of voters are *noise voters*. In each election, a fraction η of these vote for Party L's candidate. Here, η is the realization of a random variable with support $[0,1]$ and cumulative distribution function $H(\eta)$. If the regulator is elected, there is a separate (uncorrelated) draw of η for each election. The idea is that noise voters respond to non-policy relevant features of candidates such as their looks, sense of humor, etc. We assume that H is symmetric which implies that noise voters are *unbiased* in the sense that the probability that a fraction less than η vote for Party L's candidate equals the probability that a fraction less than η vote for Party R's candidate.

Noise voters make the election outcomes probabilistic. To illustrate, consider an election in which the difference between the fraction of citizens obtaining a higher utility from the policy choices generated by Party L's candidate and the fraction obtaining a higher utility from Party R's candidate is ω. Since μ is the fraction of rational voters and η the fraction of noise voters who vote for Party L's candidate, Party L's candidate will win if $\mu\omega+(1-\mu)\eta$ exceeds $(1-\mu)(1-\eta)$ or, equivalently, if η exceeds $\frac{-\mu\omega}{2(1-\mu)}+\frac{1}{2}$. The probability that Party L's candidate will win is thus

$$\psi(\omega)=\begin{cases}0 & \text{if } \omega\leq\frac{-(1-\mu)}{\mu}\\ 1-H(\frac{-\mu\omega}{2(1-\mu)}+\frac{1}{2}) & \text{if } \omega\in(\frac{-(1-\mu)}{\mu},\frac{1-\mu}{\mu})\\ 1 & \text{if } \omega\geq\frac{1-\mu}{\mu}\end{cases}.$$

Parties are assumed to correctly calculate the election probabilities associated with different candidate pairs and take them into account when choosing

to industry and others to consumers. This may be because of ideology, past associations with the industry or consumer groups, or future career concerns. Assuming that regulators can be either consumers or stakeholders and that these individuals maximize their selfish utility allows us to introduce different types of regulators in the simplest possible way.

[13]This kind of approach is common in the electoral competition literature following Baron (1994) and Grossman and Helpman (1996).

candidates. We assume that the fraction of noise voters in the population is sufficiently high so that $\left|\gamma^L - \gamma^R\right|$ is less than $\frac{1-\mu}{\mu}$. This assumption implies that $\psi(\gamma^L - \gamma^R)$ is positive but less than one, meaning that in an election between a left-winger and a right-winger in which public spending were the only issue, both candidates would win with positive probability.

Any election gives rise to a game between the two parties. Each party's pure-strategy set is the set of possible candidate types $\{L, R\} \times \{C, S\}$ and a strategy is a probability distribution over this set giving the probability that the party selects each type of candidate. Each party's payoff from any strategy pair is determined by the probability its candidate wins and its objective function. An equilibrium of the game is a pair of strategies, one for each party, that are mutual best responses. Given that each party's pure-strategy set is finite, we can be sure that an equilibrium exists.

4 Analysis

4.1 The basic model

Elected regulators: If the regulator is elected, each party has effectively two (pure) strategies for the regulator election: run a pro-consumer candidate or a pro-stakeholder candidate. Rational voters vote on the basis of a candidate's regulatory stance and hence a pro-consumer candidate has an electoral advantage over a pro-stakeholder candidate. Since the majority of members of both parties prefer pro-consumer regulators, both parties select such candidates and the party affiliation of the winning candidate is determined by noise voters. This yields:

Proposition 1 *If elected, the regulator will be pro-consumer.*

Appointed regulators: If the regulator is appointed, the type of the regulator is determined by the regulatory stance of the winning gubernatorial candidate. Thus gubernatorial candidates' preferences over both public spending and regulation are relevant for voters. However, consumers prefer the candidate who shares their public spending preferences irrespective of his stance on regulation. Stakeholders, on the other hand, prefer the candidate who is pro-stakeholder irrespective of his public spending preferences. Assuming that they offer candidates with differing public spending preferences, this provides parties with electoral incentives to run pro-stakeholder candidates.

To see this, suppose that Party L is selecting a left-winger, Party R a right-winger and that both are pro-consumer. If Party L deviates by selecting a candidate who would select a pro-stakeholder regulator it will attract the support of all the stakeholders in Party R's base. This will raise the probability that its candidate will win and implement its preferred spending level. This gain will offset the reduced probability of its preferred regulatory outcome if spending is relatively more important. On the other hand, if Party R were running a candidate who would select a pro-stakeholder regulator then Party L will lose the stakeholders in its base unless it does the same.

The argument relies crucially on the assumption that the parties offer candidates with differing public spending preferences. If this were not the case, then the only issue in the election would be regulation and the majority of votes would go to the candidate who would select a pro-consumer regulator. Parties may choose to offer candidates with different public spending preferences because they are purely policy motivated and a higher probability of winning has no intrinsic value. What is important is that public spending is sufficiently important relative to regulation that they would prefer a smaller probability of getting their preferred public spending outcome to a higher probability of getting their preferred regulatory outcome.

The following assumption embodies conditions under which equilibrium involves both parties selecting candidates who share the public spending preferences of their members, but who are pro-stakeholder.

Assumption 1: For $k \in \{L, R\}$
(i) $\psi(\gamma^k - \gamma^{-k})\Delta b(k) > \psi(\gamma_C - \gamma_S)\Delta r\,(C)$,
(ii) $(\psi(\gamma^k - \gamma^{-k}) - \psi(\gamma_C^k - \gamma_S^k - \gamma^{-k}))\Delta b(k) > \psi(\gamma_C^k - \gamma_S^k - \gamma^{-k})\Delta r\,(C)$,
and
(iii) $(\psi(\gamma^k + \gamma_S^{-k} - \gamma_C^{-k}) - \psi(\gamma^k - \gamma^{-k}))\Delta b(k) > \psi(\gamma^k + \gamma_S^{-k} - \gamma_C^{-k})\Delta r\,(C)\,.$

Parts (i) and (ii) imply that both parties selecting pro-stakeholder candidates who share their public spending preferences is an equilibrium. Part (i) ensures that neither party has an incentive to deviate to running a pro-consumer candidate with the opposing party's public spending preferences. It requires that each party's lost chance of getting its preferred level of public spending is more costly than the benefits from the improved chance of getting its preferred regulatory outcome. Part (ii) ensures that neither party wishes to deviate to a pro-consumer candidate. It requires that the electoral penalty stemming from the loss of each party's stakeholder constituency is

prohibitive. Part (iii) guarantees that both parties selecting pro-stakeholder candidates is the only equilibrium. It ensures that, when they are fielding candidates with different public spending preferences, both parties have an incentive to select a pro-stakeholder candidate if the other party were to field a pro-consumer candidate. It requires that the electoral gain associated with attracting the other party's stakeholder constituency is large. Thus we have:

Proposition 2 *Under Assumption* 1*, if appointed, the regulator will be pro-stakeholder.*

This proposition contains the basic insight into why electing rather than appointing regulators can produce more pro-consumer outcomes.[14] If the regulator's type is determined in a gubernatorial election, regulatory policy is *bundled* with other issues. Regulatory policy is salient only for voters who wish to secure a high price in the regulated industry. This means that parties can gain electorally by running candidates with pro-stakeholder regulatory attitudes. These electoral gains matter more to parties when they care more intensely about attaining their preferred public spending outcome.

The conditions of Assumption 1 ensure that the regulatory outcome is captured by stakeholders as predicted by Stigler (1971) among others. However, the logic here is due to a combination of issue bundling coupled with concentrated benefits and diffuse costs. The latter is not sufficient on its own to generate capture – it is only when there are other issues in the election that are salient to voters that the power of stakeholders will be felt. By unbundling the issues through direct elections, the scope for regulatory capture is diminished.

Substantively, Assumption 1 requires three conditions to be satisfied. First, regulation must be a non-salient issue for consumers. Second, in terms of the core issues, the population must be reasonably evenly divided between the two political parties. Third, the fraction of stakeholders in each party's base must be non-negligible. Of these three conditions, perhaps the most

[14]Given Proposition 1, Proposition 2 is more than is needed to establish the general result that elected regulators are more likely to be pro-consumer. Indeed, it is possible to establish this result under weaker conditions. For example, if only parts (i) and (iii) of Assumption 1 are satisfied, then, if appointed, the regulator will be pro-stakeholder with positive probability. Part (i) implies that in any equilibrium with appointed regulators in which a pro-consumer regulator is selected with probability one, each party's gubernatorial candidate must reflect its member's public spending preferences and be pro-consumer. Part (iii) implies that this cannot be an equilibrium.

restrictive is the third. However, the next sub-section shows that the argument goes through when the currency of political influence is money rather than votes.

4.2 Campaign contributions

In this sub-section, we allow for the regulated firm to provide campaign contributions to pro-stakeholder candidates. Candidates can use these contributions to "buy" the votes of noise voters and thereby enhance their electoral chances. Parties rationally anticipate these contributions when selecting candidates and they give rise to the same incentives as having an intense stakeholder minority.

To focus cleanly on the role of campaign contributions, we assume that all voters regard public spending to be the salient issue – thus stakeholders exercise no political influence through the ballot box. Formally, this says that for $k \in \{L, R\}$: $\Delta r\,(S)$ is less than $\Delta b\,(k)$. To understand the effect of contributions, consider an election in which the difference between the campaign expenditures of the two parties' candidates is z. If z is positive, Party L's candidate is outspending R's and *vice versa*. Then we assume that the fraction of noise voters voting for Party L's candidate, η, is a random variable with support $[0, 1]$ and cumulative distribution function $H(\eta; z)$. The function H is assumed to be twice continuously differentiable and to satisfy the condition that for all η and z, $H(\eta; z)$ is decreasing in z.

To ensure that noise voters remain unbiased, we restrict $H(\eta; z)$ to be symmetric in the sense that for all η and z, $H(\eta, z) = 1 - H(1 - \eta, -z)$. This implies that the probability that Party L's candidate gets a fraction of noise voters less than η when he out-spends Party R's candidate by an amount z equals the probability that Party R's candidate gets a fraction of noise voters less than η when he outspends Party L's candidate by the same amount. We also assume that for all η and z greater than zero, the derivative $H_z(\eta; z)$ is increasing, implying diminishing returns to outspending an opponent.

To investigate the firm's optimal contribution, consider an election in which the identity of the regulator is to be determined and let ω be the difference between the fraction of citizens obtaining a higher utility from Party L's candidate and the fraction obtaining a higher utility from Party R's candidate. If both candidates have the same regulatory stance, the monopoly will make no campaign contributions. However, if Party L's candidate is pro-stakeholder and Party R's pro-consumer, then the monopoly may contribute

to Party L's candidate. Generalizing the earlier analysis, let $\widehat{\psi}(\omega, z)$ be the probability that Party L's candidate wins when the difference between the two candidate's campaign expenditures is z.[15] Then the monopoly's optimal contribution to Party L's candidate is

$$z^*(\omega) = \arg\max\{\widehat{\psi}(\omega, z)\pi(p^*(S)) - z : z \geq 0\}.$$

If Party R's candidate is pro-stakeholder and Party L's pro-consumer, the monopoly will contribute $z^*(-\omega)$ to Party R's candidate implying that Party L's candidate would win with probability $\widehat{\psi}(\omega, -z^*(-\omega))$.

Turning to candidate selection, the parties anticipate the firm's lobbying behavior and incorporate this into the probabilities they assign to their candidates winning. Any election gives rise to a game as before, except that the election probabilities associated with different candidate pairs now incorporate the monopoly's lobbying behavior. Parties' strategies, strategy sets and the definition of an equilibrium are all unchanged.

If the regulator is elected, the analysis is essentially the same as in the last section. Each party will field a pro-consumer candidate. While contributions may mean that a pro-stakeholder candidate is at less of an electoral disadvantage, they will not induce parties to distort their candidate choice. This is because the only gain to winning the regulator election is to control regulation. Hence, the conclusion of Proposition 1 remains valid.

If the regulator is appointed, then campaign contributions serve the same purpose as the intense stakeholder minority in the previous section, inducing the parties to put up pro-stakeholder candidates. If the two parties select candidates with differing public spending preferences, a party loses no votes from rational voters if it runs a pro-stakeholder candidate. However, if its opponent is running a pro-consumer candidate, it attracts campaign contributions which allow it to buy the votes of noise voters. On the other hand, if its opponent is running a pro-stakeholder, it stops the flow of contributions to the opposing candidate. Either way, there is an electoral incentive to run a pro-stakeholder candidate.

The equivalent of Assumption 1 in terms of campaign contributions is:

Assumption 1′: For $k \in \{L, R\}$
(i) $\psi(\gamma^k - \gamma^{-k})\Delta b(k) > \widehat{\psi}(\gamma_C - \gamma_S; -z^*(\gamma_S - \gamma_C))\Delta r(C)$,

[15] Following the earlier logic, $\widehat{\psi}(\omega, z) = 0$ if $\omega \leq \frac{-(1-\mu)}{\mu}$, $\widehat{\psi}(\omega, z) = 1$ if $\omega \geq \frac{1-\mu}{\mu}$ and $\widehat{\psi}(\omega, z) = 1 - H(\frac{-\mu\omega}{2(1-\mu)} + \frac{1}{2}, z)$ otherwise.

(ii) $(\psi(\gamma^k-\gamma^{-k})-\widehat{\psi}(\gamma^k-\gamma^{-k};-z^*\left(\gamma^{-k}-\gamma^k\right)))\Delta b(k) > \widehat{\psi}(\gamma^k-\gamma^{-k};-z^*\left(\gamma^{-k}-\gamma^k\right))\Delta r\left(C\right)$, and
(iii) $(\widehat{\psi}(\gamma^k-\gamma^{-k};z^*\left(\gamma^k-\gamma^{-k}\right))-\psi(\gamma^k-\gamma^{-k}))\Delta b(k) > \widehat{\psi}(\gamma^k-\gamma^{-k};z^*\left(\gamma^k-\gamma^{-k}\right))\Delta r\left(C\right)$.

Under this Assumption, the unique equilibrium has each party giving into the firm by running a gubernatorial candidate who would select a pro-stakeholder regulator and the conclusion of Proposition 2 remains valid.[16]

Two points should be noted about the argument. First, in the equilibrium in which both parties select pro-stakeholder candidates, the firm does not make contributions. It has a significant impact on the policy outcome without making any campaign contributions! Its power stems from the credible threat to support the other party's candidate if it puts up a candidate who would select a pro-consumer regulator. Second, issue bundling remains essential to get the difference between elected and appointed regimes. It creates the ability of the firm to move regulatory policy in a non-majoritarian direction. Thus, the analysis presented here makes precise what structural features are needed and justifies building a model where the micro-foundations of the political process are specified.

5 Robustness to alternative assumptions

This section briefly discusses how our argument would hold up under different modeling assumptions. Our main purpose is to argue that the basic conclusions and the logic that we develop are more general than our specific model might suggest.

Downsian parties: Suppose that, instead of being policy motivated, parties were Downsian, caring only about winning elections.[17] Proposition 1 remains valid in this case because, in a regulator election, a pro-consumer candidate has an advantage over a pro-stakeholder candidate. However, the equilibrium underlying Proposition 2 would not be an equilibrium with Downsian parties. If, say, $\gamma^L \geq \gamma^R$, Party R could raise its probability of winning by selecting a left-wing gubernatorial candidate who would select a pro-consumer regulator. If $\gamma_C^L \geq \gamma^R + \gamma_S^L$ then the unique equilibrium would be for both parties to

[16]The proof is identical to that of Proposition 2 and hence is omitted.

[17]We maintain the assumption that parties compete by selecting candidates. Under the usual Downsian assumption that parties compete by selecting policy platforms (i.e., (g,p) pairs), the model would be intractable without introducing some noise in rational voters' voting behavior.

select pro-consumer, left-wingers and there would be no difference between the two regimes. However, if this inequality were not satisfied, then a pro-stakeholder, right-winger would win with a probability of greater than $\frac{1}{2}$ against a pro-consumer left-winger and no equilibrium in pure strategies would exist. The mixed strategy equilibrium would involve parties selecting pro-stakeholder candidates with positive probability, so that the conclusion that appointing would be more likely to produce pro-stakeholder regulators would be valid in this case.

Similar remarks apply to the case with Downsian parties and campaign contributions. Proposition 1 remains valid provided that the amount of contributions given to a pro-stakeholder candidate is not sufficient to offset the unpopularity of his position among rational voters. With appointed regulators, the equilibrium would either involve the two parties selecting pro-consumer, left-wingers or would be a mixed strategy equilibrium if contributions were sufficient to make a pro-stakeholder, right-winger win with probability of greater than $\frac{1}{2}$ against a pro-consumer left-winger.

Candidate entry: Suppose that independent candidates can enter the regulator and gubernatorial elections. Whether a pro-stakeholder independent candidate would wish to enter the regulator election if both parties selected pro-consumer candidates, would depend on how rational consumer voters behaved. If they rallied behind one of the pro-consumer candidates, the pro-stakeholder's odds of winning would be very low, perhaps so low as to make entry unattractive. However, if rational consumer voters split between the two pro-consumer candidates, then the pro-stakeholder's odds of winning might be good enough to justify entry. Nonetheless, if parties anticipated this entry, then one of them would have an incentive not to run a candidate which would mean that a pro-consumer regulator would be elected with a probability of at least $\psi(\gamma_C - \gamma_S)$. While this probability is not one, it is significantly greater than $1/2$ implying that the conclusion of Proposition 1 would only be marginally weakened.

Turning to gubernatorial elections, one might suppose that an independent pro-consumer candidate would enter to compete with the two parties' candidates. However, this neglects important issues inherent in elections with three or more candidates. Consider the entry decision of a type (L, C) independent candidate, assuming that the two parties are selecting candidates of types (L, S) and (R, S) respectively. If rational voters vote sincerely, entry by a type (L, C) independent would simply split the left-wing vote and

significantly enhance the probability of the right-wing candidate winning. If rational voters are strategic, left wingers will be reluctant to switch to the entrant for fear of wasting their vote. It follows that a type (L, C) independent is likely either to increase the probability of the right wing candidate winning or to have no effect. Either way, such a candidate has little or no incentive to enter. Thus, entry of independent candidates will not impact Proposition 2. Accordingly, entry does not disturb the basic conclusion that elected regulators are more likely to be pro-consumer.

Alternative views of lobbying: The assumptions we are making about lobbying are important for the argument. It is key that money enters the picture as campaign contributions rather than bribes. If regulated firms can bribe regulators *after* they have been selected by offering promises of future employment and other types of bribes to regulators in exchange for policy favors (as in Laffont and Tirole (1993), Grossman and Helpman (1994), and Besley and Coate (2001)), the ability of the regulator selection mechanism to mute the regulated firm's influence is more limited. Even the staunchest pro-consumer regulator may find it difficult not to be swayed by the prospect of significant personal gain.

More interestingly, it is also important that the lobby chooses its contributions *after* the parties have selected their candidates. If it moves *before* parties, as in Grossman and Helpman (1996), this might disturb the conclusions of Proposition 1. This simple change in timing endows the interest group with the ability to commit. With regulator elections, the lobby could offer to support a party's gubernatorial candidate if the party were to run a pro-stakeholder candidate in the regulator election. This may induce both parties to run such candidates resulting in the elected regulator being pro-stakeholder.

Fortunately, there are still good reasons to believe that regulator elections are more likely to produce pro-consumer regulators even with this alternative specification of lobby behavior. First, if both parties were bribed into selecting pro-stakeholder candidates for the regulator election, an independent pro-consumer candidate would have an incentive to enter and challenge them. As argued above, this is not the case with appointed regulators when both parties select pro-stakeholder gubernatorial candidates. Second, the cost to the lobby of bribing parties to select pro-stakeholder candidates in the regulator election, is higher than the cost of bribing them to select pro-stakeholder candidates in the gubernatorial election. This is because, in the

former situation, each Party k gives up the chance of a pro-consumer regulatory outcome with probability $\psi(\gamma_C - \gamma_S)$ as opposed to $\psi\left(\gamma^k - \gamma^{-k}\right)$ in the latter.

Pro-stakeholder parties: What would happen if stakeholders were an important constituency in one party and this led that party to favor a pro-stakeholder regulator? Such a party would select a pro-stakeholder candidate in a regulator election. Assuming that $\psi(\gamma_S - \gamma_C)$ is positive, there would be a positive probability that this candidate would be elected meaning that Proposition 1 no longer applies. However, the forces leading to the selection of pro-stakeholder candidates in the appointed regime would be strengthened by a party having stakeholder preferences. For, in such circumstances, there would be no policy compromise involved in running such a candidate. Thus, the conclusion that appointing would be more likely to produce pro-stakeholder regulators remains valid.

6 Empirical Implications

The basic idea of the theory is that in multi-dimensional political competition, under reasonable conditions, electing regulators will lead to more pro-consumer outcomes. This was embodied in Propositions 1 and 2 above. The first empirical implication refers to price levels. We record this as:

- **Prediction 1 (price levels):** States with elected regulators will have lower electricity prices.

Our second test is motivated by the theoretical observation that prices set by more pro-consumer regulators should be less responsive to cost shocks. To see this, suppose (following standard practice) that regulators choose prices to maximize $Nr(p, C) + \lambda\pi(p)$ subject to the constraint that $\pi(p) \geq 0$ for some weight λ. The degree to which a regulator is "pro-consumer" is then measured by the relative weight he/she places on consumer relative to producer surplus. Our model represents a special case of this general formulation, with the weight a regulator puts on the profits of the regulated firm determined by his/her connection to the firm.

Further suppose that the regulated firm's cost function is $c(x) = F + c \cdot x$ and let $p^*(c, \lambda)$ be a type λ regulator's optimal price given the marginal cost c. Assuming that $\pi(p^*(c, \lambda)) > 0$, we have that

$$p^*(c,\lambda) = \frac{c}{1 - \frac{\left(1-\frac{1}{\lambda}\right)}{\varepsilon}},$$

where ε is the price elasticity of demand. Assuming that consumer demand functions are of the constant elasticity form, it is clear that $p_c^*(c,\lambda) < p_c^*(c,\lambda')$ for $\lambda < \lambda'$.[18] This result is consonant with Joskow (1974)'s description of the regulatory process that emphasizes the dynamics of rate increases in response to costs to shocks. Pro-consumer regulators should be less willing to respond to applications for rate increases by utilities in the face of cost shocks.[19] Putting this together with the insights from Propositions 1-3 yields:

- **Prediction 2 (pass-through):** States with elected regulators will pass cost increases into price levels less than appointed regulators.

The remainder of the paper takes a look at the evidence on these predictions.

7 Evidence

Our data come from the EEI and give prices of electricity in three segments of the market – residential, commercial, and industrial from 1960 to 1997 for the 48 continental U.S. states.[20] We first test whether prices are lower in those states that elect their public utility commissioners and then examine whether prices are less sensitive to cost shocks in elected states.

[18]This also holds for the boundary where $\pi(p^*(c,\lambda)) = 0 < \pi(p^*(c,\lambda'))$ as long as $\varepsilon \leq 1$ which is the empirically relevant case for electricity demand. To see this, observe that $p^*(c,\lambda)$ satisfies the price equals average cost equation $p^* = c + F/Nx(p^*)$. This equation implies that $\partial p^*(c,\lambda)/\partial c = 1/[1 - \frac{\varepsilon(p^*(c,\lambda)-c)}{p^*(c,\lambda)}]$. Thus, using the expression for $p^*(c,\lambda')$ given in the text and noting that $[1-1/\lambda']/\varepsilon = \frac{p^*(c,\lambda')-c}{p^*(c,\lambda')}$, we have that $\frac{\partial p^*(c,\lambda)}{\partial c} < \frac{\partial p^*(c,\lambda')}{\partial c}$ if $\frac{\varepsilon(p^*(c,\lambda)-c)}{p^*(c,\lambda)} < \frac{p^*(c,\lambda')-c}{p^*(c,\lambda')}$. Since $p^*(c,\lambda) < p^*(c,\lambda')$, a sufficient condition for the result is that $\varepsilon \leq 1$.

[19]To investigate the changing importance of regulator influence, it is possible to check whether the gap between appointers and electors widened between 1970 and 1980. In a simple difference-in-difference analysis we found that the average residential price per kilowatt hour between elected and appointed states was 0.3 cents in the 1960s and increased to 1 cent in the 1970s. This widening gap is statistically significant at conventional levels. There are similar changes (also significant) for commercial and industrial prices.

[20]The data are available at http://econ.lse.ac.uk/staff/tbesley/index_own.html/data.

7.1 Price levels

At the beginning of our period (1960), thirteen states elected their utility commissioners, falling to ten by the end (1997).[21] This general trend masks the fact that six states switched their method of selecting regulators.[22] Our analysis focuses chiefly on rate setting decisions by public utility regulators and concentrates on the 42 states whose appointment method remained constant over the period.

We summarize some background information on the characteristics of the three categories of states (appointers, electors, and switchers) in Table 1. States that elect their utility commissioners tend to be smaller and poorer than states that appoint them. They are also more likely to have a Democrat as a governor. However, the states are similar in terms of demographic structure as measured by the proportion of children and their population aged over 65. There is no significant difference between the states that appoint and elect their utility commissioners in terms of the proportion of electricity produced from fossil fuels (around 70% for both kinds of states).

Table 1 also provides information on the raw means of the nominal prices of electricity (denoted in cents per kilowatt hour) across the three types of states.[23] If states with elected regulators have more pro-consumer regulators, we would expect them to have lower prices. The results give an immediate suggestion that electors have lower prices than appointers – the difference is statistically significant at 5% for residential rates and at 10% for commercial and industrial rates. Figure 1 illustrates one of these key findings graphically – plotting the mean residential price per kilowatt hour for states that appoint (marpk) and that elect (merpk). This finding is only suggestive – there are a host of reasons why prices may differ which are not controlled for in the means.

One important influence on prices are cost variations over space and time. However, to assemble a measure of costs is not straightforward given the

[21]The data appendix gives all the variations observed in the data. Appendix Table 1 gives a list of states in each category.

[22]Florida switched from electing to appointing in 1981; Iowa switched to an election system for 1962 and 1963 only; Minnesota has the most colorful history, using an election system 1960-71, appointing from 1972-5, electing from 1976-77 and appointing ever since; South Carolina switched to an election system in 1996; Texas switched from an election to an appointment system in 1977; Tenessee switched to appointing in 1996.

[23]We conduct the analysis in terms of nominal prices. Similar results are obtained when prices are deflated using the consumer price index.

variety of production methods used. In reviewing the available technologies, Turvey and Anderson (1977) contrast the low marginal cost technologies of hydro and nuclear with higher marginal cost technologies of fossil fuels. (The three main fossil fuel sources are gas, coal and oil.) Hydro generation and nuclear power tend, on the whole, to have higher fixed costs. It is much easier to get series that capture the prices of fossil fuels which have experienced dramatic price changes. This dramatic increase in costs in the 1970s is apparent from Figure 2 which graphs a composite fossil fuel price index (gas, coal and oil) over time per BTU (the variable labeled ffcomp). The turbulent period from 1969 to the mid 1980s here is evident.

To measure cross state susceptibility to shocks, we focus on the fossil fuel component. States will have very different susceptibilities to these costs on account of their varying production structures. Our cost variable is constructed by multiplying the share (in total production) of electricity produced using each type of fossil fuel measured in BTUs weighted by a price series obtained from Energy Information Agency's Annual Energy Review. Figure 2 displays our series on the residential price of electricity (mrpk) and a state specific fossil fuel cost index per BTU (mcost) – both of these are annual averages for all forty-eight states. As expected, residential price increased along with costs in the 1970s. However, it keeps rising after costs declined in the late 1980s.[24]

Table 2 looks at difference in the mean prices between electing and appointing states after controlling for (fossil fuel) costs, common macro-shocks and state specific economic and demographic variables.[25] The results con-

[24]However, the picture is somewhat different when looking at real rather than nominal prices. The 1960s saw falling real prices while prices increased in real terms in the 1980s. Real prices have been declining since.

[25]To be precise, we run a "standard" panel data regression on data from the 44 states that did not switch their method of regulator selection between 1960 and 1997. This is of the form:

$p_{st} = \alpha_s + \beta_t + \gamma c_{st} + \phi x_{st} + \varepsilon_{st}$

where p_{st} is the average price per kilowatt hour for state s in year t; α_s is a state fixed effect, β_t are year dummy variables that pick up macro-shocks and common changes in federal policy; c_{st} is our fossil fuel cost index in state s at time t; x_{st} is a vector of state specific, time varying shocks (state income per capita, state income per capita squared, state population, state population suqared, proportion aged 5-17 and proportion aged over 65). We then save the estimated fixed effects and run a regression of these on a dummy variable, δ_s, that is equal to one if the state elects its regulator. The coefficient θ is reported in Table 2.

firm the idea that price levels are lower in states that elect their pubic utility commissioners. However, the difference is only significant at a 5% level for residential prices. (Our cost variable (not reported) is strongly significant in all regressions.) To put this difference into perspective, at the mean household consumption of 10,000 kilowatt hours per annum, it implies a difference of around $60 per annum on an average household's electricity bills.

The results so far do not use data on the states that switched. However, it is interesting to look at how prices behaved before and after the transition between electing and appointing. The two most interesting cases are Florida and Texas both of whom switched roughly half way through our data period. Here, we use the rank of these states' electricity prices as the left hand side variable – a purely ordinal measure of the residential electricity prices. Figure 3 and 4 graph these ranks before and after switching from election to appointment. In each case, moving from electing to appointing increases the state's rank. The notes to the figures also give the results of regressing the rank on the change, confirming that in both cases, the move from election to appointment was associated with higher electricity prices. While concerns about endogeneity of the switching preclude reading too much into this, it is supportive of the basic findings above.

The results on price levels consistently support prediction 1. Moreover, the result is most pronounced for residential rates. This finding holds up even after controlling for economic and demographic controls and state specific fossil fuel costs. This contrasts with the previous literature which has reached mixed conclusions about whether election produces more pro-consumer outcomes. Most of the previous evidence comes from looking at cross-sectional evidence from specific years. When we run separate cross-sectional regressions for each year of our data (including economic controls and the state-specific cost index), we found that electing regulators has a negative and significant effect only for the period 1975-80. Otherwise, it is not significantly different from zero. The fact that we obtain sharper results on price level differences from panel data comes mainly from the fact that we are able to control for time varying regressors. The negative coefficient on electing regulators holds up in the panel when it is included directly in a regression which also includes time varying controls for costs, economic and demographic variables along with year fixed effects.[26]

[26]It does not hold up once state fixed effects are included. However, this is not surprising given the small amount of time series variation in the mode of regulator selection.

While consistent with the theory, there remains the possibility that the regulatory regime is selected non-randomly by a process that is related to price determination. In light of this, it would be incautious to interpret the finding as a causal effect. Regulatory regimes do not change often enough in our data period to exploit such time-series variation in any satisfactory way. Moreover, to do so would require a model of regulatory regime change. It is clear that understanding the factors that drive the choice of a regulatory regime provides an important agenda for future research.

7.2 Pass-Through

We test prediction 2 above, by running panel regressions of the form:

$$p_{st} = \alpha_s + \beta_t + \gamma_1 c_{st} + \gamma_2 \delta_s c_{st} + \phi x_{st} + \varepsilon_{st}$$

where p_{st} is the average price per kilowatt hour for state s in year t; α_s are state fixed effects proxying for long-run differences in states' production and distribution systems due to climate etc; β_t are year dummy variables that pick up macro-shocks and common changes in federal policy; x_{st} is a vector of state specific, time varying shocks (state income per capita, state income per capita squared, state population, state population squared, proportion aged 5-17 and proportion aged over 65); and δ_s is a dummy variable equal to one if the state elects its regulator and zero otherwise. To control crudely for differences in production structures across states, we also include in the x_{st} vector the fraction of fuel generated from fossil fuel sources. The variable c_{st} is our fossil fuel cost index in state s at time t. The key implication to be tested is that $\gamma_2 < 0$; i.e. prices should respond less to cost shocks when states elect their regulators. In all case, we report robust standard errors which allow for clustering by census region.

These results identify the difference between appointed and elected regulators from an interaction with a time-varying regressor (production costs). By controlling for state fixed effects, they minimize concerns about the correlation between the regulatory regime and other sources of long-run heterogeneity among the states which drive the selection of the regulatory regime.

The basic results are given in Table 3, again for the 42 states that did not switch between electing and appointing over the sample period. Columns (1) through (3) give results in each of three categories of provision where differences between states and over time are controlled for solely with state,

year effects and the fraction of energy produced from fossil fuels. The key observation is that the coefficient on costs interacted with whether a state elects its regulators is everywhere negative. This is robust to including a number of economic and demographic controls as shown in columns (4)-(6). These results suggest that the pass through coefficient for the elected states is roughly one half the coefficient for appointed states in columns (1)-(3). The gap between electing and appointing states is somewhat smaller in columns (4)-(6) with the largest difference being for residential prices.

7.3 Robustness

We have subjected the results to a variety of robustness checks. The results on pass through of costs are robust to including the full sample of states.[27] We also experimented with various controls for differences in production structure across states, including the share of non-investor owned production and production from nuclear sources. While this does lead to a more restricted sample of years, the results on pass through remain robust. The results are also robust to including an indication of whether the state had an automatic fuel adjustment clause.[28]

The data suggest three distinct "regimes" over the period that we study. The 1960s saw stagnant prices, followed by a period of rising prices, peaking in the mid 1980s after which nominal input prices drifted downwards. Joskow (1974) observes that the influence of regulators on prices is likely to be much more important in an environment where input prices are rising, since rate reviews are most likely in such periods. According to this argument, regulator influence should become more important in the post-1969 period when fossil fuel prices increased dramatically. Following Joskow (1974), we look to see whether the effect of regulatory institutions are most apparent in the middle period. The results suggest that the middle period is the most important for explaining the overall results. Joskow (1974) also suggest the possibility that there could be asymmetries between periods of cost increases and decreases. We therefore allowed for the cost pass through to vary between cases where there had been increases and decreases in costs. We find in favor of Joskow's

[27] However, there is a *positive* coefficient on a state that elects its regulators – this being identified purely off the time series variation in six states. This may suggest that changing the method of selection may be bound up with the pricing process for these states.

[28] We were only able to obtain data on this for the years 1973-95 excluding (1978 and 1990).

idea that cost increases are passed on more readily than cost decreases. The difference between electing and appointing states, however remains except for industrial prices and is more pronounced for cost increases.

We also interacted our cost variables with other state characteristics (e.g. income and population) that Table 1 reveals are different in the electing and appointing states. This did not disturb our basic result that states that elect put up prices less in response to fossil fuel price shocks. The analysis does not exploit other dimensions of state regulatory policy such as the length of terms served by commissioners, the level of payment to regulators and the sources of funding for regulatory commissions. When we included such variables in the analysis, no consistent pattern in relation to pricing decisions emerged. However, clearly there is further work to be done on these other aspects of regulatory decisions.[29] Finally, we considered whether the results are robust to disaggregating the cost variable into oil, gas and coal costs. Here we found that the pass through results are driven mainly by oil and gas cost changes.

8 Conclusion

This paper has explored the theoretical and empirical basis for the claim that electing public utility commissioners will yield regulatory policies that are more pro-consumer. Making sense of this theoretically requires a model in which outcomes can diverge from what a majority of citizens would like to see. The theoretical explanation of this here rests on issue bundling – the fact that regulatory policy becomes bundled with other issues when regulators are appointed. This can lead to a regulatory policy that favors industry stakeholders as political parties see this as a way of enhancing their political agenda on non-regulatory issues. This idea has wider significance for the political economics literature. Its implications for citizens' initiatives are discussed in Besley and Coate (2002).

[29]It is interesting to note that Navarro (1982) finds that states that elect their regulators show a more unfavorable regulatory climate according to his rankings of states gleaned from a number of commercial organizations. This is consistent with our findings although it is possible that states with elected commissioners also have stronger regulatory institutions. However, looking at the measures from Norton (1985), the only states that elected commissioners in his sample were classified as weakly regulated (Norton (1985) Table 1). (See also Costello (1984) Table 7.) Gormley (1981) observes that consumer movements are much more likely to be active in states where the public utility commissioner is appointed.

The results on price levels and pass both add credence to the theoretical approach. In each case, the evidence is consistent with the view that directly electing regulators yields more pro-consumer outcomes. Even if this conclusion is accepted, there is still a question of who is paying for the lower electricity prices achieved. In the theoretical model, lower prices simply shift rents from stakeholders to consumers. In this case, the welfare conclusions depend upon the relative weights that are placed on the payoffs of these two groups. Since (under Assumption 1) the probability distribution over public spending is the same under both regimes, electing utility commissioners is welfare enhancing if and only if this rent transfer is desirable. However, it is likely that lower prices have effects on other decisions, particularly the decision to invest. Future work might usefully investigate the relationship between service quality and regulatory regime.[30]

[30]An earlier version of this paper contained some preliminary findings suggesting that service reliability is lower in states that elect their regulators.

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9 Appendix

9.1 Proof of Proposition 2

To prove the proposition, we show that if Assumption 1 is satisfied, the unique equilibrium involves Party L selecting a type (L, S) candidate and Party R selecting a type (R, S) candidate. The strategy of proof will be to show that the game is solvable by iterated strict dominance.

Step 1: It is easy to show that for Party L the pure strategy (R, S) is strictly dominated by the strategy (L, C) when Party R's set of pure strategies is $\{(L, C), (L, S), (R, C), (R, S)\}$. It is also the case that for Party L the pure strategy (R, C) is strictly dominated by the strategy (L, S). To see this, suppose first that Party R selects (L, C). Then the expected payoff of Party L's majority member if it choose (R, C) would be:

$$\psi(\gamma^L - \gamma^R)b(g^*(L), L) + (1 - \psi(\gamma^L - \gamma^R))b(g^*(R), L) + r(p^*(C), C).$$

If it choose (L, S) the payoff of its majority member would be:

$$b(g^*(L), L) + \psi(\gamma_C - \gamma_S)r(p^*(C), C) + (1 - \psi(\gamma_C - \gamma_S))r(p^*(S), C).$$

Subtracting the former from the latter, the difference is positive by part (i) of Assumption 1.

Next suppose that Party R selects (R, C). Then the expected payoff of Party L's majority member if it choose (R, C) would be:

$$b(g^*(R), L) + r(p^*(C), C).$$

If it choose (L, S) the payoff of its majority member would be:

$$\begin{aligned}&\psi(\gamma^L + \gamma^R_S - \gamma^R_C)[b(g^*(L), L) + r(p^*(S), C)]\\ &+[1 - \psi(\gamma^L + \gamma^R_S - \gamma^R_C)][b(g^*(R), L) + r(p^*(C), C)].\end{aligned}$$

Subtracting the former from the latter, the difference is positive since $\Delta b(L) > \Delta r(C)$ by assumption.

Now suppose that Party R selects (R, S). Then the expected payoff of Party L's majority member if it choose (R, C) would be:

$$b(g^*(R), L) + \psi(\gamma_C - \gamma_S)r(p^*(C), C) + (1 - \psi(\gamma_C - \gamma_S))r(p^*(S), C).$$

If it choose (L, S) the payoff of its majority member would be:

$$\psi(\gamma^L - \gamma^R)b(g^*(L), L) + (1 - \psi(\gamma^L - \gamma^R)b(g^*(R), L) + r(p^*(S), C).$$

Subtracting the former from the latter, the difference is positive by part (i) of Assumption 1.

Finally, suppose that Party R selects (L, S). Then the expected payoff of Party L's majority member if it choose (R, C) would be:

$$\begin{aligned}&\psi(\gamma^L + \gamma_S^R - \gamma_C^R)[b(g^*(L), L) + r(p^*(S), C)]\\&+[1 - \psi(\gamma^L + \gamma_S^R - \gamma_C^R)][b(g^*(R), L) + r(p^*(C), C)].\end{aligned}$$

If it choose (L, S) the payoff of its majority member would be:

$$b(g^*(L), L) + r(p^*(S), C).$$

Subtracting the former from the latter, the difference is positive since $\Delta b(L) > \Delta r(C)$ by assumption.

Similarly, for Party R the pure strategy (L, S) is strictly dominated by the strategy (R, C) and the pure strategy (L, C) is strictly dominated by the strategy (R, S) when Party L's set of pure strategies is $\{(L, C), (L, S), (R, C), (R, S)\}$.

Step 2: We claim that for Party L the pure strategy (L, C) is strictly dominated by the strategy (L, S) when Party R's set of pure strategies is $\{(R, C), (R, S)\}$. Suppose first that Party R selects (R, C). Then the expected payoff of Party L's majority member if it choose (L, C) would be:

$$\psi(\gamma^L - \gamma^R)b(g^*(L), L) + (1 - \psi(\gamma^L - \gamma^R))b(g^*(R), L) + r(p^*(C), C).$$

If it choose (L, S) the payoff of its majority member would be:

$$\begin{aligned}&\psi(\gamma^L + \gamma_S^R - \gamma_C^R)[b(g^*(L), L) + r(p^*(S), C)]\\&+[1 - \psi(\gamma^L + \gamma_S^R - \gamma_C^R)][b(g^*(R), L) + r(p^*(C), C)].\end{aligned}$$

Subtracting the former from the latter, the difference is positive by part (iii) of Assumption 1. Next suppose that Party R selects (R, S). Then the expected payoff of Party L's majority member if it choose (L, C) would be:

$$\begin{aligned}&\psi(\gamma_C^L - \gamma_S^R - \gamma^R)[b(g^*(L), L) + r(p^*(C), C)]\\&+(1 - \psi(\gamma_C^L - \gamma_S^R - \gamma^R))[b(g^*(R), L) + r(p^*(S), C)].\end{aligned}$$

If it choose (L, S) the payoff of its majority member would be:

$$\psi(\gamma^L - \gamma^R)b(g^*(L), L) + (1 - \psi(\gamma^L - \gamma^R))b(g^*(R), L) + r(p^*(S), C).$$

Subtracting the former from the latter, the difference is positive by part (ii) of Assumption 1.

Similarly, for Party R the pure strategy (R, C) is strictly dominated by the strategy (R, S) when Party L's set of pure strategies is $\{(L, C), (L, S)\}$.

Thus, the game is solvable by iterated strict dominance and the solution is the strategy pair $\{(L, S), (R, S)\}$. This is the unique equilibrium. QED

9.2 Data

I. Data for electric prices, electricity generation and fuel prices are directly collected or calculated from the EEI yearbooks.

1960-1992: Historical Statistics of the Electric Utility Industry, 1995, EEI, Washington D.C.

1993-1997: Statistical Yearbook of the Electric Utility Industry, 1993-1997, EEI, Washington D.C.

EEI refers to the source of data for its yearbooks to various places including U.S. Department of Energy, Energy Information Administration, Federal Power Commission and Federal Energy Regulatory Commission.

a) Electric Prices for Residential, Commercial and Industrial Sectors: EEI reports annual revenues (in dollar terms) and sales (in kilowatt-hours) of total electric utility industry by state and class of service. The prices are calculated from the revenues and sales in terms of dollars per kilowatt-hour. Besides the three sectors that are reported here, there are four other sectors categorized in the EEI yearbooks: street and highway lighting, other public authorities, railroads and railways, and interdepartmental. The three sectors take more than 95 percent of the revenues and sales throughout the years.

b) Electric Generation and Sources of Energy for Electric Generation: EEI reports two kinds of break-down of electric generation: (1) by type of prime mover driving the generator and (2) by energy source. The totals from each different break-down are consistent. We have used the second break-down here, and it consists of coal, fuel oil, gas, nuclear fuel, and hydro. There is one other source of energy that is reported to EEI is "other" which includes generation by geothermal, wood, waste, wind and solar. The generation by "other" is within 1-3 percent of total and affect only a small number of states.

Generation by "hydro" was initially reported in the first category, type of prime mover, but from 1984 onwards, it was reported in both categories. Our data for "hydro" for 1960-1983 are from the first category. EEI consistently reported that for 1960-1983 the total generation in the second category is smaller than the one in the first category by the amount of "hydro". As mentioned earlier, because of the "other" the total generation is not equal to the sum of the generation by different sources in a few states. All values less than five hundred thousand kilowatt-hours are recorded as zero, as they are reported blank in EEI data.

II. Data on prices of fossil fuels reported in kilowatt hours came from the Energy Information Administration, Annual Energy Review, 1998, Table 3.1 and denoted in dollars per British Thermal Unit (BTU) available at http://www.eia.doe.gov/emeu/aer/finance.html. To construct the fossil fuel cost index for state i in year t, let s_{jit} be the share of energy source j in state i in year t and let p_{jt} be the price per BTU. Then the cost index $c_{it} = \sum_j s_{jit} p_{jt}$.

III. Data for commissioners are from the state yearbooks.

1960-1997: The Book of the States, 1960-1997, Council of State Governments, Lexington, KY. There are seven methods of selecting commissioners in our data. (The proportion of observations in each category are given in parentheses.)

1. Direct election (26.13%)
2. Appointed by Governor (19.12%)
3. Appointed by Governor with confirmation by the Senate (45.88%)
4. Appointed by Governor with confirmation by executive council (2.85%)
5. Appointed by Governor with approval by legislature (2.20%)
6. Selected by general assembly (0.66%)
7. Selected by Legislature (3.07%)

Table 1: Table of Means

	States that Appoint Public Utility Commissioners	States that Elect Public Utility Commissioners	States that switched between 1960 and 1997
Residential price per* kilowatt hour (cents)	5.10 (2.93)	4.39 (2.19)	4.54 (235)
Commercial price per kilowatt hour (cents)	4.65 (2.58)	4.25 (2.11)	4.27 (1.97)
Industrial price per kilowatt hour (cents)	3.15 (2.16)	2.71 (1.60)	2.80 (1.63)
Income per capita* (1982 dollars)	10746 (2518)	9177 (2059)	9857 (2294)
State population (thousands)	4939 (5301)	2468 (1583)	6239 (4406)
Proportion (%) Aged 5-17	22.25 (3.61)	23.36 (3.43)	22.41 (3.76)
Proportion (%) Aged 65 and over	10.87 (2.07)	11.19 (2.00)	11.74 (2.89)
Proportion (%) Fossil fuels	70.89 (31.95)	67.82 (26.11)	79.18 (17.52)
Proportion (%) who elect a Democratic governor *	56.77 (49.57)	73.33 (44.30)	63.33 (48.32)
Number of states	32	10	6

Standard deviation in parentheses. See the data Appendix for source and definitions of variables. A'*' denotes statistically significant difference between states that appoint and select at 5% significance level. The data on power interruptions is available only for 1984-1997. Proportion who elect a Democrat is percentage of years in which a Democrat holds the Governor's chair.

Table 2: Mean Differences in Prices Controlling for Year Effects, Costs and Economic Controls

	(1) Residential	(2) Commercial	(3) Industrial
State elects public utility commissioner	-0.73 (2.17)	-0.45 (1.45)	-0.43 (1.57)
Implied % price reduction in states that elect their public utility commissioners	-14.78	-9.96	-14.43

Absolute values of t-statistic is in parentheses. Footnote 25 in the text explains the exact method of estimation used to generate this coefficient. All regressions use robust standard errors with robust standard. They are run only on the 42 states that did not switch their method of selection over the period 1960-97. See the data appendix for sources and definitions of variables.

Table 3: Results on Pass Through

	(1) Residential	(2) Commercial	(3) Industrial	(4) Residential	(5) Commercial	(6) Industrial
Fossil Fuel Cost	0.87 (9.20)	0. 81 (5.40)	0.88 (7.15)	0.75 (5.28)	0.70 (3.79)	0.78 (5.72)
Elect* Fossil Fuel Cost	-0.40 (1.80)	-0. 29 (1.43)	-0.40 (2.14)	-0.26 (2.21)	-0.12 (2.40)	-0.21 (2.60)
Fossil Fuel Share	-3.02 (5.18)	-2.46 (6.31)	-2.04 (3.33)	-2.32 (8.61)	-1.94 (9.13)	-1.44 (5.40)
Economic Controls	No	No	No	Yes	Yes	Yes
State Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1487	1487	1487	1446	1446	1446
R^2	0.94	0.94	0.93	0.96	0.95	0.95

See the data appendix for sources and definitions of variables. These regressions are run on the sample of 42 continental states that did not switch between electing and appointing their regulators during the period 1960-97. All regressions use robust standard errors allowing for clustering by census region. Absolute values of t-statistics are in parentheses. Other controls are state income per capita, state income per capita squared, state population, state population squared, proportion aged over 65, proportion aged 5-17.

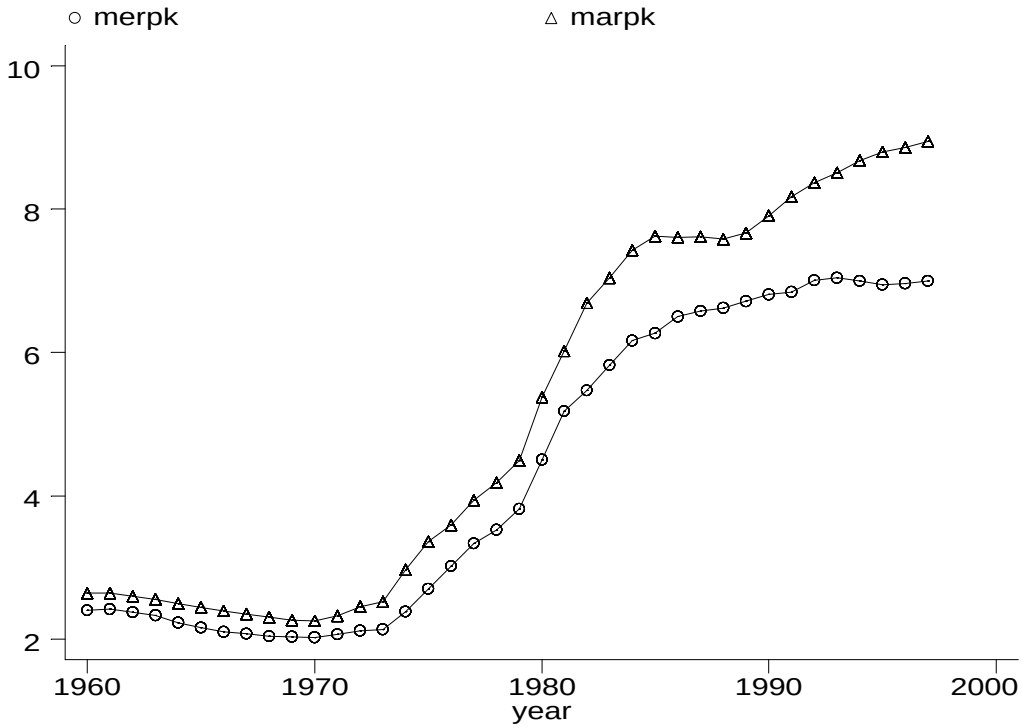

Figure 1: Mean Residential Prices over Time

Notes: merpk is the annual average residential price of electricity per kilowatt hour for states that elected their public utility commissioners and marpk is the annual average residential price of electricity per kilowatt hour for states that appoint their public utility commissioners.

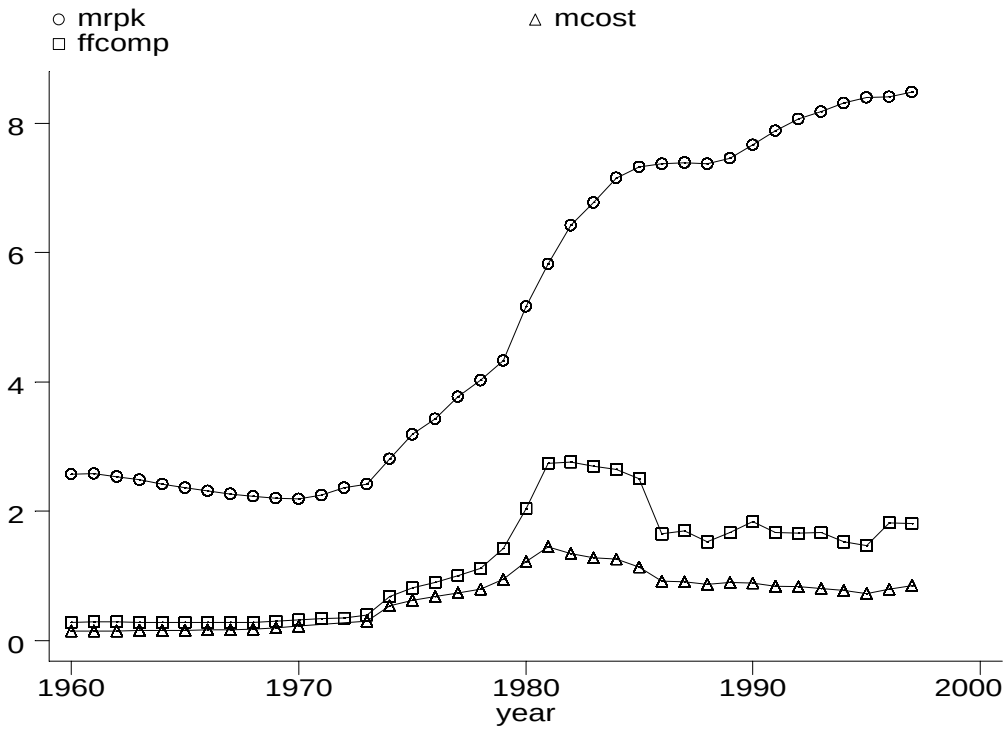

Figure 2:

Notes: ffcomp is a fossil fuel price index, mcost is the annual average fossil fuel cost and mrpk is the annual average residential price of electricity per kilowatt hour.

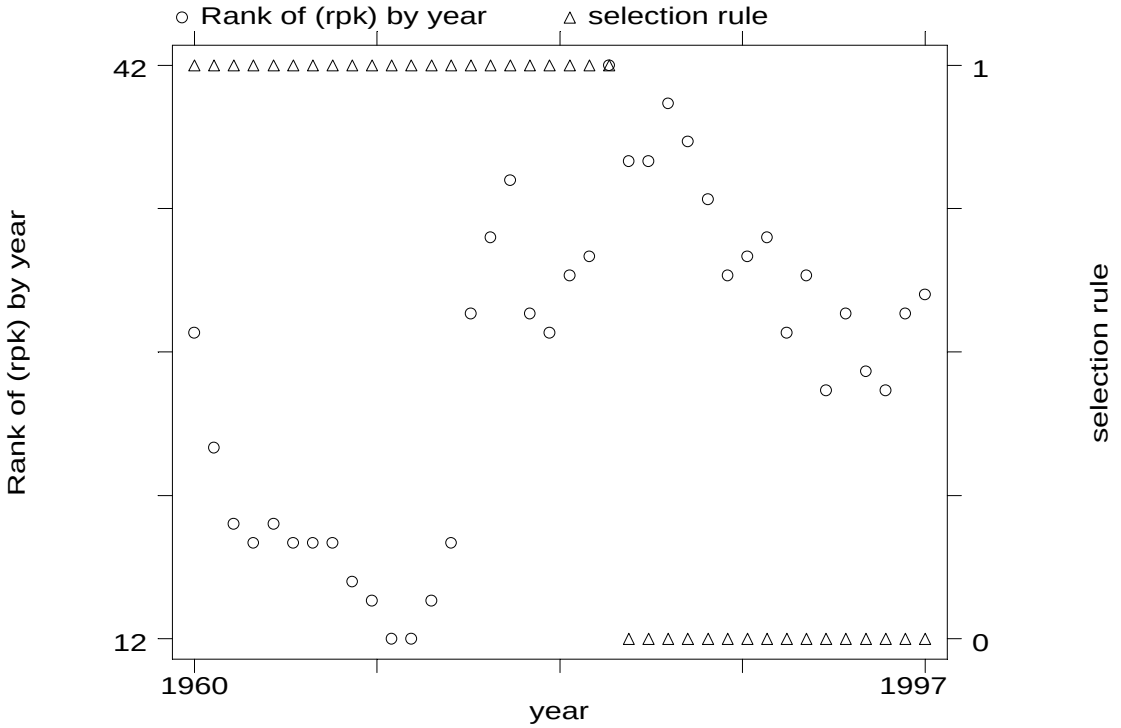

Figure 3: Effect of switching from electing to appointing on rank of electricity price in Florida
(Rank = 31.62 – (8.98)*elect: t-value 3.74)

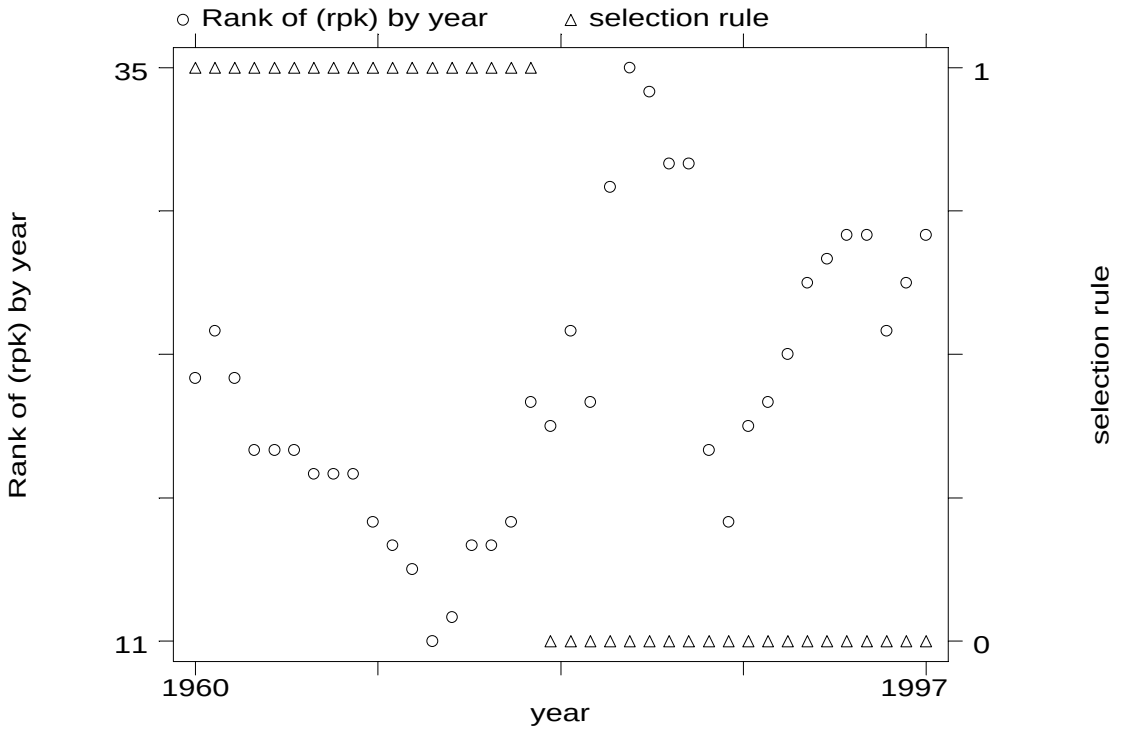

Figure 4: Effect of switching from electing to appointing on rank of electricity price in Texas
(Rank = 25.60 – (8.16)*elect: t-value 5.62)

Notes: Select = 1 if the state elects its utility commissioners. The rank is the cross-sectional rank in the distribution of residential prices of the state in each year.

Appendix Table 1: List of States

Elect: (10)	AZ, GA, LA, MS, MT, ND, NE, OK, SD.
Appoint: (32)	AK, AR, CA, CO, CT, DE, ID IL, IN, KS, KY, MA, MD, ME, MI, MO, NC, NH, NJ, NM, NV, NY, OH, OR, PA, RI, VT, WA, WI, WY, WV.
Switch: (6)	FL, IA, MN, SC, TN, TX.

Note:
- Florida switched from elect to appoint in 1981
- Iowa switched to an election system for 1962&3 only
- Minnesota used election 1960-71, appointing 1972-5 and electing from 1976-77 and appointment since 1978
- South Carolina switched to an election system in 1996
- Texas switched to an appointment system in 1977
- Tennessee switched to an appointment system in 1996