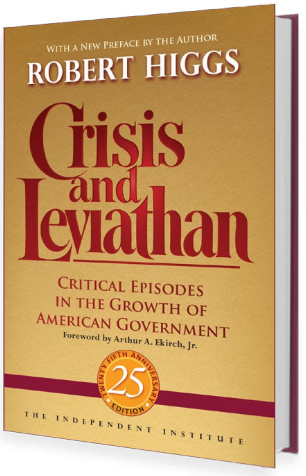
SUBSCRIBE NOW AND RECEIVE *CRISIS AND LEVIATHAN** FREE!

"***The Independent Review*** does not accept pronouncements of government officials nor the conventional wisdom at face value."
—**JOHN R. MACARTHUR**, Publisher, *Harper's*

"***The Independent Review*** is excellent."
—**GARY BECKER**, Noble Laureate in Economic Sciences

Subscribe to ***The Independent Review*** and receive a free book of your choice* such as the 25th Anniversary Edition of ***Crisis and Leviathan: Critical Episodes in the Growth of American Government***, by Founding Editor Robert Higgs. This quarterly journal, guided by co-editors Christopher J. Coyne, and Michael C. Munger, and Robert M. Whaples offers leading-edge insights on today's most critical issues in economics, healthcare, education, law, history, political science, philosophy, and sociology.



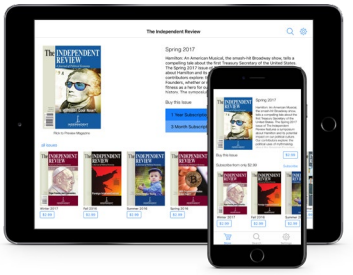
Thought-provoking and educational, ***The Independent Review*** is blazing the way toward informed debate!

Student? Educator? Journalist? Business or civic leader? Engaged citizen? This journal is for YOU!

*Order today for more *FREE* book options

SUBSCRIBE

Perfect for students or anyone on the go! ***The Independent Review*** is available on mobile devices or tablets: iOS devices, Amazon Kindle Fire, or Android through Magzter.



Download on the App Store | Available at amazon | Available on MAGZTER

INDEPENDENT INSTITUTE, 100 SWAN WAY, OAKLAND, CA 94621 • 800-927-8733 • REVIEW@INDEPENDENT.ORG PROMO CODE IRA1703

LAB REPORT

Demand-Side Bidding Will Reduce the Level and Volatility of Electricity Prices

STEPHEN J. RASSENTI, VERNON L. SMITH, AND BART J. WILSON

With the move to deregulate wholesale electricity prices in the United States, each state or region needed to develop a plan for restructuring its electric-utility industry and to establish the rules of an auction market for determining the hourly wholesale price of energy. All these new markets adopted supply-side bidding mechanisms—designed for the most part by intermediaries, consultants, and suppliers, with acquiescence by consumers—in which generator firms submitted bids to supply whatever quantity of energy would be demanded by wholesale buyers for resale to final consumers at regulated prices. In this setup, all final consumers, regardless of the individual circumstances of their need for an uninterruptible flow of energy, would be guaranteed that their demands would be satisfied. This policy of meeting all "must serve" demand, as it is known in the industry, was inherited from a rigid regulatory system that had politicized the reliability of service to all consumers without regard to cost, differing consumer priorities for service, or corresponding differences in willingness to pay for reliability of service. Consequently, retail consumers were shielded from exposure to the great natural variability in energy cost,

Stephen J. Rassenti is a professor in the College of Arts and Science, **Vernon L. Smith** a professor of economics and law, and **Bart J. Wilson** an associate professor of economics—all at George Mason University.

The Independent Review, v.VI, n.3, Winter 2002, ISSN 1086-1653, Copyright © 2002, pp. 441–445.

from nighttime lows to daytime highs and across seasons, by an averaging of these cost variations into flat-rate prices.

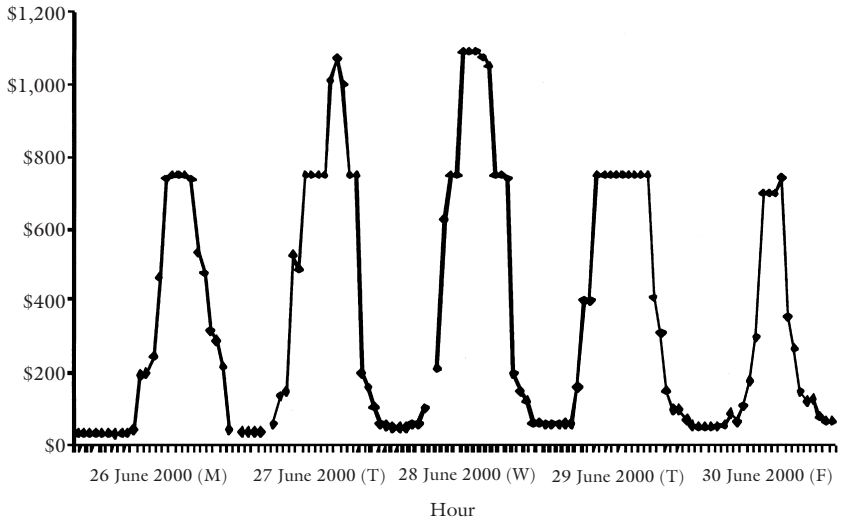
The driving justification for deregulation is to improve performance by exposing the industry and its customers to cost-based price signals, a policy that has worked well in the transportation (air, truck, rail) and natural gas industries. Unfortunately, in the electricity industry, deregulation in wholesale markets has not been accompanied by concurrent attention to the deregulation of retail markets, and this discrepancy has exposed the industry to unusual stresses comparable to the energy crunch of the 1970s. Because cost-effective means for producing and storing electricity during off-peak periods, to be consumed later during peak-use periods, are very limited, peak-period consumers account for the required higher energy and investment costs incurred to satisfy their demands. Efficient pricing requires on-peak consumers to pay substantially higher prices than off-peak consumers because the on-peak unit cost can easily be ten or more times the off-peak cost.

The same need to meet instantaneous demand applies to the unregulated prices of the motel industry. Competition in that industry long ago gave rise to variable demand-responsive prices for room accommodations, differing by season and by day of the week, with no noticeable culture shock to alert the news media. But developments have not been so smooth or so successful in the electricity industry.

Beginning three years ago in the midwestern and southern wholesale markets, summer peak prices reached levels of ten and occasionally a hundred or more times the normal price of twenty to thirty dollars per megawatt hour. This outcome was the predictable direct consequence of completely unresponsive retail demand impinging on a discretionary supply. Recently, California has been plagued by similar increases in spot prices because of supply shortages, together with insufficient investment in switching technologies that allow selective interruption of low-priority uses of power during high-cost peaks in demand. In figure 1, we plot a time series of hourly wholesale prices over a typical week on the California PX (spot exchange), now shut down by the intervention of Governor Gray Davis.

In a recent study, we have shown that the high general level of these prices, as well as the tendency of upward price spikes to occur when electricity supplies are tight, can be avoided in markets in which no more than 16 percent of the peak demand can be selectively interrupted through discretionary bids submitted by wholesale buyers. This new study is based on laboratory experiments using profit-motivated buyers and sellers of energy in a network with three major centers of consumption and generation in which demand cycles through transitional shoulder, peak, and off-peak levels. Figures 2 and 3 compare average prices and the volatility of prices, respectively, with and without demand-side bidding, for each of the three demand levels in these experiments. (For a more detailed discussion, see our report *Controlling Market Power and Price Spikes in Electricity Networks: Demand-Side Bidding,* at http://www.ices-gmu.org.)

Figure 1: California PX Prices
(Unconstrained Day-of/Hour-ahead Market)



Californians and people elsewhere in the country can avoid the price shocks they have experienced by redesigning their markets to provide better incentives for bulk buyers to introduce technologies that allow energy flows to be voluntarily reduced to customers willing to consume less in return for a discount on their electricity bills. The switching technology for the temporary appliance-specific interruption of energy deliveries to customers, by contractual agreement, has long been available. Newer technologies are available for demand management directly by households, with time-of-day metering. Noticeably absent from utility management has been aggressive investment in the provision of customer incentives for allowing such technologies to be implemented. Trained for a century to function within a regulatory framework, utility managers do not readily think in terms of profiting from the enormous savings in wholesale energy cost to be realized by buying less. Ironically, in the end, California utilities have been forced to impose involuntary areawide brownouts and rolling blackouts on their customers, treating all of these customers, including those stranded in elevators, with equal priority. A small fraction of the billions lost by the California distributors, if invested in demand-responsiveness measures, could have stopped the hemorrhaging of their treasuries and turned them a profit. Instead, they counted on their commission to allow an increase in their average rates, which neither solves the root problem nor prompts profit-seeking managers to focus on prioritizing their demand rather than on appealing to their regulatory commission.

Various pundits—regulators, media commentators, and government officials—have suggested alternatives to a demand-responsive spot market, such as wholesale price ceilings and long-term contracting for generation. Wholesale price volatility,

Figure 2: Average Electricity Prices

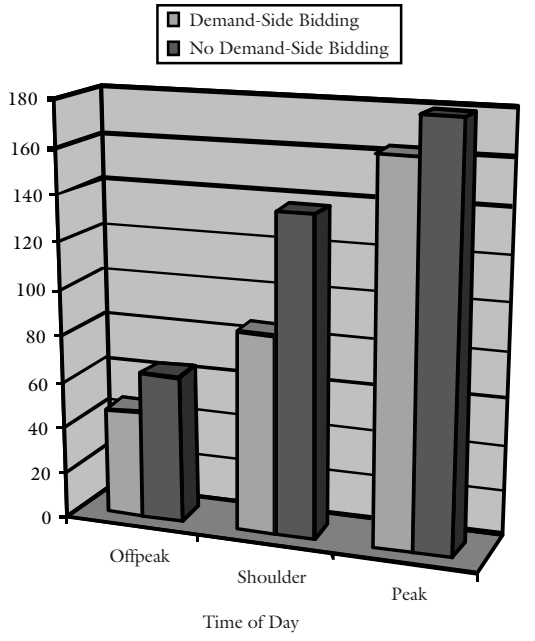
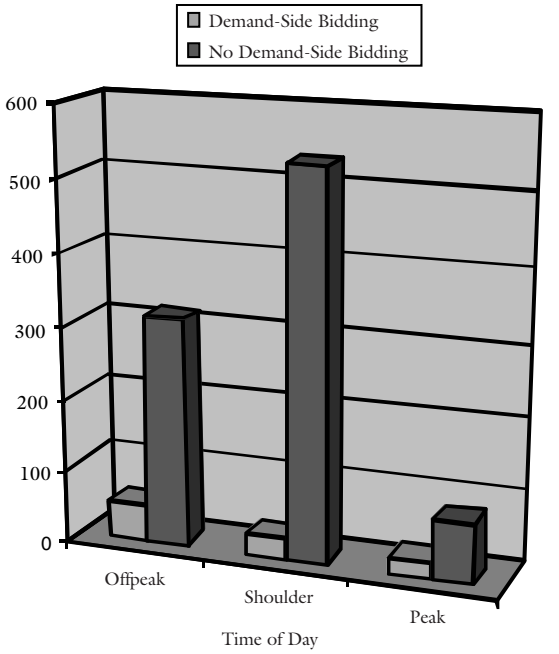


Figure 3: Variance of Changes in Electricity Prices from Day to Day



however, is entirely appropriate given the large daily variation in producer costs. The anomaly is the attempt to maintain a fixed, regulated, retail price. Long-term contracting is simply a negotiated means of fixing (averaging) the wholesale price over the cycle for the contracting parties. It does nothing to facilitate the adjustment of time-of-day demand to cost variation. That adjustment must occur in a robust spot market.

A policy of decentralizing the demand side of the market to allow free choice is both more flexible and much less costly than allowing the utilities to recover their energy-purchasing cost by a new, regulated levy on all consumers. The latter policy provides all the wrong incentives for conservation as a competitive alternative to more investment in high-cost peak-period capacity. Empowering buyers will lower short-run electricity prices while reducing the need for emergency reserves when outages of transmission lines or generators occur. It will also save investment in new generation and transmission lines as well as reduce the associated impact on the environment.