On the Political Economy of Electricity Deregulation—California Style

When looked at through a game-theoretic lens, the political problems posed by deregulation efforts often trump any economic considerations. Unless this political economy is factored into the deregulation equation, deregulation is likely to fail.

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I. Introduction

It's been said many times that ''good politics'' makes for ''bad economics.'' Nowhere is this easier—or more important—to illustrate than in California electricity crisis and the ongoing global debate over the viability of electricity deregulation.

Between October 2000 and April 2001, California experienced numerous blackouts and other supply disruptions while the price of a kilowatt-hour of electricity soared from less than 10 cents/kWh to as high as an astonishing $3.88/kWh. In the wake of that crisis, the pace of electricity deregulation has perhaps understandably slowed, both worldwide and within the United States,[1] as academics, (de)regulators, and policymakers continue to sift through the wreckage to determine exactly what went wrong.

This article uses a game-theoretic approach to look at the ''good politics'' that resulted in such ''bad economics'' and the eventual overthrow of the ''good politician'' Gov. Gray Davis, who thought he was saving himself—only to wind up falling on the Schwarzenegger sword.

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The value of this analysis lies in the contribution it can make to the political economy of the ongoing electricity deregulation debate. We shall see that when looked at through the game-theoretic lens, the political problems posed by deregulation efforts often trump any economic considerations. Unless this political economy is factored into the deregulation equation, deregulation is likely to fail.

II. History and Background

To prepare for our game-theoretic analysis, it is useful to note for lay readers that the traditional economic rationale for rate regulation of electricity generation has historically rested on the presence of significant economies of scale in the construction and operation of large, central-station power plants, e.g., coal and nuclear. However, beginning in the 1990s, the advent of much smaller, more technologically advanced, highly efficient, combined-cycle natural-gas-fired combustion turbines opened the door to the argument that electricity generation could be deregulated; this argument proceeded in much the same way that deregulation proponents argued that with the advent of satellite technology, the formerly ''pole and wire only'' long-distance telephone service should be deregulated.

In the wake of this technological sea change, and as articles in *The Electricity Journal* have amply documented, the move to deregulate electricity generation took on considerable momentum as countries from Great Britain and Chile to New Zealand and Australia all embraced deregulation. In a similar time frame, within the United States, the Federal Energy Regulatory Commission took a number of major steps to ''fast track'' any of the individual states' efforts to implement electricity deregulation.[2]

The first mistake was to design a wholesale market and auction rules that were easy to strategically game by sellers into the market.

Following FERC's liberalization of its regulatory rules, California became one of the first states to adopt a comprehensive plan to ''restructure'' its electricity markets.[3] However, and again as documented in articles in *The Electricity Journal* and elsewhere, the state architects of the California experiment made, what in hindsight, were at least six major mistakes.

The first was to design a wholesale market and a set of auction rules that were easy to strategically game by sellers into the market.[4] In particular, in periods of tight supply (caused by either real physical shortages of capacity or the artificial withholding of capacity from the market), sellers could not only significantly drive up price but also sell excess power into the market at a premium price.

The second mistake was to encourage the divestiture of much of the natural-gas-fired generating assets of the major utilities. Such a divestiture was supposed to prevent the utilities from exercising market power in the wholesale market—and indeed, it did. However, the practical result was to concentrate these assets in the hands of a small handful of merchant generators who, under certain conditions, could artificially withhold capacity from the market and, under the flawed market design and rules, thereby significantly drive up price.

The third mistake was for California to surrender much of its central regulatory authority to FERC. In this role, it was presumed that FERC would act as an ''honest broker'' and fair ''referee''—but, as history would suggest, this was not to be.

In this regard, FERC retained at least two important tools that could be deployed to restrain any exercise of market power. The first was the imposition of price caps. The second tool was the ability to issue ''must-run orders,'' which could command any merchant generator to supply as much power to the market as there was capacity available.

Together, these must-run orders and price caps could effectively simulate a competitive market outcome.

The fourth mistake was that the California Public Utilities Commission discouraged (and thereby effectively prohibited) the state's electric utilities from entering into very favorable long-term contracts at a time well before the crisis, when prices were relatively cheap. Thus, when the crisis hit, these utilities were totally unhedged with respect to deregulatory price risk.

Fifth, during the original deregulation debate in the mid-1990s, a ''universal metering'' proposal was defeated under pressure from utility interests who feared that they would be stuck with the capital investment bill. The practical effect of this mistake is that the state had little capability to implement real-time pricing at the residential and small-business levels when shortages emerged and prices spiked.

Finally, the implementing legislation imposed a retail ''rate freeze,'' even as wholesale rates were allowed to vary. This provision set up the utilities and their shareholders as the ''deep pockets'' that would bear at least the initial brunt of the crisis when wholesale rates began to spike.

In a game-theoretic context, I will now illustrate why, under a set of stylized assumptions that comport very well with the facts in the California case, the state endured what was arguably the worst electricity supply crisis in deregulation history *during a time—October 2000 through May 2001—when there was seemingly adequate energy supply ''on the books*.''

III. A Three-Player, Three-Move Sequential Game

We model this period as a three-player, three-move sequential game. In the first move of the game, a group of merchant generators must decide whether to withhold capacity from the system. If these merchant generators choose not to withhold capacity, the game is over. However, if the generators withhold capacity, the central regulatory authority must make the second move of the game.

Another mistake: The legislation imposed a retail ''rate freeze,'' even as wholesale rates were allowed to vary.

In this second move, the central regulatory authority must decide whether or not to impose price caps on the generators and issue must-run orders to bring forth the artificially constrained supply. If the central regulatory chooses the price cap/must-run option, the game ends at the second move. However, if the central regulatory authority chooses not to intervene in the market, the third player in the game, the political leader, must make the final move.

In this final move, the political leader must choose among the following strategies: (1) seize the merchant generators' plants, run them under the laws granted to the state governing private property rights during public emergencies, and pay the competitive market price; (2) lift the retail price cap and raise rates to the monopoly price; or (3) sign a set of long-term contracts with the merchant generators at the monopoly price that would eliminate (or greatly reduce) the state's reliance on the deregulated wholesale market.[5]

Before we ''play'' this game, we must determine the likely payoffs to each of the players for each of the possible outcomes in the game. To do so, we must make some additional assumptions about each of the players and their objective functions as well as the structure and nature of the market itself. Regarding the market and the possible exercise of market power, we assume that: (1) the period is one of non-peak demand in which there is sufficient capacity available to meet demand; (2) the merchant generators control sufficient capacity at the margin to affect price should some or all of this capacity be withheld; and (3) the rules of the auction market

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make it highly susceptible to gaming.

Regarding the merchant generators, we make the following assumptions: (1) they are profit maximizers; (2) their numbers are small enough so as to make tacit collusion possible; (3) their internal economic forecasts indicate a future ''glut'' of power plant capacity and a long-term price at or near marginal cost as new power plants under construction come on line; (4) they are engaged in negotiations to sign long-term power contracts with the political leader at prices above marginal cost in anticipation of this glut; and (5) the presence of extreme price volatility and supply disruptions will enhance the merchant generators' bargaining power in the long-term contract negotiations.

Under these assumptions, the merchant generators will receive a price equal to or modestly above marginal cost in the short run and equal to marginal cost over the long run if they simply supply all available power to the market. We assign to this stream of revenues an associated profit payoff of $\mathbf{\Pi_c}$.

Alternatively, if the merchant generators choose to withhold capacity from the market, their payoff will be contingent on the strategic choice, first, of the central regulatory authority and then, if the central regulatory authority refuses to impose price caps and must-run orders, then upon the political leader.

In particular, if the merchant generators constrain supply in the short run, they may be able to receive the monopoly price in the short run in the spot market. Because of attendant pressures on the political leader to bring the crisis ''under control,'' the generators may also be able to ''lock in'' the monopoly price over the long term through terms agreed upon in the long-term power contracts.

If the merchant generators constrain supply in the short run, they may be able to receive the monopoly price in the short run in the spot market.

In this scenario, the merchant generators would receive a payout equal to $\mathbf{\Pi_m}$, where $\mathbf{\Pi_m} > \mathbf{\Pi_c}$.

Note, however, that this ''monopoly price'' outcome is uncertain and will be contingent first on the willingness, or lack thereof, of the central regulatory authority to impose price caps and must-run orders, and second upon the response of the political leadership.

Regarding the central regulatory authority, and consistent with the ''capture-ideology'' framework of Kalt (1983),[6] we make the following assumptions: (1) a majority of commissioners making decisions within the authority are utility maximizers; (2) a majority of commissioners are driven (at least in part) by ideological motives; (3) ideologically, the majority has a conservative ideological commitment to the long-term path of deregulation and they are predisposed to *oppose* any kind of market intervention, particularly the use of price caps; and (4) in the event of an electricity crisis, the central regulatory authority will be subject to significant political pressure to both impose price caps and must-run orders during the crisis and slow the pace of (or halt) electricity deregulation over the long run.

Under these assumptions, we can ordinally rank the potential payoffs to the central regulatory authority as a ''best-case scenario'' equal to 1, a ''worst-case scenario'' equal to −1, and a middle-ground scenario equal to zero. The best-case scenario is when the merchant generators supply all possible power to the market. In this scenario, the central regulatory authority's ideological goal of expanding deregulation across the many states will not be slowed by the occurrence of a major crisis that calls the efficacy of deregulation into question. Accordingly, this scenario maximizes the utility of the central regulatory authority relative to all other scenarios considered below.

At the other end of the utility-maximizing spectrum and in the

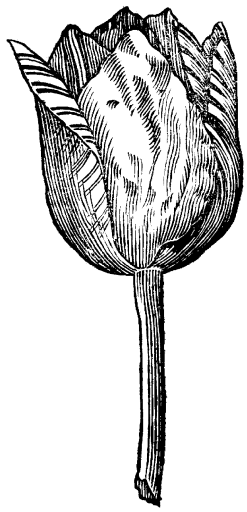
worst-case scenario, the central regulatory authority imposes price caps and must-run orders on the merchant generators in response to their withholding power from the market. In our ordinal ranking, this results in the greatest loss of utility because the central regulatory authority has taken an action not only contrary to its ideological beliefs. It has also taken an action that represents at least a tacit admission of the failure of deregulation, and such an action may call into question the longer-term viability of the electricity deregulation movement.

As for the middle-ground scenario, this occurs when the central regulatory authority refuses to impose price caps and must-run orders after the merchant generators have withheld capacity and the political leader either seizes the plants or signs long-term contracts. In either case, the central regulatory authority is spared the embarrassment of taking actions contrary to its ideological interests and goals.

Regarding the political leader and his constituents, we assume that: (1) the leader is a vote maximizer; (2) the leader has political ambitions for national office; and (3) the median voter will view any seizure of private property by the political leader as an extremist act. Under these assumptions, we can likewise model the potential payoffs of the political leader as a (1, 0, −1) set.

The political leader's best-case payoff of 1 occurs either: (1) when the merchant generators supply all available power to the market, no crisis occurs, and the game ends with the first move, or (2) when the central regulatory authority intervenes with price caps and must-run orders to prevent any prolonged crisis.

In the political leader's middle-ground scenario with a



payoff of zero, the leader signs long-term power contracts at the monopoly price. For a political leader with a short electoral horizon, this has two apparent benefits. The first is that the signings immediately end the crisis by eliminating the state's reliance on the spot market. This is because the political leader has effectively purchased most, if not all, of the capacity that would otherwise be sold in the spot market.

The second *political* benefit is that while the *economic* benefits of these contracts will be highly concentrated in the hands of a small number of merchant generators, the costs of the contracts may be diffused over both a large ratepayer base and a time horizon that stretches well beyond the next election.[7]

Note, however, there is not one but rather two ''worst-case scenarios''—both of which we assume have a payoff of −1. In the first scenario, the political leader suffers a significant loss of political popularity after seizing the merchant generators' plants. This is because the plant seizure, as noted above, is viewed as an undesirable extremist act by the median presidential voter. In the second worst-case scenario, the governor dramatically raises retail electricity rates. This unleashes a wave of negative public reaction.

IV. Illustrating and Solving the Game

Figure 1 presents the three-move sequential game in extensive form and its associated payoffs. Note that the payoffs are presented in the standard form of (*X*, *Y*, *Z*), where *X* represents the payoffs to the first mover, the merchant generators; *Y* represents the payoffs to the central regulatory authority; and *Z* represents the payoffs to the political leader. We now search for a unique equilibrium using the method of ''backwards induction.''[8]

We begin at the third move of the game by observing that if confronted with an electricity crisis, and in the absence of

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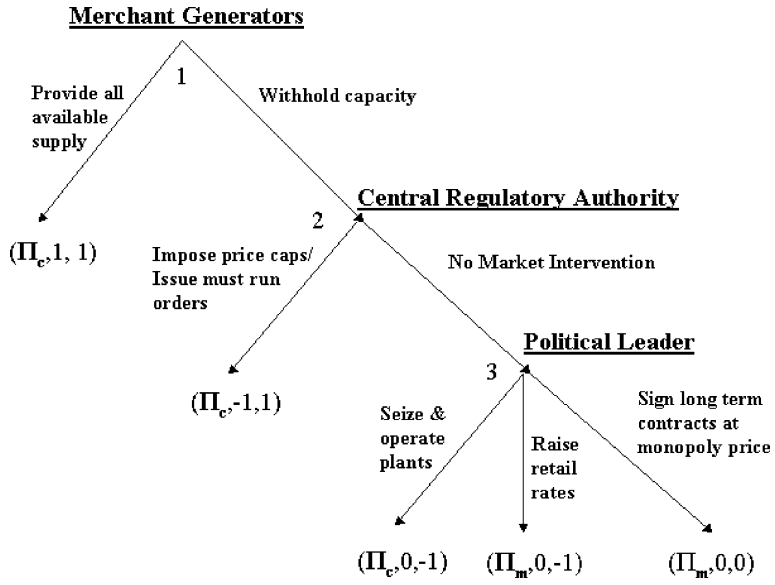

Figure 1: Modeling Electricity Deregulation

any market intervention by the central regulatory authority, the political leader will prefer the signing of long-term contracts and an associated payoff of 0 to end the crisis to any plant seizure or raising of retail rates and an associated payoff of −1.

Moving back one move to the central regulatory authority, we further observe that if confronted by the withholding of capacity by merchant generators, this authority will prefer ''no market intervention'' to imposing price caps and issuing must-run orders. This is because the choice of ''no market intervention'' leads to a payout of 0 regardless of the political leader's strategic choice while intervention results in a payout of −1.

These observations lead us back to the first move of the game. Since the merchant generators can anticipate that the central regulatory authority prefers no market intervention to a price cap/must-run order regime should they withhold capacity and that the political leader will prefer signing long-term contracts to plant seizure if the central regulatory authority fails to intervene, the preferred strategy for the merchant generators is to withhold capacity.

It follows that through this backwards induction process, *we reach a unique Nash equilibrium in this game in which the generators withhold capacity, the central regulatory authority does not intervene, the political leader ends the crisis by signing long-term contracts at the monopoly price, and the payoff is* (Π_m, 0, 0).

V. The Facts Closely Mirror the Stylized Assumptions

Earlier we asserted that our stylized assumptions in this game comport well with the facts of the California crisis. Before providing our final observations on the implications of this analysis for the possible future of electricity deregulation, it may be useful to further substantiate this assertion.

Borders (2001), among others, has explained how the market was exceedingly easy to game.[9] The problem was not the market's auction rules *per se* but rather its ''separated, sequential'' structure that made it difficult for state officials to monitor and effectively police the market. Likewise, the divestiture of much of the major utilities' natural gas-fired generating capacity is now regarded as one of the single biggest mistakes of the crisis.[10]

In addition, there is abundant and incontrovertible evidence that the merchant generators artificially withheld substantial capacity throughout the October 2000 through May 2001 period. This evidence ranges from analyses by the California Public Utilities Commission[11] and findings by FERC[12] to an analysis performed by the Government Accounting Office,[13] fines levied by the California Independent System Operator, and admissions of guilt by the generators themselves.[14]

For their part, both the FERC chairman and several commissioners that would make up the FERC majority made repeated statements regarding their ideological commitment to deregulation and ideological aversion to market intervention.[15] As for

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FERC's reluctance to meaningfully intervene in the market, the commission actually adopted ''soft price caps'' at a critical period in the crisis, but they were price caps in name only. These soft caps did not bar generators from submitting bids greater than the cap. They merely required them to confidentially report their incremental generation costs, as well as any opportunity costs they considered in developing the bid.[16] The ironic result was that as soon as the soft cap was in place, electricity prices soared, hitting $1,500/MWh within the week.[17]

As for California's political leader, Gov. Gray Davis, he was facing not only the prospect of re-election as the electricity crisis began to unfold. He was also in the beginning stages of an exploratory campaign for the 2004 presidential nomination.[18] Within this political context, Davis ultimately rejected the idea of plant seizure and instead doggedly pursued a strategy of negotiating long-term contracts. When these contracts were signed in the Spring of 2001,[19] Davis would hail them as the bold stroke that successfully ended the crisis.[20] In fact, the crisis did end, as the contracts effectively eliminated the state's reliance on the deregulated spot market.[21] However, the $43 billion pricetag for the contracts included an overpayment of ''monopoly rents'' estimated to be roughly $21 billion, and the ''good'' political decision ultimately helped bring about Davis' downfall in a totally unexpected recall election.

VI. Concluding Remarks

The California electricity crisis cost the state tens of billions of dollars—both directly in rates that

were higher than in the absence of the exercise of market power and indirectly through costs ranging from those associated with supply disruptions and lost output to the environmental degradation associated with the relaxation of air pollution standards. It would be easy to conclude from the costly results of this most prominent of ''deregulation experiments'' that deregulation is fundamentally flawed.

Once, however, one better understands the historical and institutional evolution of the crisis in a game-theoretic context, this conclusion becomes too facile. Indeed, the real problem in California was likely not deregulation *per se* but rather the set of exceedingly poor choices made with regard to market design, structure, implementation, and monitoring coupled with the lack of a central regulatory authority committed to protecting ratepayer interests. Add to this volatile mix a myopic political leader with a very short-run view of good politics that led to very bad economics, and deregulation in the Golden State never stood a chance. The lesson, then, is that any debate over deregulation must factor in not just economics but a hefty dose of attention to political behavior as well. Otherwise, deregulation is unlikely to move forward.■

Endnotes:

1. For the current status of state electric industry restructuring activity in the United States, visit http://www.eia.doe.gov/cneaf/electricity/chg_str/regmap.html.

2. The two most relevant reforms were embodied in FERC Orders 888 and 889. Order 888 mandated the unbundling of electrical services and required all public utilities owning, controlling, or operating transmission lines to file nondiscriminatory open access tariffs that would offer and make available to the merchant generators—and other utilities—the same transmission services that these utilities provided themselves. Order No. 889 set up standards of conduct that were supposed to prevent employees of a marketing arm or affiliate of a utility from gaining preferential access to the open access tariff information.

3. AB1890 was passed unanimously by the California State Legislature on Sept. 23, 1996.

4. For more about these market flaws, see, for example, Charles M. Studness,

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CPUC Chooses Reregulation Over Deregulation, PUB. UTIL. FORTNIGHTLY, July 15, 1995, regarding the market structure, and William A. Borders, *Learning from the Storm: Lessons for Illinois Following California's Experience with Electricity Resturcturing*, KENT LAW REV., Vol. 77:333, 354 (2001), regarding the auction rules.

5. In California, a fourth strategy was discussed, but only *after* the Governor had signed the expensive long-term contracts. This involved the formation of a ''buyer's cartel'' in which the state would set a price above which it would not pay and take the blackouts. One obvious political risk involved was similar to that of the plant seizure option: It may have been viewed as extremist. It was also a politically risk ''game of chicken'' that may have not worked if the generators had decided not to pay the cartel price.

6. See JOSEPH P. KALT, THE ECONOMICS AND POLITICS OF OIL PRICE REGULATION (Cambridge, MA: MIT Press, 1983).

7. The political significance of scenarios involving ''concentrated benefits'' and ''diffuse costs'' was first identified by James Q. Wilson. See *The Politics of Regulation*, in James Q. Wilson, ed., THE POLITICS OF REGULATION (New York: Basic Books, 1980), at 366–372. This dynamic usually works in insulating politicians from voter anger. It failed miserably, however, for Gray Davis in California as the signing of the contracts would eventually be one of the pivotal events that would lead to his downfall.

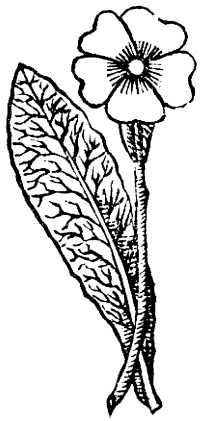
8. This technique is described in most books on game theory. For an example, see ROBERT GIBBONS, GAME THEORY FOR APPLIED ECONOMISTS (Princeton, NJ: Princeton Univ. Press, 1992).

9. Borders, *supra* note 4.

10. ''State Sen. Debra Bowen, chairwoman of the Senate Energy, Utilities and Communications Committee, has said if there were one action that could be undone in this energy mess, it would be PUC's requirement that the utilities 'divest most of their generation assets with no requirement for long-term contracts for the supply generated by those assets.' '' *How PG&E Missteps Preceded Crisis*, S.F. CHRONICLE, Jan. 22, 2001.

11. See, for example, California Public Utilities Commission, *Supplement to the California Public Utilities Commission Staff's Wholesale Generator Investigation Report, Dated September 17, 2002*, Jan. 30, 2003, at 5.

12. For example, On Jan. 31, 2003, FERC approved a $13.8 million settlement with Reliant Energy over the



physical withholding of power in California. Order Approving Stipulation and Consent Agreement, Docket No. PA02-2-001.

13. *Energy Markets: Results of Studies Assessing High Electricity Prices in California*, Government Accounting Office (GAO-01-857), June 2001. Available at http://www.house.gov/inslee/images/GAO_report.pdf.

14. On July 2, 2002, the ISO announced penalties of $251 million imposed on more than two dozen merchant generators for withholding power from the grid during the state's electricity crisis in 2000 and 2001. On Jan. 6, 2003, the ISO released a previously confidential report revealing more possible gaming. For details see Report by California ISO, Department of Market Analysis, *Analysis of Trading and Scheduling Strategies Described in Enron Memos* (Oct. 4, 2002). Available at http://www.caiso.com/docs/2003/01/06/2003010617125814460.pdf.

15. The most prominent and vocal of these commissioners was Republican Chairman Curtis Hebert. At a critical point, he rejected price caps by arguing that: ''These price caps are systemic problems.. . . They would spread from California to the Northwest, Midwest, and Northeast, and before long we have destroyed an industry.'' Quoted in *Bush's Top Energy Official Won't Allow State Price Caps*, FRESNO BEE, Feb. 9, 2001.

16. U.S. Federal Energy Regulatory Commission, Order Directing Remedies for California Wholesale Electric Markets, Docket No. EL00-95-000, *et al.* Dec. 15, 2000. Available at http://www.ferc.gov/electric/bulkpower/cal1215order.pdf. It was only after the crisis was over that FERC reluctantly put price caps into effect.

17. In June 2001, months after the crisis had subsided and the long-term contracts were signed, FERC finally adopted more stringent price caps.

18. More than 100 stories of these ambitions may be accessed on Lexis-Nexis with the keywords ''Gray Davis'' and ''presidential ambitions.'' For one such story detailing the link between these ambitions and the long-term contracts, see *Davis Finds Agenda on Hold, Future Less Bright*, SAN DIEGO UNION TRIBUNE, Jan. 28, 2001.

19. The state committed $43 billion in long-term energy purchase contracts that are roughly twice the actual unmanipulated market value of the electricity—about $20 billion above the competitive market price outcome.

20. In the ensuing months, the contracts would be heavily and roundly criticized by numerous observers as being too expensive, eventually Davis himself would have to admit this fact, and the state would later petition FERC to have them abrogated. FERC steadfastly refused.

21. Other policy decisions contributed to the eventual end of the crisis. These included encouraging conservation, relaxing air pollution emissions regulations to increase electricity supply, and restoring the output of ''qualified facilities.''