Is there a deadweight loss of politics in public service provision?

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This study examines how changes in political incentives impact state firms' decisions. We measure changes in political incentives using the timing of elections, since prior scholarly work has emphasized the incentive of elected officials to increase the supply of public goods and decrease taxes right before elections. We examine 503 municipal electric utilities in United States, during the years 1990 through 2013, that operate under the authority of a mayor and a council. We find that the price of electricity charged by municipal utilities is 1% higher two years before mayoral elections than in election years. Harberger's formula is used to compute the loss from this cyclicality in prices as 0.0001% of electricity revenues. Thus our measure of the deadweight losses of politics in public service provision are very close to zero, with a confidence interval that rules out effects greater than 0.0002% of electricity revenues. Our results can be explained by the fact that voters hold mayors accountable for electricity prices. We find that a 10% increase in the municipal utility electricity price reduces the number of votes to the incumbent mayor by 1–2% points, when state electricity prices are held constant. Further, voters seem to be able to distinguish competence from luck: a 10% increase in the municipal utility electricity prices concurrent with a 10% increase in state electricity votes has no effect on the number of votes obtained by the incumbent.

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1 Introduction

Accounts of successful privatizations are often used as evidence of state firms' inefficiencies. For instance, La Porta and Lopez-de-Silanes [1999] examine the performance of Mexican firms that were privatized between 1983 and 1991, and find that privatizations were followed by a 24 percentage point increase in the firms' ratio of income to sales. La Porta and Lopez-de-Silanes provide empirical evidence that these increases in profitability are due to shedding of excess labor. Further they argue that political constraints must have led state firms to keep excess labor, and hence that political factors were the main cause for the inefficiency of state firms, rather than managerial factors (e.g., lack of incentives and monitoring).

Nonetheless, not all privatizations are successful [Estrin et al., 2009]. Political factors can affect both the success of state firms and how successfully privatization are carried out. In order to systematically examine the impact of politics of the performance of state firms, this study examines how changes in political constraints impact state firms' decisions. We measure changes in political constraints by the timing of elections, since prior scholarly work has emphasized the incentive of elected officials to increase the supply of public goods and decrease taxes right before elections [Rogoff, 1990, Boylan and McKelvey, 1995, Levitt, 1997, Brender and Drazen, 2005, Shi and Svensson, 2006, Vlaicu and Whalley, 2013]. For instance, it has been hypothesized that incumbents have an incentive to boost the supply of public goods prior to elections, hoping that voters would attribute the boost to incumbents' competence

We examine 503 municipal electric utilities in United States, during the years 1990 through 2013, that operate under the authority of a mayor and a council. We find that the price of electricity charged by municipal utilities is 1% higher two years before an election. Harberger's formula is used to compute the loss from this cyclicality in prices as 0.0001% of electricity revenues. Thus our estimate of the political cost of state ownership are very close to zero, with a 95% confidence interval that rules out costs greater than 0.0002% of revenues.

Two contrasting electoral models are consistent with our finding. In the first model, voters do not put much weight on electricity prices when evaluating incumbents, and thus incumbents do not seek to manipulate voter expectation by delaying increases in electricity prices until after

an election.[1] In the second model, voters care about electricity prices, but cannot be fooled by incumbents delaying price increases until after an election.

To provide empirical support for these models, we regress the percent of the vote for the incumbent mayor on the municipal utility electricity price and the average state electricity price. We find that a 10% increase in the municipal utility electricity price reduces the number of votes to the incumbent mayor by 1–2% points, when state electricity prices are held constant. However, a 10% increase in the municipal utility electricity prices concurrent with a 10% increase in state electricity prices has no affect on the number of votes obtained by the incumbent. Thus if voters interpret low electricity prices as proxies for competence, voters can distinguish competence vs. luck.

Our results suggest that voters in mayoral elections are sophisticated in distinguishing the causes for increases in electricity prices. Thus our results are consistent with Besley and Case [1995], who find that increases in state taxes lead to an increase the probability of an incumbent defeat, except when neighboring states increase taxes at the same time.[2]

The sophistication of voters in U.S. municipal elections suggests that incumbent mayors are limited in how they can manipulate electricity prices. Thus, the costs of the political manipulations of electricity prices by U.S. municipal utilities are small compared to the political costs incurred by Mexican state firms in the 1980s [La Porta and Lopez-de-Silanes, 1999]. The reasonableness of this finding is corroborated by three exiting literatures.

First, existing empirical evidence suggests that municipal utilities in the United States operate relatively efficiently. For instance, using data from the 1970s, Atkinson and Halvorsen [1986] find that publicly and privately owned utilities in the United States are equally cost efficient. Boylan [2014] provides evidence consistent with municipal utilities being more likely to experience storm related outages than investor owned utilities, but finds the differences to be small.[3]

[1] There are many newspaper accounts that contradict this model. For instance, in the 2008 Plaquemine mayoral race, both the incumbent and challenger said they would lower city electricity bills if elected [Cruse, 2008]. In 2006, the mayor in Farmington was recalled after two hefty rate increases at the city-owned electric utility [St. Louis Post-Dispatch, 2006].

[2] Other studies have however provided evidence of voters' irrationality. Wolfers [2007] provides evidence that voters in oil-producing states tend to re-elect incumbent governors during oil price rises, and vote them out of office when oil prices drop. Similarly, Achen and Bartels [2012] provide evidence that voters in communities affected by a dramatic series of shark attacks in 1916 significantly punished the incumbent U.S. President at the polls.

[3] For the years 1950 through 1980, Rose and Joskow [1990] find that investor owned utilities adopt new technolo-

Second, Brender and Drazen [2005] and Shi and Svensson [2006] provide empirical evidence that country budgets are more likely to be manipulated before elections in developing countries and new democracies, compared to developed countries and old democracies.[4] Thus, it is not surprising that we find that manipulations of electricity prices are small in the United States.

Third, studies of municipal budgets in the United States have found political manipulations to be small. Specifically, Levitt [1997], McCrary [2002], Vlaicu and Whalley [2013] provide evidence that cities increase the number of police officers in mayoral election years, but the effect is small.[5] Similarly, Ferreira and Gyourko [2009] find that changes in the political affiliation of a city's mayor after a close election do not affect the size of city government, the allocation of local public spending, or crime rates.

While our findings are consistent with the prior literature, they still contribute to it. First, by studying a non-storable rivalrous private good, our results have direct welfare implications.[6] Second, given that we examine a good which is provided by both public and private firms, our results have direct implications for the privatization debate. Namely, we point out that the value of privatization dependends on the how efficiently state firms are run, which in turn depends on the political structure in place. Third, prior estimates of the effect of the electoral cycle on budgets in developed countries were based on small samples, and hence are imprecisely estimated. For instance, Brender and Drazen [2005] find that in election years, old democracies have an 11% smaller balance. However, the 95% confidence interval suggest that, in election years, old democracies could have a balance that could be 37% smaller or 16% larger than in non-election years. In contrast, in our study all the relevant parameters are precisely estimated.

gies before municipal utilities. However, this finding does not show that municipal utilities were inefficient since, during these years, the profits of investor owned utilities were capped by returns on capital, and thus investor owned utilities had incentives to overspend on new technologies. The relative efficiency of publicly owned electric utilities in the United States stands in contrast with international evidence, see for instance Allcott et al. [2015].

[4]Brender and Drazen [2008] also provide evidence that higher deficits in developed countries and old democracies reduce the likelihood of incumbents' reelection.

[5]For instance Vlaicu and Whalley [2013] find that mayors employ 0.6% more police officers in election years.

[6]In contrast, different levels of policing over the electoral cycle need not be inefficient. Clearly, if criminals cannot detect the cycle, differences in policing will have no impact on crime. If criminals can detect the cycle, Lando and Shavell [2004] show that a cycle can reduce crime. Specifically, in circumstances when allocating police resources evenly does not deter crime, it may be preferable to concentrate resources to deter crime is certain periods.

2 Estimates of welfare costs of cycles

First, we review the deadweight loss of an excise tax. For a specific good, we let c be marginal cost, Q be the quantity demanded when price is c, and let ϵ be the price elasticity of demand. Then, the Harberger formula for the deadweight loss from a per unit tax τ is $-(0.5)\tau^2\epsilon Q/c$.[7]

In our context, we compute the deadweight loss from charging a higher prices two periods before an election, in a city where they mayor has a four year term in office. To do so, we compare the deadweight loss of charging prices of $\tau + P$, two periods before and election and $P > c$ in other years, versus charging a price of $\tau/4 + P$ every year. In the first case, the average deadweight loss is

$$-(1/4)(0.5)[(\tau + P - c)^2 + 3(P - c)^2]\epsilon Q/c. \tag{1}$$

In second case, the deadweight loss is

$$-(1/4)(0.5)4(\tau/4 + P - c)^2\epsilon Q/c. \tag{2}$$

Thus, the deadweight loss from the electoral cycle is the difference between equation (1) and equation (2) or

$$-(3/16)0.5\tau^2\epsilon Q/c. \tag{3}$$

When we normalize the deadweight loss by electricity revenues collected when a utility charges marginal cost, we obtain

$$\frac{-(3/16)0.5\tau^2\epsilon Q/c}{cQ} = -(3/16)0.5(\tau/c)^2\epsilon. \tag{4}$$

In the empirical section we find that $\tau/c = 0.7\%$. Prior work suggests that an upper bound for

[7] This is the area of the triangle with one one side, the tax τ, and on the other side, the change in quantity $\epsilon\tau Q/c$.

the medium run price elasticity of demand is $\epsilon = -0.3$ [Borenstein, 2012].[8] Thus, the deadweight loss is

$$-(3/16) \times 0.5 \times (0.007)^2 \times (0.3) = 0.0001\% \text{ of revenues.}$$

Finally, we can use the delta method to compute the 95% confidence interval as [0.00001, 0.0002] percent of electricity revenues.

3 Empirical framework

In this paper we estimate two regressions. The first regression examines the effect of elections on electric utility's decisions. The second regression examines the effect of electricity prices on the percent of votes received by an incumbent.

In the first set of regressions, the unit of observation is a utility in city c, in state s, and year t. The variable $l(c,t)$ denotes the length of the term of office for a mayor in city c and year t, while $k(c,t)$ is the number of years remaining in that mayor's term. In order to estimate the impact of the electoral cycle on electricity prices, we estimate the following panel regression:

$$\ln \text{Price}_{cst} = \alpha_t^1 + \alpha_c^2 + \alpha_{l(c,t)}^3 + \beta_{k(c,t)}^{l(c,t)} + \gamma \, \Delta \ln \text{State Price}_{cst} + \epsilon_{cst}. \tag{5}$$

In the result section, we will provide evidence that in cities where mayors are elected to four years in office, electricity prices are higher two years before the mayoral election. I.e., we provide evidence of an electoral cycle

$$\beta_3^4 = 0\%, \quad \beta_2^4 = 0.7\%, \quad \beta_1^4 = 0\%, \quad \beta_0^4 = 0\%.$$

In the second set of regressions, we restrict our sample to election years and estimate the impact

[8] Long-run price elasticities are believed to be at least as high as -0.7 [Sweeney, 1984, Rapson, 2014]. We can also estimate the price elasticity in our sample by two stage least squares. Specifically, we regress the quantity of electricity purchased on the municipal electricity price, with state prices as the instrument, and find a price elasticity of demand of -0.19.

of electricity prices on the percent of the votes received by the incumbent; i.e., we estimate the following regression:

$$\%\ \text{Inc}_{cst} = \alpha_t^1 + \alpha_s^2 + \gamma \text{Price}_{cst} + \delta \text{State Price}_{cst} + \nu_{cst}, \tag{6}$$

We may be concerned that weaker incumbents (i.e., small ν_{cst} incumbents) are less likely to raise prices, thus leading γ to be upward biased. If this were true, the coefficient of γ would be smaller when we include controls for the strength of the incumbent. For this reason, we rerun regression (6) with, as an additional control, Prior % Inc_{cst}, the percent of the votes received by the incumbent in the election before year t:

$$\%\ \text{Inc}_{cst} = \alpha_t^1 + \alpha_s^2 + \beta(\text{Prior}\ \%\ \text{Inc}_{cst}) + \gamma \text{Price}_{cst} + \delta \text{State Price}_{cst} + \nu_{cst}. \tag{7}$$

If we obtain a significantly smaller coefficient for γ in regression (7) than in regression (6), then this would indicate that weaker incumbents are less likely to raise prices.

4 Description of our sample of municipal utilities

In this section we describe our sample, as well as providing an overview of city government and electric utilities in the United States. The sources of the data are listed in Table 2 at the end of the paper.

In 2011, 14% of U.S. residential customers received electricity from a municipal utility, versus 74% from investor owned utility and 12% from cooperatives. While other countries have privatized government owned utilities, in the United States the fraction of residential customers served by a municipal utility has remained stable for several decades. For instance, Table 1 provides information on acquisition of electric utilities between 1985 and 2013. Over this period, only four municipal utilities were acquired, while five utilities were municipalized. More recently, the press has reported calls to municipalize investor owned utilities, rather than calls to privatize municipal utilities [Singer, 2012, Cardwell, 2013, Bruun, 2009, Janoski, 2012].

Table 1: Acquisition of utilities, by ownership type during the years 1985–2013

		Acquired		
		Cooperative	Investor Owned	Municipal
Acquirer	Cooperative	71	8	3
	Investor Owned	3	88	1
	Municipal	1	4	0

Sources: UDI Directory of electric Power Producers and Distributors, 2012 Edition; U.S. Energy Information Administration, Electric power sales, revenue, and energy efficiency (Form EIA-861), detailed data files

Our sample consists of 503 municipal utilities that are under to control of a mayor and city council for which we could find mayoral election information. Thus, the following types of utilities are *not* in our sample: 1. utilities belonging to political entities other than a municipality (e.g., county or state), 2. utilities in cities where voters do no elect their mayors, 3. utilities in cities where voters elect members of the utilities board or where utility board members are appointed by the state, 4. utilities in cities where we could not find information on mayoral elections over our entire sample.[9]

Table 3 provides summary statistics for our sample. The utilities are located in 44 different states, although 81% of utilities are in the south and in the midwest. The average utility is located in a city with 44,017 individuals and serves 19,283 residential customers. This number is misleading since our sample includes a few very large cities (e.g., Los Angeles, Seattle, San Antonio). When, we remove the 10% largest cities from our sample, the average utility is located in a city with 19,055 individuals and serves 7,642 residential customers. Nonetheless, the other characteristics of the sample are unaffected by the inclusion of large cities.

In 2012, the average population size among the 7,640 cities, townships, and villages reporting to the Census of Government was 12,611, although 78% of individuals lived in a city with population greater than 23,659. Given that individuals living in smaller towns in the south and the midwest tend to earn less, it is not surprising that the the average income in the cities in our sample is 53% of the U.S. income per capita in 2012.

On average the utilities in our sample charge 9¢ per kWh, where throughout, all dollar amounts

[9]Information on the appointment method of board members to utilities was obtained from 1992 Census of Governments, Government Organization, city charters, and utility board charters.

are normalized to 2012 dollars. This is the same price charged by the other utilities in the same state (mostly, investor owned). This is not surprising since the municipal utilities in our sample mostly sell electricity that they purchase wholesale and generate only 9% of the electricity they sell.

It can also be seen that utility revenues represent a 31% markup over operating expenses. Part of the markup are transfers to the cities' general funds ($64 per capita).[10] Thus, in contrast to many government owned firms, utilities are not subsidized by the general treasury. Further, these transfers imply that utilities charge more than marginal cost.

U.S. cities tend to adopt one of two forms of government: mayor-council and council-manager. In mayor-council cities, the executive authority is in the hands of the mayor, while in council-manager cities, the executive authority is in the hands of a council-appointed manager.[11] Nelson [2011] finds that 55.5% of cities with at least 10,000 individuals have council-manager government, while 45.5% have mayor-council government. Council-manager cities can be further split in the 34.6% where voters elect the Mayor, and 20.9% where the council elects the mayor. A majority of cities in our sample have a mayor-council government, in part because we have excluded from our sample cites where the council elects the mayor.

Prior work has shown that the form of government affects cities' spending decisions [Coate and Knight, 2011, Vlaicu and Whalley, 2013]. Further, we expect the political pressure faced by utilities to differ depending on whether the executive authority is in the hands of the mayor or the city manager. For instance, it it is more likely that low prices proxy for competence in mayor-council cities than in city-manager cities. For this reason, we re-run all regression on the subsample of cities with mayor-council governments.[12]

Cities also vary with respect to the mayor's term in office. In our sample, the mayoral term is four years or more for 65% of observations, and two years for 27% of observations. Further, 350

[10]There is some evidence that these transfers are used to lower property taxes. For instance, Strauss and Wertz [1976] find that North Carolina cities with municipal electric utilities collect $26.33 in property taxes per capita, versus $44.90 for cities without municipal electric utilities. Similarly, Stumm and Khan [1996] find that U.S. cities with municipal electric utilities collect $121 in property taxes per capita versus $274 for cities without municipal electric utilities. In contrast, in India, government subsidies amount to 20 percent of the distribution companies revenues in 2009 [Allcott et al., 2015].

[11]The council is the legislative body of the city. Often, in council-manager cities, the mayor is the head of council.

[12]Over our sample, only three cities change form of government.

cities in our sample elect mayors for the same term of office throughout our entire sample.[13] In this paper, we are able to obtain precisely estimated effects because we analyze the electoral cycle of a large number of cities. It is also crucial that in 38 states (out of 44) there is variation amongst cities in the mayoral electoral cycle. To illustrate one of the numerous ways in which this variation occurs, we discuss one state in greater detail. In Iowa, all municipal elections in our sample occur in odd years, fives cities have two year mayoral terms, two cities have four year mayoral terms, and two cities switch from two year terms to four year terms. Thus depending on the year, 0%, 55%, 67%, 100% of cities in Iowa have a mayoral election.

The number of voters in mayoral election in our sample equals 21% of the city population. In contrast the number of voters in the 2012 U.S. presidential election equalled 23% of the U.S. population. Finally, most elections are not close: on average, the winners obtain 68% of the total votes. This is similar to Ferreira and Gyourko [2009]: in their sample, on average, winners obtain 66% of the votes.

5 Results

Table 4 summarizes the results of regressing the log of electricity price on the electoral cycle, average state prices, year fixed effects, and utility fixed effects, with standard errors clustered at the state level. We see that in cities where the mayor is elected for a term of at least four years, the price of electricity is 0.7% higher two periods before the mayoral election. Our result does not change qualitatively depending on wether we include length of term fixed effects, utility fixed effect, state-year fixed effects (i.e., an effect for Alabama in 1990, Alabama in 1991, ...), or estimate the model in first differences. When we run the regression on just the sample of cities with mayor council governments, we find that the price of electricity is 1% higher two periods before the mayoral election. Thus, mayors with greater executive authority are more likely to delay increases in electricity prices until after an election. We also ran the regression without the 76 observations with mayoral terms greater than four years, and obtain almost identical results. In conclusion, we

[13] Changes in length of office can occur because of a change in city charter or because of a special election to replace a recalled, resigned, or deceased mayor.

precisely estimate the electoral cycle in electricity pricing and it is of small magnitude.

La Porta and Lopez-de-Silanes [1999] attributed state firm inefficiencies to bloated payrolls. For this reason, we also estimate the effect of the electoral cycle on the electric utility total payroll, see Table 5. We would expect utilities to be more likely to cut average wage and reduce the number of employees for from elections. Again, we find that any electoral manipulations of the payroll are small in magnitude. For mayor-council cities, the payroll is 2.2% lower two years before an election than in another year.

One possible concern with our results is that we may have picked an issue (electricity pricing) that is not salient to voters. For this reason we regress the percent of votes received by the incumbent mayor on the municipal utility price and the state price. We might expect voters to hold incumbent more accountable if they are elected to four years versus two years. Thus, we organize the results by the mayor's length of term. In regression (1) in Table 6, we control for year fixed effects, state fixed effects, and cluster the standard errors at the state level. For four year (or longer) mayoral terms, we see that when holding state electricity prices constant, a 10% increase in the municipal prices decreases the percent of votes for the incumbent by 1%. We may be concerned that the price variable is correlated with the strength of the incumbent, for instance if weak incumbents are less likely to raise electricity prices. For this reason, we rerun the regression with as a control for the strength of the incumbent, the percent of the votes that the incumbent received in the previous election, see regression (2). We cannot reject the hypothesis that the coefficient for Price is the same in regression (1) and regression (2).[14] Thus, although weaker incumbent do pick lower electricity prices, this effect is statistically insignificant. We re-run the regression controlling for utility and state-year fixed effects and find that a 10% increase in the municipal prices decreases the percent of votes for the incumbent by 1–2%. Finally we re-run the regression only on cities with Mayor-Council governments and obtain similar results. However, we find no such effects for cities with two year terms.

[14]The chi-square statistic is 0.26 which corresponds to a p-value of 0.6.

6 Conclusion

We examine 503 municipal electric utilities in United States, during the years 1990 through 2013, that operate under the authority of a mayor and a council. We find that the price of electricity charged by municipal utilities is 1% higher two years before mayoral elections. Harberger's formula is used to compute the loss from this cyclicality in prices as 0.0001% of electricity revenues. Thus our measure of the political cost of state ownership are very close to zero, with a confidence interval that rules out effects greater than 0.0002% of revenues. Further, empirical results suggest that voters hold mayors accountable for electricity prices. We find that a 10% increase in the municipal utility electricity price reduces the number of votes to the incumbent mayor by 1–2% points, when state electricity prices are held constant. Suppose that voters view low electricity prices as a sign a mayor's competence. Then, we also provide empirical evidence that voters are able to distinguish competence form luck: a 10% increase in the municipal utility electricity prices concurrent with a 10% increase in state electricity votes has no affect on the number of votes obtained by the incumbent.

While our findings are consistent with the prior literature, they still contribute to it. First, by studying a non-storable rivalrous private good, our results have direct welfare implications. In particular, it allows us to compute the deadweight loss of the electoral cycle using the standard Harberger formula. Second, given that we examine a good which is provided by both state and private firms, our results have direct implications for the privatization debate. Namely, that the value of privatization is dependent on the how efficiently publicly owned utilities are run, which in turn depends on the political structure in place. Third, prior estimates of the effect of the electoral cycle on budgets in developed countries were based on small samples, and hence are imprecisely estimated. In contrast, given our large sample size, our estimates are both small and precisely estimated.

References

Christopher H. Achen and Larry M. Bartels. Blind retrospection: Why shark attacks are bad for democracy. Mimeo, 2012.

Hunt Allcott, Allan Collard-Wexler, and Stephen D. O'Connell. How do electricity shortages affect industry? Evidence from india. Mimeo, 2015.

Scott E. Atkinson and Robert Halvorsen. The relative efficiency of public and private firms in a regulated environment: The case of U.S. electric utilities. *Journal of Public Economics*, 29(3): 281–294, April 1986.

Timothy Besley and Anne Case. Incumbent behavior: Vote-seeking, tax-setting, and yardstick competition. *American Economic Review*, 85(1):25–45, March 1995.

Severin Borenstein. The redistributional impact of nonlinear electricity pricing. *American Economic Journal: Economic Policy*, 4(3):56–90, August 2012.

Richard T. Boylan. Power to the people: Does ownership type influence electricity service? Mimeo, 2014.

Richard T. Boylan and Richard D. McKelvey. Voting over economic plans. *American Economic Review*, 85(4):860–871, September 1995.

Adi Brender and Allan Drazen. Political budget cycles in new versus established democracies. *Journal of Monetary Economics*, 98(7):1271–1295, October 2005.

Adi Brender and Allan Drazen. Do budget deficits and economic growth affect reelection prospects? evidence from a large panel of countries. *American Economic Review*, 98(5):2203–2220, December 2008.

Matthew Bruun. Municipal utilities pondered after storm mess; irate customers looking for options. *Sunday Telegram (Massachusetts)*, A1, January 11, 2009.

Diane Cardwell. Power to the people. *New York Times*, B1, March 14, 2013.

Stephen Coate and Brian Knight. Government form and public spending: Theory and evidence from us municipalities. *American Economic Journal: Economic Policy*, 3(3):82–112, August 2011.

Deidre Cruse. Plaquemine mayors race: Gulotta, challenger Ramirez eye high city electricity rates. *Plaquemine Post South*, Oct 3, 2008.

Saul Estrin, Jan Hanousek, Evžen Kočenda, and Jan Svejnar. The effects of privatization and ownership in transition economies. *Journal of Economic Literature*, 47(3):699–728, September 2009.

Fernando Ferreira and Joseph Gyourko. Do political parties matter? Evidence from U.S. cities. *Quarterly Journal of Economics*, 124(1):399–422, February 2009.

Steve Janoski. 2 towns want to join Butler utility after company's fast storm repairs. *The Record (Berger County, NJ)*, L03, November 17, 2012.

Rafael La Porta and Florencio Lopez-de-Silanes. The benefits of privatization: Evidence from Mexico. *Quarterly Journal of Economics*, 114(4):1193–1242, November 1999.

Henrik Lando and Steven Shavell. The advantage of focusing law enforcement effort. *International Review of Law and Economics*, 24(2):209–218, June 2004.

Steven D. Levitt. Using electoral cycles in police hiring to estimate the effect of police on crime. *American Economic Review*, 87(3):270–290, 1997.

Justin McCrary. Using electoral cycles in police hiring to estimate the effect of police on crime: Comment. *American Economic Review*, 92(4):1236–1243, September 2002.

Kimberly Nelson. State-level autonomy and municipal government structure: Influence on form of government outcomes. *American Review of Public Administration*, 41(5):542–561, September 2011.

David Rapson. Durable goods and long-run electricity demand: Evidence from air conditioner purchase behavior. *Journal of Environmental Economics and Management*, 68(1):141–160, July 2014.

Kenneth Rogoff. Equilibrium political budget cycles. *American Economic Review*, 80(1):21–36, March 1990.

Nancy L. Rose and Paul L. Joskow. The diffusion of new technologies: evidence from the electric utility industry. *RAND Journal of Economics*, 3(21):354–373, Autumn 1990.

Min Shi and Jakob Svensson. Political budget cycles: Do they differ across countries and why? *Journal of Public Economics*, 90(8–9):1367–1389, September 2006.

Stephen Singer. Connecticut eyes utility system changes. *Berkshire Eagle*, November 22, 2012.

St. Louis Post-Dispatch. Voters oust mayor in recall spurred by hefty electric rate increases. B4, August 9, 2006.

Robert P. Strauss and Kenneth L. Wertz. The impact of municipal electric profits on local public finance. *National Tax Journal*, 29(1):22–30, March 1976.

Theodore J. Stumm and Aman Khan. Effects of utility enterprise fund subsidization on municipal taxes and expenditures. *State & Local Government Review*, 28(2):103–113, Spring 1996.

James L. Sweeney. The response of energy demand to higher prices: What have we learned? *American Economic Review*, 74(2):31–37, May 1984.

Razvan Vlaicu and Alexander Whalley. Hierarchical accountability in government: Theory and evidence. Mimeo, University of Maryland, 2013.

Justin Wolfers. Are voters rational? Evidence from gubernatorial elections. Mimeo, 2007.

Table 2: Sources

Variable	Source
Electricity sales, electricity revenues, number of residential consumers	U.S. Energy Information Administration, Annual Electric Power Industry Report (EIA-861)
State average electricity prices	U.S. Energy Information Administration, State Energy Data System (SEDS)
Markup, transfer to city general revenues	U.S. Energy Information Administration, survey EIA-412, Annual Electric Industry Financial Report
Full time equivalent number of employees working for the electric utility, total compensation for work in electric utility[1]	U.S. Census, Government Employment and Payroll
City population	U.S. Census of State and Local Finances
City income per capita	Census 1990, Census 2000, American Community Survey 2009–2013 (5-Year Estimates)[2]
Mayoral elections	Ferreira and Gyourko [2009], Newsbank, Factiva, Google News Archive, city council minutes, county electoral boards web sites, `www.ourcampaigns.com`

[1] Salaries, wages, commission, and overtime before witholdings for taxes, insurance and other, but excluding fringe benefits.

[2] Income per capita estimates for the other years are interpolations.

Table 3: Average values

Utilities	All (n=503)	Small (n=453)
Percent Northeast	6	7
Percent Midwest	35	37
Percent South	46	44
City population	44,017	19,055
Residential customers	19,283	7,642
Percent sales residential	38	38
Income per capita	23,744	23,496
Price (¢ per kWh)	9	9
State price (¢ per kWh)	9	9
Percent self-generated	9	6
Number of employees	105	32
Average utility wage	55,379	53,815
Percent markup	31	28
Utility's transfer to city ($ per capita)	64	60
Percent mayor-council	62	64
Percent 2-year term	27	27
Percent 4-year term	65	66
Percent voters per capita	21	22
Percent votes for winner	68	68

"Small utilities" refer to all utilities except for the 10% largest utilities (by average number of residential consumers). "Markup" is the difference between operating revenues and operating costs (measured as a percentage of operating costs). All monetary amount are in 2012 dollars

Table 4: Electricity prices as a function of mayoral election cycle

	(1) Price	(2) Price	(3) Δ Price	(4) Price	(5) Price
(Term ≥ 4) $\times$ (Election @ $t+2$)	0.007**	0.007***	0.006**	0.006***	0.010***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
(Term ≥ 4) $\times$ (Election @ $t+1$)	0.001	0.001	-0.003	0.002	0.004
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
(Term ≥ 4) $\times$ (Election)	-0.002	-0.002	-0.003	-0.003	0.001
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
(Term $= 3$) $\times$ (Election @ $t+1$)	0.002	-0.006	-0.003	0.005	-0.001
	(0.008)	(0.008)	(0.004)	(0.006)	(0.019)
(Term $= 3$) $\times$ (Election)	0.004	-0.004	0.001	0.011	0.007
	(0.009)	(0.009)	(0.004)	(0.009)	(0.021)
(Term $= 2$) $\times$ (Election)	0.000	0.001	0.001	0.003	-0.006
	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)
State Price	0.572***	0.572***			0.590***
	(0.074)	(0.074)			(0.089)
Δ State Price			0.394***		
			(0.047)		
Term ≥ 4		0.083**		-0.047***	
		(0.038)		(0.010)	
Term $= 3$		0.095**		-0.092***	
		(0.040)		(0.021)	
Term $= 2$		0.081**		-0.048**	
		(0.039)		(0.022)	
R-squared	0.87	0.87	0.15	0.60	0.87
N. of observations	11,807	11,807	11,303	11,807	7,303
Additional fixed effects	Utility	Utility		State–Year	Utility
Subsample					Mayor-Council

Price of electricity is in logs. All regression include year fixed effects. Standard errors are clustered at the state level.

Table 5: Electrical utility payroll as a function of mayoral election cycle

	(1) Pay	(2) Pay	(3) Δ Pay	(4) Pay	(5) Pay
(Term ≥ 4) $\times$ (Election @ $t+2$)	-0.008	-0.005	-0.007	0.044	-0.022**
	(0.009)	(0.008)	(0.008)	(0.046)	(0.010)
(Term ≥ 4) $\times$ (Election @ $t+1$)	-0.013	-0.011	-0.003	0.027	-0.012
	(0.012)	(0.010)	(0.011)	(0.033)	(0.014)
(Term ≥ 4) $\times$ (Election)	-0.011	-0.008	0.001	0.003	-0.016
	(0.011)	(0.010)	(0.012)	(0.034)	(0.013)
(Term $= 3$) $\times$ (Election @ $t+1$)	0.049	0.038	0.025	-0.116	0.061
	(0.031)	(0.023)	(0.025)	(0.071)	(0.039)
(Term $= 3$) $\times$ (Election)	0.035	0.024	-0.007	0.010	0.035
	(0.021)	(0.016)	(0.021)	(0.063)	(0.034)
(Term $= 2$) $\times$ (Election)	-0.003	-0.005	-0.006	-0.011	-0.019
	(0.010)	(0.010)	(0.012)	(0.022)	(0.019)
State Price	-0.060	-0.061			-0.152
	(0.152)	(0.150)			(0.159)
Δ State Price			0.080		
			(0.076)		
Term ≥ 4		-0.065***		-0.944***	
		(0.023)		(0.139)	
Term $= 3$		-0.039		-0.552***	
		(0.042)		(0.159)	
Term $= 2$		-0.051		-1.259***	
		(0.041)		(0.092)	
R-squared	0.97	0.97	0.06	0.43	0.97
N. of observations	6,447	6,447	4,905	6,447	3,600
Additional fixed effects	Utility	Utility		State–Year	Utility
Subsample					Mayor-Council

Total pay for all employees of electric utility is in logs. All regression include year fixed effects. Standard errors are clustered at the state level.

Table 6: Percent votes for incumbent mayor – cities with mayoral terms of at least four years

	(1)	(2)	(3)	(4)	(5)	(6)
Price	-0.097**	-0.109***	-0.188***		-0.115**	-0.120**
	(0.043)	(0.037)	(0.064)		(0.054)	(0.047)
State Price	0.186	0.181	0.216			0.083
	(0.163)	(0.163)	(0.223)			(0.154)
Prior % Incumbent		0.340***	-0.030	-0.030	0.391***	0.400***
		(0.073)	(0.076)	(0.076)	(0.107)	(0.098)
Price − State Price				-0.192***		
				(0.057)		
R-squared	0.10	0.18	0.57	0.57	0.44	0.21
N. of observations	985	828	828	828	828	578
Additional fixed effects	State	State	Utility	Utility	State–Year	State
Subsample						Mayor-Council

Price of electricity is in logs. All regression include year fixed effects. Standard errors are clustered at the state level.

Table 7: Percent votes for incumbent mayor – cities with mayoral terms of two years

	(1)	(2)	(3)	(4)	(5)	(6)
Price	0.018	0.017	0.113		0.001	0.053
	(0.047)	(0.043)	(0.150)		(0.065)	(0.099)
State Price	0.031	0.094	0.063			0.379
	(0.137)	(0.151)	(0.214)			(0.298)
Prior % Incumbent		0.204***	0.015	0.015	0.233**	0.161
		(0.060)	(0.067)	(0.066)	(0.087)	(0.104)
Price − State Price				0.090		
				(0.144)		
R-squared	0.10	0.14	0.33	0.33	0.42	0.17
N. of observations	853	709	709	709	709	325
Additional fixed effects	State	State	Utility	Utility	State–Year	State
Mayor-Council						Mayor-Council

Price of electricity is in logs. All regression include year fixed effects. Standard errors are clustered at the state level.