Do Elected Public Utility Commissioners Behave More

Politically than Appointed Ones?

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In the United States, public utility commissioners are either appointed or elected and the vast majority is either Republican or Democrat. While previous research has analyzed whether selection method and political affiliation have independent effects on the policy choices of these commissioners, this paper investigates whether these influences may be interrelated and how this question can be analyzed empirically. The context explored in this paper is telecommunications network lease prices and retail prices. While data limitations preclude causal interpretations, the political affiliation of elected commissioners may be correlated with the lease prices that they set. Further, retail prices may vary with the political affiliation of appointed regulators.

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1. Introduction.

State public utility commissions are responsible for regulating industries that have a direct impact on the daily life of nearly every citizen. These commissions are typically responsible for ensuring that consumers and businesses have access to dependable telecommunications, electricity, and water services at reasonable prices. The ubiquitous use of these services ensures that the policies adopted by the commissions have far-reaching effects.

While these commissions can differ in a number of ways, two of the most significant are the means by which the commissioners are selected and their political affiliation. In almost every state, commissioners attain office by being appointed by the governor or by winning statewide elections.[1] Thus, depending on the state, commissioners are either chosen by a single individual or must win a plurality of the votes in the state. The political affiliation of commissioners also varies significantly across states and over time. While a small number of commissioners describe themselves as independents, the vast majority is either Republican or Democrat. In some states the number of Republican and Democrat commissioners differs by only one, while in others all of the commissioners are of the same party.

This paper investigates whether the means by which public utility commissioners are selected affects the influence of political affiliation on policy choices. Specifically, do appointed commissioners and elected commissioners of the same party behave differently in office? Further, does the selection method affect differences between Republican and Democratic commissioners? This paper explores how summary statistics and regression analyses of policy outcomes may be employed to answer these questions.

These empirical approaches are applied to two prices set by public utility commissions: the price at which competitive telecommunications firms can lease a portion of the incumbent's

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[1] The three exceptions to these two methods occur in South Carolina, Virginia, and Tennessee. In South Carolina and Virginia, the state legislatures elect the commissioners. In Tennessee, one commissioner is appointed by the Governor, another by the Lieutenant Governor, another by the Speaker of the House, and a final commissioner is jointly appointed by the Governor, Lieutenant Governor, and Speaker of the House.

network and the incumbent's retail price. The results suggest that the means by which a commissioner is selected may be related to the influence of his/her political affiliation. While political affiliation appears to have limited influence on lease prices set by appointed commissioners, elected Democratic commissioners are associated with higher lease prices relative to elected Republican commissioners. Conversely, appointed Republican commissioners are associated with higher retail prices than appointed Democrats. Due to differences in the data on lease prices and retail prices are estimated, caution is warranted in making comparisons between the two sets of results. The limited number of shifts in political affiliation in the data further limits the ability to reach definitive conclusions. However, the findings indicate that analyses of political effects may benefit from exploring whether the effects are influenced by selection method.

Prior studies have analyzed the independent effects of how public utility commissioners are chosen and the influence of their political affiliation.[2] In their analyses of the telecommunications lease prices that are analyzed this paper, Lehman and Weisman (2000), Beard and Ford (2004), and de Figueiredo and Edwards (2004) find that prices are higher in states with elected public utility commissioners. Studies of the relationship between selection method and retail telecommunications and electricity prices tend to find that, in states with elected commissioners, prices are either lower (Besley and Coate (2003), Smart (1994)) or not statistically significantly different (Primeaux and Mann (1986)) from prices in states with appointed commissioners. In regards to political affiliation, de Figueiredo and Edwards (2004) do not find a link between the political affiliations of commissioners and telecommunications lease prices.

This paper improves upon the existing literature both in the analysis employed and the

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[2] While the papers mentioned in the main text are the most relevant to the analysis below, there is a long line of research into the determinants of policy choices by public utility commissioners. Important contributions include Baron (1988), Boyes and McDowell (1989), Costello (1984), Fields, Klein, and Sfirdis (1997), Hagerman and Ratchford (1978), Harris and Navarro (1983), and Navaro (1982).

data used. Prior studies assume that the effects of commissioner political affiliation do not vary with the method by which the commissioner came into office. The empirical approaches proposed here may provide insight into how to determine if the means by which commissioners attain office influences the policies they implement. Further, these effects are compared across wholesale and retail prices. The effects of political affiliation and selection method may vary due to differences in the parties involved and how visible the prices are to voters. To measure the effects on wholesale prices, a unique data set is employed that captures the entire history of the lease prices for each state. An analysis of retail prices over the same period for certain metropolitan locations is also performed.

The remainder of the paper is organized as follows. Section 2 explains how state public utility commissions set retail and wholesale telecommunications prices. Sections 3 and 4 outline how it may be possible to determine whether the effects of commissioner political affiliation are influenced by how he/she attained office. Section 3.1 presents summary statistics regarding public utility commissions and wholesale prices, while Section 3.2 presents the results of a regression analysis. Section 4 follows the same approach in investigating retail prices. Section 5 concludes.

2. Background information.

The lease prices analyzed in this paper are for Unbundled Network Elements (UNEs). Under the Telecommunications Act of 1996,[3] competitive local phone companies are able to lease UNEs from incumbent phone companies in order to provide phone service to their customers.[4] The focus of this paper is the UNE price for the local loop.[5] The local loop is the wire that runs from the customer's premises to the switching equipment that connects the wire to

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[3] Pub. L. No. 104-104, 100 Stat. 56 (codified at 47 U.S.C. Section 151).

[4] Some rural incumbent phone companies are not obligated to lease UNEs to entrants.

[5] Specifically, it is the price set for the former Regional Bell Operating Companies.

the broader telephone network. Unless a competitive company chooses to build its own network, it must lease the local loop from the incumbent. Typically incumbent companies favor higher UNE prices while competitive firms favor lower ones.[6]

State public utility commissions are required to set UNE prices. The Federal Communications Commission determined that the prices are to be based on the cost a hypothetical firm would incur if it were to build the network today using the most efficient technology available (U.S. Federal Communications Commission (1996)). This methodology, known as TELRIC, requires that the state commissions determine both the most efficient technology and the cost of deploying that technology. These somewhat vague guidelines can introduce a significant degree of latitude in interpretation and may allow for factors other than cost to influence how the prices are set.

State public utility commissions also have substantial discretion over retail telecommunications prices. The commissions control the local service prices of large incumbents through either rate-of-return regulation or some form of incentive regulation, which may include price caps or price freezes.[7] Under rate-of-return regulation, the commissions oversee retail prices by determining the margin by which the incumbent can price above cost. Incentive regulation typically involves commissions setting an upper bound on a price index that incorporate a number of services, including local service. Further, many incentive regulation plans contain specific restrictions on local phone service prices.

The potential variability resulting from the relative freedom commissions have in setting these wholesale and retail prices is compounded by heterogeneity across public utility commissions. As described above, the commissions can differ in the means by which

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[6] While incumbents argue for higher UNE prices to state public utility commissions, Sappington (2005) constructs a theoretical model that suggests the price at which an entrant can lease an input may have little effect on its decision to lease the input from the incumbent supplier or make the input itself. This conclusion arises because the lease price influences the intensity of downstream competition such that the incumbent tends to price less aggressively when the lease price paid by the competitor is higher.

[7] Nebraska and South Dakota are exceptions. In 1986 Nebraska deregulated retail prices, but reserved the right to reverse local price increases upon petition by affected customers. South Dakota deregulated retail prices in 2003.

commissioners are selected and their political affiliation. The commissions can also differ in other ways, such as the number of sitting commissioners, their term lengths, the industries they regulate, and the available research support.

In their theoretical model, Besley and Coate (2003) find that elected commissioners favor consumers by setting lower retail prices. However, their model does not explicitly analyze the effects of commissioner selection method on wholesale prices such as UNE prices. Given their preference for pro-consumer policies, elected commissioners may prefer lower UNE prices as they may lead to more competitive entry and lower retail prices. On the other hand, whereas retail price determinations may be somewhat visible and easily understood by voters, UNE price determinations may be much less so. The amount paid by consumers is not directly related to UNE prices and the prices receive little attention in the media. Given the relative obscurity of UNE prices and that the methodology is dictated by the FCC, elected commissioners may feel less pressure to set lower prices. In fact, elected commissioners may view UNE prices as an opportunity to curry favor with incumbent providers that they may have previously alienated when voting for lower retail prices.

3. UNE price analysis.

3.1. Summary Statistics.

The policy choices of public utility commissioners can be analyzed both in terms of their levels and how they change over time. The first part of this section employs summary statistics to investigate UNE price levels, while the second part examines UNE price changes.

The UNE price data capture every instance from 1996 through 2004 in which a state public utility commission set or revised the UNE local loop price.[8] Specifically, the price is the

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[8] UNE prices are often revised by state commissions at the conclusion of interconnection agreements between incumbents and entrants. However, if neither the incumbent nor entrant objects to the existing UNE price, commissions typically do not revisit the existing price. Thus, the results below can be interpreted as being conditional on the commission revising the rate.

statewide[9] average monthly price an entrant must pay to lease the incumbent's local loop.[10] The resulting data set contains 117 observations. (The appendix describes the data sources.) Figure 1 illustrates how the prices varied significantly immediately after the Telecommunications Act became law. As time passed, the prices generally fell and became less divergent.

The price data are combined with data regarding the political affiliation of the commissioners and the means by which they are selected. Table 1 details how the average UNE price varies by commission political affiliation and selection method. While the overall average price is roughly $16, the average price set by elected commissioners is roughly 25% higher than that set by appointed commissioners. This difference is statistically significant at a confidence level of greater than 99%. Conversely, the average UNE price does not differ significantly by commission political affiliation.

However, differences attributed to commissioner selection method may vary by political affiliation. For instance, elected Democrats may be more inclined than elected Republican to pursue policies that may lower consumer prices. As such, elected Democrats may be associated with lower UNE prices than elected Republicans. To investigate this possibility, the bottom half of Table 1 describes the average UNE price by political affiliation, holding constant the selection method. The data indicate that, within each selection method, prices vary little by political affiliation.

In addition to looking at price levels, price changes may shed light on the effects of political affiliation and selection method. Table 2 divides the 72 UNE price changes in the data by whether the change was greater or less than the median price change.[11] While the selection

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9   Since 2000 and sometimes earlier, state public utility commissions have set prices that vary within the state according to how densely populated the local area is. Given that these deaveraged rates were not introduced until halfway through the sample period, the statewide average is used.

[10] Excluded from the sample are instances where the commission revised the price to address a technical error in the calculation of the previous price and where the incumbent voluntarily lowered the price. Observations for South Carolina and Virginia are also excluded because commissioners in these states are elected by state legislatures, rather than appointed by the governor or elected via statewide elections.

[11] The median UNE price change in the sample is -$1.04.

method appears to have little or no relationship to UNE price changes, a slight majority of the changes by Republican commissions was less than the median amount. Conversely, a slight majority of the changes by Democratic commissions was greater than the median. However, the slight differences and the limited number of price changes do not allow for any conclusive findings.

Another angle by which to investigate the data is to look at how UNE prices change following a change in commission political affiliation. Of the 72 UNE price changes during the period, Table 3 indicates that roughly half were made by commissions whose political affiliation had changed since their previous UNE price determination. The first column of Table 3 is limited to those instances in which Republican representation had increased, while the second column is limited to increases in Democratic representation. While there is some variation in the price changes, none of the pairs of means differ statistically.

The analysis of price levels and price changes yield somewhat different results. The summary statistics of price levels suggest that there may be a relationship between commissioner selection method and UNE prices that does not vary substantially by political affiliation. Yet, this relationship is not present in the data regarding price changes. The next section explores these relationships further via regression analysis.

3.2. Regression Results

A potential test for the influence of political affiliation on commission choices is to regress the policy instrument on a proxy value for that instrument and variables that reflect the commissioners' political affiliation. The political affiliation variable can then be interacted with the selection method to test if the effect of political affiliation varies by how the commissioner attained office. If this interaction term is significant, it provides some evidence that the two effects are interrelated. In the current context, this approach entails regressing the UNE price on a proxy for the cost of the local loop and variables that measure commission political affiliation and selection method. Table 4 describes the variables used in this analysis.

The embedded cost of the loop is used as a proxy for the UNE price. The embedded cost is based on the actual cost that the incumbent incurred to build the local loop. The backward-looking nature of the embedded cost differs from the forward-looking nature of the TELRIC cost upon which the UNE price is to be based. As Table 4 illustrates, the average embedded cost is almost 33% greater than the average UNE price set by the state public utility commissions. However, the embedded cost should be highly correlated with the TELRIC cost and explain much of the variation in UNE prices.

Additional explanatory variables are included to control for characteristics of the public utility commissions outside of political affiliation and selection method. For example, the length of time that a commissioner serves may also influence his/her decisions. To measure this potential effect, the average tenure of the commissioners and the term length of their appointments are included as explanatory variables. The number of commissioners is also included to control for the possibility that the number of votes required to pass a UNE price change may be related to the price that is agreed upon.

State officials outside of the public utility commissions may influence how UNE prices are set. As noted, in some states the governor appoints the commissioners. Further, state legislatures may not only have the power to block commissioner appointees, but they may determine the level of funding received by the commission. To control for these effects, the political affiliations of the governor and the state legislature are included as explanatory variables.

Other regulatory factors may affect how state public utility commissions determine UNE prices. For instance, in the period immediately following the passage of the Telecommunications Act, state public utility commissions often relied on outside arbitrators to determine the UNE price. These price determinations were based on competing proposals by the incumbent and entrant firms, rather than a cost study by the public utility commission. Also, the manner in

which the incumbent firm's retail prices are regulated may influence the level of UNE prices.[12] Finally, during the sample period the incumbent telephone companies applied for permission with state commissions and the FCC to sell long distance services. One of the criteria by which these applications were judged was whether the UNE prices were sufficiently low to encourage competitive entry (FCC (1999), p 129). Dummy variables for each of these regulatory conditions are included as explanatory variables.[13,14]

UNE prices set by the commissions may also reflect market conditions in the state. For example, commissions in smaller states may feel that potential entrants may be less inclined to enter due to economies of scale and thus lower UNE prices are needed to encourage entry. To control for this potential effect, the number of telephone lines in the state is employed. Also, the degree of business activity may have an impact on the rates set by commissioners. As UNE-based entrants typically focus on business customers, commissioners in states with a relatively strong concentration of business customers may be inclined to use lower UNE rates to benefit business customers. The percentage of the telephone lines in the states that serve business customers is included to capture this effect.

Two types of fixed effects are included. Dummy variables for each incumbent telephone company are included to control for effects common to all states within an incumbent's operating region that do not vary over the sample period.[15] Examples of these region-wide

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[12] Lehman and Weisman (2000) argue that commissions that enact retail price cap regulation may use lower UNE rates to ensure that cost increases for the incumbent company are not passed through to retail prices.

[13] Retail rate regulation schemes are quite complex, as some plans can have price caps on some services and another form of incentive regulation on other products. In the analysis below, a dummy variable is used that reflects whether the state employs rate-of-return regulation on either residential or business basic services. Thus, the complications posed by the idiosyncrasies of the various incentive-based regulation plans are avoided. As this variable takes a value of one when rate-of-return regulation is used, the expected sign of the coefficient of this variable is positive given Lehman and Weisman's (2000) analysis.

[14] A dummy variable is included to measure the effect of the incumbent applying to sell long-distance services. The variable takes a value of one if the UNE price was set during the period that begins one year prior to the incumbent's application and ends on the date of the FCC's decision.

[15] The identities of the incumbents are muddled somewhat by the mergers that have taken place among the former Regional Bell Operating Companies. For instance, Pacific Telesis and Ameritech were acquired by SBC in 1998 and 1999, respectively, while Verizon (formerly Bell Atlantic) acquired NYNEX in 1997. Given their geographic

effects include similarities in the existing phone networks and the use by incumbents of the same personnel and arguments in state UNE price proceedings throughout their service region. Year dummy variables are also included to capture national trends in UNE prices, such as the effects of court decisions regarding how UNE rates should be calculated.[16,17]

The estimated equation is:

$$UNEPRICE_{i,t} = \alpha + \beta_1 EMBED_{i,t} + \beta_2 PUC_{i,t} + \beta_3 GOVLEG_{i,t} + \beta_4 OTHREG_{i,t} \qquad (1)$$
$$+ \beta_5 OPENV_{i,t} + \chi_j + \delta_t + \varepsilon_{i,t}$$

where,

$UNEPRICE_{i,t}$ is the UNE loop price set in state i in year t

$EMBED_{i,t}$ is the embedded cost

$PUC_{i,t}$ are state public utility commission variables

$GOVLEG_{i,t}$ measure the political affiliation of the governor and state legislature

$OTHREG_{i,t}$ are other regulatory variables

$OPENV_{i,t}$ are variables that reflect the operating environment in that state

χ_j are incumbent fixed effects

δ_t are year fixed effects

The regressions are estimated via ordinary least squares. The observations are weighted to control for differences in the number of observations by state. Huber-White robust errors are

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locations and the timing of the acquisitions, Pacific Telesis and Ameritech are treated separately from SBC while the former Bell Atlantic and NYNEX are treated as one entity.

[16] The FCC's decisions regarding UNE prices were challenged numerous times in the courts. They were challenged both on the grounds of whether the FCC had the authority to dictate the rate-setting methodology and also whether the TELRIC methodology was consistent with the Act. The Supreme Court eventually decided both issues in favor of the FCC. (AT&T v. Iowa Utilities Board (1999), Verizon, et al v. FCC, et al (2002))

[17] An alternative to the data set used here would be a panel that includes observations for commissions and dates when the lease price was not revised. However, the relatively limited number of price changes in each state makes use of a panel data set problematic. To mitigate the relative stationarity of the dependent variable, one could use relatively long time periods as the unit of observation. However, given that the explanatory variables could have varied significantly within the time period, it would be difficult to precisely measure the effects of these variables. A shorter time period would alleviate this problem, but would exacerbate the lack of variation in the dependent variable.

used to account for potential heteroskedasticity and the observations are clustered at the state level to allow for dependence between the observations for a given state.[18,19]

Table 5 details the regression results. Column (I) contains the estimates when the percent of Republican commissioners and the method of selection are not interacted, while Column (II) contains the results when the two variables are interacted.

As expected, the embedded cost variable explains a great deal of the variation in UNE prices. However, the coefficient estimate of 0.53 indicates that there is not a one-to-one relationship between the embedded cost and the UNE price. Even after accounting for the fact that UNE prices are on average 75% of the embedded cost, there exists variation in UNE prices beyond what is explained by the embedded cost estimate.

A significant amount of this remaining variation appears to be related to the combined effects of the commissioners' political affiliation and selection method. Based on the assumption that the two effects are not related, the results in Column (I) indicate that Republican commissioners are associated with somewhat lower UNE prices and elected commissions are associated with somewhat higher UNE prices. However, the effect of elected commissions is not statistically significant.

The results in Column (II) indicate that the interaction omitted in Column (I) may help capture the effects of commissioner political affiliation and selection method. Under the specification in Column (II), the *% Republican* coefficient measures the effect of appointed Republican regulators versus appointed Democratic regulators. Compared with Column (I), both

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[18] As a robustness test, the dependent variable was replaced by the ratio of UNE price to the embedded cost and the embedded cost was dropped as an explanatory variable. Other robustness tests that were performed include pooling the data, first-differencing the data, and varying the control variables. The results from these approaches are largely unchanged from the results reported below.

[19] A potential threat to the identification is that the form of retail rate regulation may be endogenous to the choice of UNE prices. To address this concern, the model was estimated using three measures of customer satisfaction as instruments for the form of retail rate regulation. The logic underlying the choice of these instruments is that the choice of retail rate regulation involves consumer input, whereas UNE price determinations do not. The first-stage regression estimates indicate that the instruments are valid as they are both relevant and exogenous to the determination of UNE prices. However, the Durbin-Wu-Hausman test results indicate that the form of retail rate regulation is not endogenous, suggesting that the results reported below are valid.

the coefficient estimate and statistical significance of the *% Republican* variable are much smaller. The Column (II) estimate indicates that there is relatively little difference in the UNE prices set by appointed Republican and Democratic commissioners.

Given the included interactions, the coefficient on *Elected* in Column (II) now measures the effect of elected Democratic commissioners. The relatively large point estimate and statistical significance suggest that rates tend to be higher under elected Democratic commissioners. The interaction variable, *% Republican * Elected*, measures the effect of elected Republicans relative to elected Democrats. The negative and statistically significant coefficient estimate suggests that elected Republican commissioners are associated with lower UNE prices than elected Democratic commissioners. Based on a hypothetical one seat change in a three member elected commission, the coefficient suggests that replacing a Republican with a Democrat is correlated with a $1.80 increase in the UNE price. The same approximate difference holds when an elected Democrat replaces an appointed commissioner of either party. While causal interpretations are not possible given the limited data and reduced form specification, one could speculate that elected Democrats may favor higher UNE prices (which are less visible to voters) to offset the lower retail prices that they favor but that gain the ire of incumbents.

Overall, the summary statistics of price levels and regression estimates yield somewhat consistent results. The summary statistics indicate that elected commissions are associated with higher prices, while the regression results suggest that this association is limited to elected Democrats. Yet, the analysis of price changes does not reveal any relationships. The rough similarity of the results from the price level statistics and regression analysis is perhaps not surprising, given that the regression is largely based on cross-sectional variation. However, an important limitation is the relatively few shifts of political affiliation in the sample, especially among elected commissioners. As indicated in Table 3, there are only six changes in political affiliation among elected commissions.

4. Analysis of Retail Prices.

This section applies the methodology followed in Section 3 to analyze retail prices.

4.1. Summary Statistics.

As in Section 3.1, the first part of this section uses summary statistics to investigate price levels, while the second part examines price changes.

The Federal Communications Commission annually publishes the residential prices charged by incumbents in 95 cities in 41 states. The price chosen for this analysis is for monthly basic local residential flat-rate service. These flat-rate plans allow for unlimited local calling and abstract from potential differences across cities in how prices vary with the number of minutes used by customers. However, these price data are not available for six of the 95 cities reported by the FCC. The data are further limited to only those cities that are served by one of the Regional Bell Operating Companies that are the subject of the UNE price analysis above. For the 1997 – 2004 period, the resulting sample consists of 79 cities in 35 states.

Table 6 parallels Table 1 in that it details how the average retail price varies by commission political affiliation and selection method. As was the case for UNE prices, the average retail price in states with elected commissions is higher than that in states with appointed commissions at a 99% statistical confidence level. This result is somewhat surprising, as elected commissions are directly dependent on the approval of consumers to remain in office. Subsetting by selection method does not reveal statistical differences in the prices set by Republican and Democratic commissions.

Tables 7 and 8 examine changes in retail prices. Table 7 includes segregates the price changes by their relationship to the median price change.[20] While elected and appointed commissions had roughly equal numbers of changes below and above the median price level, a dichotomy is present in regards to political affiliation. Majority Republican commissions more

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[20] The median retail price change in the sample is $0.37.

often implemented price changes that were greater than the median change, whereas Democratic commissions more often implemented changes that were less. While this pattern is not present when the data are limited to elected commissioners, the relative few number of price changes in this subset precludes any inferences.

Table 8 describes those price changes which were preceded by a change in the political affiliation of the commission. This perspective does not reveal any correlation between price changes and either selection method or political affiliation.

Overall, the summary statistics indicates that while there is not a discernable pattern between retail price levels and political affiliation, there may be a difference in the price changes implemented by Republican and Democratic commissions.

4.2. Regression Analysis.

The retail price regression differs from the UNE price regressions above. First, the prices typically exhibit a substantial degree of variability across years for a given city. Thus, a fixed effects panel data analysis is appropriate to precisely measure the effects of changes in the explanatory variables over time.[21] The city fixed effects control for any influences on retail prices that do not vary over time for a given city, such as the term length of the public utility commissioners or the incumbent that serves the city. However, the panel fixed effects analysis implies that the effects of these types of variables cannot be measured.[22] Second, a proxy for the retail price is not included as an explanatory variable. Yet, given such a proxy would likely vary little over the period within a city, the inclusion of city fixed effects arguably functions as a proxy.

Third, a number of variables that are included in the UNE price regressions are not

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[21] Given the pooled nature of the UNE price regressions, this precludes estimating the UNE price and retail price regressions simultaneously.

[22] As such, the following variables are not included in the retail price regressions: *Elected*, *Term Length*, *Number of Commissioners*, and *ROR Retail Rate Regulation*.

expected to influence retail prices and are omitted from the retail price regressions.[23] Fourth, the state per capita personal income is included as an explanatory variable to control for income effects on the retail price. Finally, interactions between the commission political affiliations, whether the commission is elected, and the gubernatorial political affiliation are found to be statistically significant and are included in this regression. The estimated equation is:

$$RETPRICE_{i,t} = \alpha + \beta_1 PUC_{i,t} + \beta_2 GOVLEG_{i,t} + \beta_3 INTERACT_{i,t} + \beta_4 OPENV_{i,t} \qquad (2)$$
$$+ \chi_j + \delta_t + \varepsilon_{i,t}$$

where,

$RETPRICE_{i,t}$ is the retail price for local residential flat-rate service in city i in year t

$PUC_{i,t}$ are state public utility commission variables

$GOVLEG_{i,t}$ measure the political affiliation of the governor and state legislature

$INTERACT_{i,t}$ are interactions of variables in $PUC_{i,t}$ and $GOVLEG_{i,t}$

$OPENV_{i,t}$ are variables that reflect the operating environment in that state

χ_j are city fixed effects

δ_t are year fixed effects

The regression is estimated via ordinary least squares. As is the case for the UNE price regressions, Huber-White robust errors are used to account for potential heteroskedasticity and the observations are clustered at the state level to allow for dependence between the observations for a given state.[24]

The sample used in the retail price regression is detailed in Table 9. The top half of the table reports summary statistics of the levels of the variables, while the first differences are detailed in the bottom half. For instance, the average retail price for the sample is $22, while the

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[23] These variables are: *Embedded Cost*, *AT&T Arbitration*, and *Application to Sell Long-Distance Service*.

[24] A number of robustness tests were performed on the retail price regressions. Estimates that do not control for city fixed effects differ significantly from those reported below, which suggests that time-invariant factors within each city explain a great deal of the variation in retail prices. Also, the statistical significance of some of the results decreased when the included control variables were varied.

average annual change is $0.64.

Table 10 details the estimates of the retail price regressions. Unlike the UNE price regressions, the commission political affiliation has a statistically significant effect on the retail price while the interacted variable does not. Consistent with the analysis of price changes in Section 4.1, the coefficient estimate for *% Republican* suggests that Republican commissions are associated with larger price changes. However, the negative point estimate of the interaction coefficient entails that the effect is statistically significant (at a 90% confidence level) only for appointed, and not elected, commissions. The finding that appointed Republicans are associated with higher retail prices may reflect that elected Republicans are constrained from setting higher prices due to electoral concerns.

Thus, in regards to retail prices, the summary statistics of price changes and the regression analysis lead to somewhat consistent results. Conversely, for UNE prices, the summary statistics of price levels were similar to the regression estimates. This difference may be due to the panel nature of the retail price regression data and the cross-sectional nature of the UNE price regression data.

5. Conclusion.

This paper proposes a number of ways to investigate whether the political affiliation of commissioners and the means by which they are selected have interrelated effects on policy outcomes. Through the use of summary statistics and regression analysis, it may be possible to determine whether political effects are influenced by how commissioners attain office.

These methods were applied to telecommunications wholesale and retail prices. The relatively sparse number of changes in political affiliation, especially among elected commissions, precludes definitive conclusions. Further, differences in the wholesale and retail price data do not allow for direct comparisons of the effects across the two types of prices. However, the results indicate that the effects of political affiliation may vary by selection method.

Further analyses may provide insight into how public utility commissioners should be chosen. For instance, some may feel that public utility commissions should be somewhat apolitical in their policy decisions. Given the result that UNE prices set by appointed Republicans and Democrats are roughly similar, appointed commissioner may help achieve this goal. However, the analysis of retail prices indicates that appointed commissioners may not fully meet this potential objective.

There are a number of directions in which this paper could be extended. The empirical results in this paper are limited to telecommunications. As noted above, electricity is another contentious industry that public utility commissions regulate. A similar analysis of electricity rates could produce very different results, especially in light of the politically charged California electricity crisis in the early 2000s. Also, data regarding the background of the commissioners could provide additional insight. For instance, do appointed commissioners with a political background behave differently than those who have more of a technical background? Finally, the difference in the specifications of the lease and retail price regressions implies that one must use caution when comparing the results. Data sets that allowed for similar specifications would allow for more confident conclusions regarding comparisons of commission behavior across regulated wholesale and retail prices.

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Figure 1 – UNE Statewide Average Loop Prices

UNE Rates
1996-10 through 2004-12
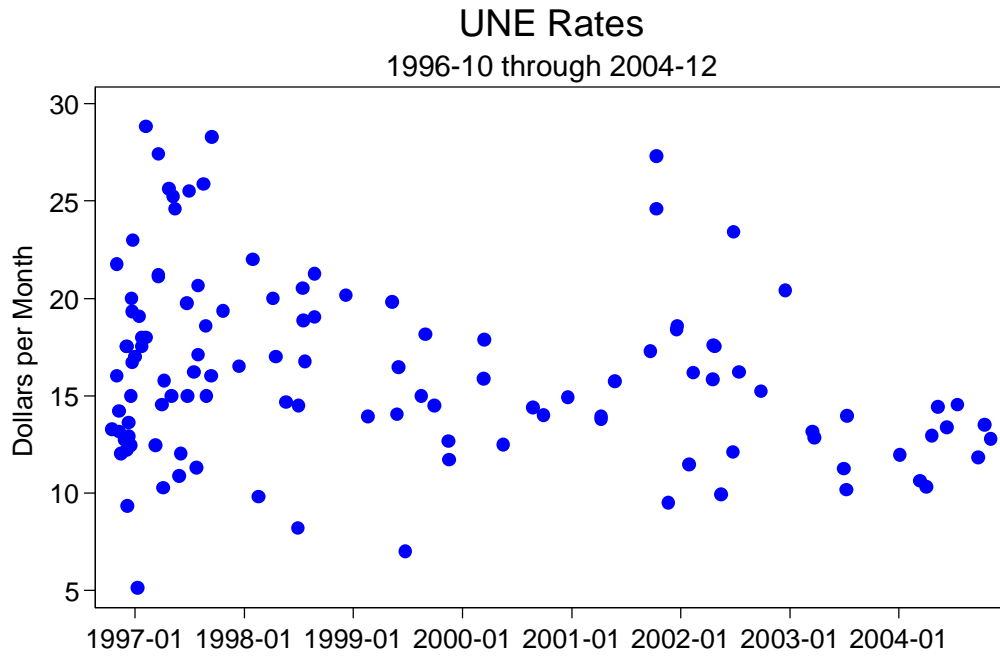
Table 1 – UNE Prices Subset by Commissioner Political Affiliation and Selection Method

Sub-Population	Mean Average Statewide UNE Loop Price (number of observations)
All Observations	$16.21 (117)
Selection Method	
Appointed	$15.28 (93)
Elected	$19.80 (24)
Political Affliliation	
Majority Republican	$15.85 (62)
Majority Democratic	$16.40 (40)
Split	$17.17 (15)
Selection Method and Political Affliliation	
Appointed	
Majority Republican	$14.90 (48)
Majority Democratic	$15.11 (31)
Split	$16.94 (14)
Elected	
Majority Republican	$19.08 (14)
Majority Democratic	$20.85 (9)
Split	$20.50 (1)

Table 2 – Changes in UNE Prices

	Less than Median UNE Price Change[1]	Greater than Median UNE Price Change[1]
Number of Occurences	36	36
Selection Method		
Appointed	30	28
Elected	6	8
Political Affliliation		
Majority Republican	22	18
Majority Democratic	10	13
Split	4	5
Selection Method and Political Affliliation		
Appointed		
Majority Republican	17	14
Majority Democratic	9	10
Split	4	4
Elected		
Majority Republican	5	4
Majority Democratic	1	3
Split	0	1

[1] The median UNE price change in the sample is -$1.04.

Table 3 – Changes in UNE Prices Preceded by Changes in Commission Political Representation

	Increase in Republican Representation	Increase in Democratic Representation
All Observations		
Number of Occurences	19	18
Followed by Increase in UNE Price	6	8
Followed by Decrease in UNE Price	13	10
Mean UNE Price Change	-$0.75	-$0.09
Appointed Public Utility Commissions		
Number of Occurences	14	17
Followed by Increase in UNE Price	5	7
Followed by Decrease in UNE Price	9	10
Mean UNE Price Change	$0.29	-$0.29
Elected Public Utility Commissions		
Number of Occurences	5	1
Followed by Increase in UNE Price	1	1
Followed by Decrease in UNE Price	4	0
Mean UNE Price Change	-$3.64	$3.34

Table 4 – Summary Statistics – UNE Price Regressions (n=117)

Variable	Mean	Standard Deviation	Minimum	Maximum
State Average UNE Loop Price	$16.21	$4.66	$5.13	$28.82
Embedded Cost	$20.85	$4.45	$13.75	$34.07
Public Utility Commission				
% Republican	56	30	0	100
Elected	0.2	0.4	0	1
% Republican * Elected	12	27	0	100
Average Tenure (years)	4.7	2.7	0.7	19.2
Number of Commissioners	4.0	1.1	3	7
Term Length (years)	5.4	0.94	3	8
Governor & Legislature				
Governor Republican	0.6	0.5	0	1
% State Legislature Republican	48	14	14	85
Other Regulatory				
AT&T Arbitration	0.3	0.5	0	1
ROR Retail Rate Regulation	0.2	0.4	0	1
Application to Sell Long-Distance	0.15	0.35	0	1
Operating Environment				
Number of Lines (millions)	3.4	3.7	0.2	18.3
% Business Lines	31	4	25	43

Table 5 –UNE Price Regression Estimates

Dependent Variable: State Average UNE Loop Price				
Explanatory Variable	I		II	
Embedded Cost	0.53 (0.08)	***	0.53 (0.08)	***
Public Utility Commission				
% Republican	-0.02 (0.009)	**	-0.006 (0.011)	
Elected	0.55 (1.11)		3.43 (1.31)	**
% Republican * Elected			-0.05 (0.02)	**
# Observations	117		117	
R-squared	0.68		0.69	

Notes -

Huber-White robust standard errors clustered by state are reported in parentheses.

*** - 99% confidence level, ** - 95% confidence level, * - 90% confidence level

Specification includes controls for additional attributes regarding the public utility commission (average tenure, number of commissioners, term length), state government (governor and legislature political party), other regulatory conditions (AT&T arbitration, retail rate regulation, application to sell long-distance), and operating environment (number of lines and percent business lines). Incumbent and year fixed effects are also included.

Table 6 – Retail Prices Subset by Selection Method and Political Affiliation Variables

Sub-Population	Price for Residential Flat-Rate Local Service (number of observations)
All Observations	$21.62 (632)
Selection Method	
Appointed	$21.33 (553)
Elected	$23.63 (79)
Political Affliliation	
Majority Republican	$21.60 (371)
Majority Democratic	$20.93 (197)
Split	$23.83 (64)
Selection Method and Political Affliliation	
Appointed	
Majority Republican	$21.19 (328)
Majority Democratic	$20.63 (162)
Split	$23.88 (63)
Elected	
Majority Republican	$24.73 (43)
Majority Democratic	$22.34 (35)
Split	$20.99 (1)

Table 7 – Changes in Retail Prices

	Less than Median Retail Price Change[1]	Greater than Median Retail Price Change[1]
Number of Occurences	276	277
Selection Method		
Appointed	246	237
Elected	31	39
Political Affliliation		
Majority Republican	147	177
Majority Democratic	101	73
Split	29	26
Selection Method and Political Affliliation		
Appointed		
Majority Republican	131	155
Majority Democratic	87	56
Split	28	26
Elected		
Majority Republican	16	22
Majority Democratic	14	17
Split	1	0

[1] The median retail price change in the sample is $0.37.

Table 8 – Changes in Retail Prices Preceded by Changes in Commission Political Representation

Sub-Sample	Increase in Republican Representation	Increase in Democratic Representation
All Public Utility Commissions		
Number of Occurences	86	130
Followed by Increase in Retail Price	40	69
Followed by Decrease in Retail Price	32	39
Followed by No Change in Retail Price	14	22
Mean Retail Price Change	$0.34	$0.33
Appointed Public Utility Commissions		
Number of Occurences	74	107
Followed by Increase in Retail Price	33	64
Followed by Decrease in Retail Price	28	38
Followed by No Change in Retail Price	13	21
Mean Retail Price Change	$0.35	$0.31
Elected Public Utility Commissions		
Number of Occurences	12	7
Followed by Increase in Retail Price	7	5
Followed by Decrease in Retail Price	4	1
Followed by No Change in Retail Price	1	1
Mean Retail Price Change	$0.28	$0.65

Table 9 – Summary Statistics – Retail Price Regressions (n=632)

Variable	Mean	Standard Deviation	Minimum	Maximum
Levels				
Price for Residential Flat-Rate Local Service	$21.62	$4.42	$13.05	$35.56
Public Utility Commission				
% Republican	61	32	0	100
% Republican * Elected	7	21	0	100
Average Tenure (years)	4	2.2	0.4	14
Governor & Legislature				
Governor Republican	0.67	0.5	0	1
% State Legislature Republican	46	12	13	75
Operating Environment				
% Business Lines	31	4	25	43
Per Capital Personal Income (thousands)	29	4.7	18	44
First Differences				
Price for Residential Flat-Rate Local Service	$0.64	$1.83	-$7.99	$17.52
Public Utility Commission				
% Republican	-0.5	16	-100	100
% Republican * Elected	0.19	4.4	-33	50
Average Tenure (years)	0.06	1.4	-11	2
Governor & Legislature				
Governor Republican	-0.01	0.3	-1	1
% State Legislature Republican	0.27	2.6	-13	13
Operating Environment				
% Business Lines	0.17	1.2	-5.4	7.2
Per Capital Personal Income (thousands)	1.1	0.5	0.02	2.6

Table 10 –Retail Price Regression Estimates

Dependent Variable: Retail Price for Residential Flat-Rate Local Service		
Explanatory Variable		
Public Utility Commission		
% Republican	0.03	**
	(0.01)	
% Republican * Elected	-0.02	
	(0.02)	
Additional Interactions		
% PUC Republican * Governor Republican	-0.02	*
	(0.01)	
% PUC Republican * Governor Republican * Elect	0.02	**
	(0.01)	
# Observations	632	
Within R-squared	0.61	

Notes -

Huber-White robust standard errors clustered by state are reported in parentheses.

*** - 99% confidence level, ** - 95% confidence level, * - 90% confidence level

Specification includes controls for additional attributes regarding the public utility commission (average tenure), state government (legislature political party), and operating environment (percent business lines and per capita income). State and year fixed effects are also included.

Appendix.

The UNE prices used in the study were obtained primarily from state commission orders and incumbent documents. For 4 of the 117 observations de-averaged rates were reported and a statewide average was neither reported nor could be calculated based on the available data. In those instances a simple average of the de-averaged rates was used as the statewide average rate. The state commission orders and incumbent documents were also used to determine if the rate was the result of an arbitration case between the incumbent and AT&T.

The retail price data come from the FCC's Reference Book of Rates, Price Indices, and Household Expenditures for Telephone Service (2004) ([http://www.fcc.gov/Bureaus/ Common_Carrier/Reports/FCC-State_Link/IAD/ref04.pdf](http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/ref04.pdf)), Table 1.4 ("Monthly Residential Telephone Rates in the Sample Cities"). The FCC samples those cities that were included in the Bureau of Labor Statistics Consumer Price Index in 1986.

The embedded cost is reported by the National Exchange Carrier Association Universal Service Fund annual submissions (Appendix E). These reports were also used to determine the number of lines served by the incumbent.

The political affiliation and tenure of the PUC commissioners were derived from *Profiles of Regulatory Agencies of the United States & Canada: Yearbook 1995-1996* (NARUC) and NARUC membership directories (specifically, directories dated January 1998, February 1999, February 2002, February 2003, July 2003, and March 2004). Besides being reported as either a Democrat or Republican, a commissioner could also be listed as independent or have no reported political affiliation. For the purposes of this analysis, those commissioners who were reported as independent of for whom a political affiliation was not reported are equally Democrat and Republican. (For example, if a state's PUC is composed entirely of independents and/or commissioners for whom their political affiliation is not reported, the value of the variable percent of commissioners that are Republican for that PUC would be 0.5.) The means of selection, term length, and number of commissioners were taken from the *Book of the States*

(editions 1998-1999, 2000-2001, 2002, and 2003).

The gubernatorial data are obtained from the Book of the States (The Council of State Governments, 1996-1997, 1998-1999, 2001-2002, 2002, 2003) and the CNN.com web page "2004 Election Results" (http://www.cnn.com/ELECTION/2004/pages/results/governor/ full.list/). The state legislature data are obtained from *Statistical Abstracts of the United States* (U.S. Census Bureau, 2002, 2003, 2004-2005) and the National Conference of State Legislatures website (2005 Partisan Composition of State Legislatures, http://www.ncsl.org/ncsldb/elect98/ partcomp.cfm?yearsel=2005). As Nebraska's legislature is non-partisan, for this analysis the percentage of state legislatures that are Republican is assumed to be 50%.

The type of retail rate regulation employed in each state is derived from reports in the *State Telephone Regulation Report* (1/25/96, 2/8/96, 3/20/97, 4/3/97, 4/3/98, 4/17/98, 8/20/99, 9/3/99, 9/29/00, 10/13/00, 10/27/00, 2/15/02, 3/1/02, 3/15/02, 5/9/03, 5/23/03, 6/6/03, 7/30/04, 8/13/04, and 8/27/04). For some of the descriptions of the regulatory plans, only a year was given for the beginning or the end of the plan's duration. In those instances, the exact dates were inferred from the prior or succeeding plan. Data regarding RBOC applications to provide long-distance service are obtained from the FCC web page "RBOC Applications to Provide In-region, InterLATA Services Under § 271" (http://www.fcc.gov/Bureaus/Common_Carrier/in-region_applications/).

The percent of lines to business customers is derived from the annual FCC ARMIS Report 43-08. The three residential customer satisfaction variables used as instruments for the form of retail rate regulation come from the annual FCC ARMIS Report 43-06. Specifically, they are the percent of customers surveyed that are dissatisfied with the RBOC's installation, repair, and billing services.

The per capita personal income data are taken from the Bureau of Economic Analysis at the U.S. Department of Commerce (http://www.bea.gov/bea/regional/spi/default.cfm? satable=summary).