# DID RESIDENTIAL RATES FALL AFTER RETAIL COMPETITION?A DYNAMIC PANEL ANALYSIS

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## Overview

A key selling point for the restructuring of electricity markets was the promise of lower prices, that competition among independent power suppliers would lower electricity prices to retail customers. There is not much consensus in earlier studies on the effects of electricity deregulation, particularly for residential customers. Part of the reason for not finding a consistent link with deregulation and lower prices was that the removal of the transitional price caps led to higher prices. In addition, the timing of the removal of price caps coincided with rising fuel prices, which were passed on to consumers in a competitive market. Using a dynamic panel model, we analyze the effect of participation rates, fuel costs, market size, a rate cap and a switch to competition for 16 states and the District of Columbia. We find that an increase in participation rates, price controls, a larger market, and high shares of hydro in electricity generation lower retail prices, while increases in natural gas and coal prices increase rates. The effects of a competitive retail electricity market are mixed across states, but generally appear to lower prices in states with high participation and raise prices in states that have little customer participation.

## Methods

Our goal is to develop a model of electricity prices for residential customers that takes advantage of differences both within and across states that have or have had retail competition in their electricity markets. We are interested in examining differences in the effects of retail competition programs and transitional pricing schemes across states.

The data employed in our analysis is a monthly panel of 16 states and the District of Columbia. The states analyzed are CA, CT, DC, DE ,IL, MA, MD, ME, MI, NH, NJ, NY, OH, PA, RI,TX and VA. The panel contains 3,247 observations and covers a period from January 1990 to May 2010. The data are primarily from the U.S. Energy Information Administration (EIA) and state Public Utility Commissions. The dependent variable is seasonally adjusted average real price per kilowatt-hour (kWh) for residential customers. As a key independent variable, we include the percent of eligible residential customers who have chosen a competitive provider in each state to capture the level of market participation by residential customers.

To control for input costs of electric generating facilities that might be passed on to customers, we include the real average cost of coal for electricity generation and the real average cost of natural gas for electricity generation. We also include controls for each state's percentage of generation from nuclear and hydro sources. The total number of megawatt hours sold in each state is included to control for market size, and the deviation from normal heating and cooling degree days is included to capture weather-related demand spikes. We include dummy variables to capture months when each state is open to electric competition for residential customers, and months when each state had some sort of price control or transitional pricing (rate cap, rate freeze, etc.) in addition to retail competition. Finally, we include a lag of seasonally adjusted average real price per kilowatt-hour (kWh) for residential customers in an effort to proxy for unknown omitted variables that affect prices historically.

The baseline model to be estimated is of the form:

$$\Delta y_{it}=(\Delta x_{i,t-k})'\beta+\delta(\Delta y_{i,t-1})+ f_{it}'\gamma+\Delta\varepsilon_{it} \qquad (1)$$

where x is a vector of control variables at lags $k\in K=\{0,1,2,3,4,5,6\}$ believed to influence residential electric rates:

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|---|---|
| $PARTICIPATION_{i,t-k}$ | Percent of residential electric customers in state i choosing a competitive retail electric provider at time t-k |
| $LNTOTALSALESMWH_{i,t-k}$ | Log of total megawatt hours sold in state i at time t-k |
| $LNCOALPRICEELECGEN_{i,t-k}$ | Log of real national average cost of coal for electricity |

| | |
|---|---|
| | generation at time t-k |
| $LNGASPRICELECGEN_{i,t-k}$ | Log of real national average cost of natural gas for electricity generation at time t-k |
| $PCNTHYDRO_{i,t-k}$ | Percent of electric generation from hydro in state i at time t-k |
| $PCNTNUCLEAR_{i,t-k}$ | Percent of electric generation from nuclear in state i at time t-k |
| $CDDEV_{i,t-k}$ | Deviation from normal number of cooling degree days in state i at time t-k |
| $HDDEV_{i,t-k}$ | Deviation from normal number of heating degree days in state i at time t-k |

and f is a vector of dummy variables:

| | |
|---|---|
| $RETAILCOMP_{it}$ | =1 if state i was open to residential retail electric competition at time t; =0 otherwise |
| $RATECAP_{it}$ | =1 if state i had a transitional price control or rate cap in place at time t; =0 otherwise |
| $RETAILCOMP_{it}*STATE_i$ | Interaction of $STATE_i$ with $RETAILCOMP_{it}$, defined above |
| $RATECAP_{it}*STATE_i$ | Interaction of $STATE_i$ with $RATECAP_{it}$, defined above |

$\varepsilon_{it}$ is a state specific heteroskedastic error term, and $\beta$ ,$\delta$, and $\gamma$ are parameters to be estimated.

## Results

The results from the estimation are generally consistent with our expectations. An increase in participation rates takes some time to be reflected in lower electricity prices. Although the contemporaneous effect of the participation rate on retail prices is positive and significant, the lagged effects of increased participation are negative, significant, and larger in magnitude than the contemporaneous effect. A higher participation rate implies that a larger group of residential customers are switching to competitive retail electricity providers (CREPs), increasing the share supplied by competitive retailers, and eventually lowering the overall residential price of electricity.The contemporaneous effect of a change in total megawatt hours sold in a state is a statistically significant decline in retail prices. Lagged effects are positive but statistically insignificant. If we think of the MWh variable as a measure of the size of the total electricity market, then the larger the market, the more suppliers it can support, leading to more competition and lower prices. A larger market may also result in lower prices because of economies of scale in electricity generation.

As would be expected, increases in the prices of fuels used to generate electricity have an overall positive effect on retail prices. The effects of the rise in fuel prices come in with a lag, as neither coal nor natural gas prices used in electricity generation have a significant contemporaneous effect on retail electricity prices.

Our results suggest that state effects of competitive markets and transitional pricing are somewhat mixed. For Texas, Connecticut, Maine, and Pennsylvania, moving to a competitive retail market lowers retail prices. Texas, Connecticut, and Pennsylvania have relatively high participation rates, and Pennsylvania still had some price controls in place over our sample period. For the remaining states, the switch to retail competition did not necessarily lower retail prices.

## Conclusions

The restructuring of U.S. electricity markets has received a great deal of attention in the energy economics literature, particularly in the mid 2000s as many states experimented with retail competition. Earlier studies on the effects of restructuring initiatives have failed to reach a consensus, particularly as these initiatives apply to residential customers. Previous efforts to study this topic were complicated by an inseparability of the effects of temporary transitional pricing schemes from the true effects of a competitive market. With several years of data following the expiration of many of these temporary pricing schemes, we revisit this issue using an econometric approach unique to this literature. Increasing participation in the competitive market appears to be a crucial element in reducing residential electric rates, while price reductions detected by earlier studies were likely driven by price controls rather than competitive forces. With the exception of Maine's somewhat unique bid-for-generation setup, states that have failed to provide the proper market incentives for residential customers to switch to a competitive provider and for firms to provide electricity to residential customers have been less successful in reducing residential electric rates. Our findings suggest that with a market design that encourages adequate participation, a competitive retail electricity market can benefit residential customers.

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