

# **CALIFORNIA ELECTRICITY PRICES AND FORWARD MARKET HEDGING**

**SCOTT M. HARVEY\***  
**WILLIAM W. HOGAN\*\***

\*LECG, LLC, Cambridge, MA 02139

\*\*Center for Business and Government  
John F. Kennedy School of Government  
Harvard University  
Cambridge, Massachusetts 02138

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Scott M. Harvey and William W. Hogan<sup>1</sup>

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High prices in California implicate the fundamental flaws in market design. Comprehensive reform of the market design should be a first priority, and market power mitigation should focus on those who have market power. Relying on buyers to engage in forward market hedging per se is not likely to have significant benefits in mitigating the market power of sellers.

## INTRODUCTION

High prices in the California electricity market during the first three quarters of 2000 have produced an immediate need for both analysis of the events and development of policy recommendations. The average wholesale cost of electricity in June 2000 was \$166 per MWh as compared to \$36 per MWh in the summer of 1999.<sup>2</sup> The much higher prices were a surprise, with significant immediate and long-term consequences.

The usual requirement that development of policy recommendations flow from an analysis of the problems and their likely effects is especially important in the context of the California market. The California market is already widely recognized as beset with a "fundamentally flawed" market design that has been the subject of intense scrutiny and debate.<sup>3</sup> This review process was incomplete at the end of September 2000, but it did reveal that the analysis of events in California is complicated by the interaction of the

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<sup>1</sup> Scott Harvey is a Director with LECG, LLC., an economic and management consulting company. William Hogan is the Lucius N. Littauer Professor of Public Policy and Administration at the John F. Kennedy School of Government, Harvard University. The authors are or have been consultants on electricity market design and transmission pricing, market power or generation valuation issues for American National Power, British National Grid Company, Calpine Corporation, Commonwealth Edison, Constellation Power Source, Detroit Edison, General Electric Capital, GPU, Inc. (and the Supporting Companies of PJM), GPU PowerNet Pty Ltd., Duquesne Light Company, Electricity Corporation of New Zealand, ISO New England, National Independent Energy Producers, New England Power, New York Energy Association, New York ISO, New York Power Pool, New York Utilities Collaborative, Niagara Mohawk Corporation, PJM Office of the Interconnection, Putnam, Hayes & Bartlett, Reliant Energy, San Diego Gas & Electric, Semptra Energy, Southern Energy, Southwest Power Pool, TransÉnergie, Transpower of New Zealand Ltd., Westbrook Power, Williams Energy Group, and Wisconsin Electric Power Company. The views presented here are not necessarily attributable to any of those mentioned, and any errors are solely the responsibility of the authors.

<sup>2</sup> Department of Market Analysis, "Report on California Energy Market Issues and Performance: May-June 2000," Special Report, California Independent System Operator (CAISO), August 10, 2000, p. 18. This includes the cost of energy and ancillary services.

<sup>3</sup> Federal Energy Regulatory Commission, FERC Docket No. ER00-555-000 January 7, 2000. The resulting CAISO process began with Congestion Management Reform (CMR) and expanded into redefinition of the acronym as Comprehensive Market Redesign. See [www.aiso.com](http://www.aiso.com) for further details.

effects of mistaken assumptions, bad design, associated real shortages, higher fuel prices, market power, and simple bad luck.<sup>4</sup> Separating out these factors and their relative importance will be no easy matter. However, the further consequences of misdiagnosing the problem and then prescribing the wrong medicine would only compound the difficulties.

Major contributions to the analysis of market performance appear in the series of reports prepared by the Market Surveillance Committee (MSC) of the California Independent System Operator (CAISO). In particular, the September report (MSC September Report) "An Analysis of the June 2000 Price Spikes in the California ISO's Energy and Ancillary Services Market,"<sup>5</sup> examines the interaction between shortages, market design flaws and the exercise of market power. The MSC September Report provides recommendations for reform, including the need to correct fundamental design flaws. In particular, the first market design flaw identified and the first recommendation of the report focus on the role of forward contracting by the utility distribution companies (UDCs). The MSC September Report concludes that there is substantial market power in the California electricity market. Furthermore, it concludes that unrestricted forward contracting by the UDCs would have substantially mitigated this market power in the past and would do so in the future.

Working towards a more comprehensive examination of the full analysis and recommendations, the present note addresses this particular recommendation and the implications for market performance. Setting aside for separate discussion the degree and nature of market power in the California electricity market, we examine the argument that simply removing regulatory restrictions on UDCs and providing them with incentives to forward contract would significantly mitigate market power. The attractions of long-term forward contracting include risk management, but the argument here goes much further in suggesting that creating the opportunity for forward contracting by the UDCs would produce a substantial mitigation of the market power of generators. If correct, this would be a valuable tool in the kit of market power mitigation. If not correct, this argument might significantly distract from the real problem of fixing the problems of market design and developing more direct measures for market power mitigation.

We find that there is little or no evidence to support the argument that the mere opportunity to arrange long-term forward market contracts would mitigate market power. Compulsion by regulators to require generators to sign long-term forward contracts at favorable prices would be another matter, but placing regulatory pressure on the generators to compel them to sign long-term contracts does not appear to be the intent.

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<sup>4</sup> In addition to the presumably normal generator outages, California experienced significant weather-related reductions in available imports from the Pacific Northwest. Moreover, California may have suffered more than some regions from a longer hiatus in new plant construction during several years of debate and uncertainty over the speed and direction of industry restructuring. This hiatus occurred at a time of rapidly growing electricity demand.

<sup>5</sup> Frank. A. Wolak, Robert Nordhaus, and Carl Shapiro, "An Analysis of the June 2000 Price Spikes in the California ISO's Energy and Ancillary Services Market," Market Surveillance Committee of the California Independent System Operator, September 6, 2000.

Furthermore, accepting this argument and placing the pressure on the buyers in the current market might have the opposite of the intended effect, leading to higher not lower overall costs.

## **FORWARD MARKET HEDGING**

The relevant section of the MSC September Report appears under the heading "Insufficient Forward Market Hedging."<sup>6</sup> Here there are several points and they have different implications. The report states:

"Had California's three utility distribution companies (UDCs) signed forward financial contracts equal to their expected net demand for energy and ancillary services during each hour of the months of May and June of 2000, average prices in the PX and ISO markets during these months would have been significantly lower. Even if the June 2000 price spikes had still occurred, the UDCs would have been largely insulated from this spot market price volatility, because of their forward hedges."<sup>7</sup>

The first assertion is that the existence of successfully completed forward contracts would have materially altered the behavior of the market and produced lower average prices. The second assertion is that even in the absence of the first effect the impact of the high prices would have been substantially reduced due to the protection of having paid for the electricity in the forward contracts.

As for the second assertion, it is true as the MSC September Report states that "forward market purchases limit the spot price exposure faced by a load-serving entity. It is subject to spot price risk on its real-time energy requirements only to the extent that they differ from its forward market purchases."<sup>8</sup> However, this is only part of the story, because the forward market contract does not prevent exposure to the forward market price. Presumably it is the total cost that is relevant, the amount paid in the spot market and the amount paid for the forward contract.

In the present case of California, the events of the summer of 2000 produced prices that were substantially above the prices that would have been required to obtain a summer forward contract as recently as the spring of 2000.<sup>9</sup> Apparently the prices of the summer of 2000 were also well above the prices now being suggested that would be

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<sup>6</sup> MSC September Report, pp. 6-13.

<sup>7</sup> MSC September Report, p. 6.

<sup>8</sup> MSC September Report, p. 6.

<sup>9</sup> The closely related NYMEX Palo Verde Futures Price for August 2000 Contracts was between \$50 and \$75 per MWh from March through May 2000, and reached just over \$200 by the end of July 2000. Testimony of Matthew P. Harris, "Price Forecasting in the California Electricity Market," Application of San Diego Gas & Electric Company (U 902-E) in the Third Annual Transition Cost Proceeding Addressing (1) The Transition Cost Balancing Account (TCBA), and (2) The Reasonableness of San Diego Gas & Electric Company's Energy Procurement Practices," Volume II, Before the California Public Utilities Commission, October 2, 2000.

required for prospective long term contracts in the California market.<sup>10</sup> There is little dispute that in the present case those customers who held forward contracts for the summer of 2000 saw substantially lower average prices than those who relied solely on the spot market.

As a guide for future policy recommendations, however, this undisputed fact suffers from the problem of twenty-twenty hindsight. The high prices were a surprise, and prices in the forward market looked unappealingly high at the time. After the fact, when the coin came up heads, the wager on the forward contracts looked like it was a good bet. But if the coin had come up tails, there would have been a very different concern about the money "wasted" on the forward contracts.

And coins fall both ways. In New York City, for example, in the spring of 2000 forward prices for a July/August strip were as high as \$140 per MWh for delivery to New York City. In the event, the average peak period day-ahead prices in New York City were \$64.44 and \$79.44, respectively.<sup>11</sup> Hence, if buyers in New York would have followed the advice to arrange forward contracts, by September there would have been the complaint that average prices of the hedgers were 100%-200% above market outcomes, the mirror image of the relative outcomes in California. In the event, most customers in New York did not sign up for the forward contracts. They were unhappy with their high spot prices compared to what they would have preferred, but not compared to the forward contract prices.

We all know that it is easier to have perfect hindsight than it is to have even good foresight. Further, the simple fact that a hedging contract reduces exposure to spot market prices is not sufficient to conclude that hedging contracts would always, or even on average, reduce the total price paid for electricity. It could easily turn out the other way in particular instances, and there may even be a premium in the average price under the hedging contract in order to avoid the risk. Furthermore, with the UDC in the business of arranging the contracts, there would be many other complicated and familiar problems under regulation where "[a] perceived inability of the regulatory processes around the world to cause firms to produce in a least-cost manner in the former vertically integrated monopoly led to widespread introduction of competition in generation and supply."<sup>12</sup>

## **MARKET POWER MITIGATION**

Stepping around the trap of perfect hindsight, the more interesting argument in the MSC September Report would be the first claim that the existence of forward contracts

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<sup>10</sup> "Three suppliers have proposed forward contracts at 6 cents per kWh, while Duke Energy has proposed 5 cents per kWh for the next two years and Enron has offered 5.6 cents per kWh, Keebler [Reliant] said." Power Markets Week, October 9, 2000, p. 20.

<sup>11</sup> Consolidated Edison Company, personal communication. The June 2000 day-ahead average was \$95.86.

<sup>12</sup> MSC September Report p. 12.

would provide the right incentives to change behavior in the spot market and lower spot prices, along with the implication that this would be both doable and worth the cost:

"... forward market purchases from a generation unit owner limits the incentives this supplier has to exercise market power in the spot market. Generation unit owners that have sold forward financial contracts have a strong incentive to bid aggressively (low prices for large quantities of capacity) into the spot market in order to sell a sufficient amount to cover the forward financial commitment with actual physical sales of energy or capacity. The larger the quantity of the forward financial commitment sold by a generation unit owner, the more aggressively this owner will bid into the spot market that the forward financial contract clears against. This is a straightforward application of the basic economic concept of marginal revenue that underlies optimal pricing and bidding behavior."<sup>13</sup>

There are several ideas embedded in this claim, and the MSC draws its conclusion from other further investigations of this subject. To understand what this argument says and does not say, it would be useful to distinguish cases covering well designed and badly designed markets, and competitive markets versus those with market power.

For the well designed competitive markets, even with shortages, there should be little disagreement that the mere existence of forward contracting opportunities should have no impact on the equilibrium expected prices in either the spot or the forward market. The outcome should be the competitive price, which could be high in the case of shortages. Competition in real time would produce a competitive price. Competition in the forward market along with financial arbitrage would imply that the forward contract price would be the expected real time price, plus or minus a small risk premium or discount. This is consistent with the general thrust of the argument in the MSC report and underlying analyses cited.

Hence, the claim for the efficacy of forward contracts must arise from either the problems of bad design or the problems of market power. Although the MSC has been quite explicit and detailed in its current and past critiques of the problems produced by bad design features of the California market, the impact of bad design combined with competitive market performance does not appear to be the foundation of the argument for the importance of forward market hedging. The real focus of the MSC September Report is on the central importance of market power, for both good and bad market designs. The important public policy claim in that report is that the bidding behavior of generators with market power would be changed by the introduction of the opportunity for greater forward contracting.

The MSC September Report with its conclusion regarding forward contracting and market power relies on an extensive body of work, notably the investigations of Wolak using the experience in the Australian market.<sup>14</sup> Additional support for the

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<sup>13</sup> MSC September Report, p. 6.

<sup>14</sup> Frank A. Wolak, "An Empirical Analysis of the Impact of Hedge Contracts on Bidding Behavior in a Competitive Electricity Market." International Economic Journal, 14(2), pp. 1-40. (available from <http://www.stanford.edu/~wolak>)

importance of forward contracting can be found in the early experience in the market in England and Wales.<sup>15</sup> The theoretical argument is that given a large forward contract position, the generator would have less incentive to exercise market power because the reduction in demand and its sales due to higher prices would no longer be compensated by higher short-run profits on all of its remaining production. The theoretical argument is correct as far as it goes, but it raises the questions of why the generators would sign the forward contracts in the first place, what price would generators charge in the forward contracts, would generators take account in setting prices of the impact of higher prices both on current profits and future profits under term contracts, and what relevance this has to the particular conditions in California?

Answers to the first two of these questions could be that the generators would sign contracts at low prices because they would be compelled to do so by regulators as part of a transitional vesting process. As it turned out, in the case of England and Wales the original vesting contracts were mandatory but not necessarily at low prices. And in the case of Australia, the source cited by the MSC explains why there was so much forward contracting that helped reduce spot market prices:

"A final reason for the large amount of hedge contracts held by Firm A is the relatively large amount of vesting contracts outstanding during this time period. Under the rules of the NSW and Victoria markets, generators in these markets were required to sell to retail suppliers of electricity hedge contracts in sufficient quantity to cover the forecast load of non-contestable or captive customers served by these retailers. Non-contestable customers are prohibited from choosing their retailer. They must purchase electricity from the incumbent local retailer. The prices of these vesting contracts are set by the state government at fairly generous levels relative to current prices in the wholesale market. Given the relatively small number of contestable customers in the NSW and Victoria market during the sample period, these vesting contracts were a very large fraction of the quantity of hedge contracts held by all generating companies."<sup>16</sup>

Apparently the generators were compelled to sign the contracts, and the implication that this is beneficial for mitigating market power means that total prices on average must have been lower than compared to the absence of the vesting contracts.

It seems clear that if the regulators are prepared to compel generators to sign long-term contracts at prices that lower their total average prices and profits, then customers would see lower average prices. The disconnect, however, is in defining the relevance this has for the California market or for the conclusion that the UDCs not signing forward contracts is the source of the problem. The key ingredient, compelling the generators to cooperate on offering lower prices, was not envisioned in the past and is not mentioned in the MSC recommendation for the future.

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<sup>15</sup> See for example, Richard Green, "Britain's Unregulated Electricity Pool," in M. Einhorn (ed.) From Regulation to Competition: New Frontiers in Electricity Markets, Kluwer, Boston, 1994, pp. 73-95.

<sup>16</sup> Frank A. Wolak, "An Empirical Analysis of the Impact of Hedge Contracts on Bidding Behavior in a Competitive Electricity Market," (p. 43 in web page version).

The common sense question looms as to exactly why generators possessing market power would be prepared to offer low price contracts in order to lower the spot price and lower their own profits? Here the answer is a little more complicated, and much more controversial. The apparent claim of the MSC September Report is that generators with market power would voluntarily sign such contracts and lower their expected profits due to the incentives that would be induced by the interaction of the forward and contract markets.

Clearly a single monopolist would not be affected by the opportunity to sign forward contracts. Hence, the logic behind this argument would depend on a game theory formulation of the oligopoly problem with limited competition among a few suppliers. There is a literature on this subject that traces back to a common root in the work of Allaz.<sup>17</sup> The details are important, but the basic outline is simple. A spot market with firms able to exercise market power produces high prices and inefficient outputs. The oligopoly model applied by Allaz and Vila<sup>18</sup> to the spot and forward markets follows the familiar Cournot formulation, which is usually justified based on its analytical convenience rather than its descriptive power. There is a one-period spot market. Producers take the outputs of their competitors as fixed. Introduction of a single forward market in this formulation substantially reduces the suppliers' market power in real time as each supplier now must compete not only with other suppliers in this period but also in effect with other suppliers and itself in the forward period. Extension of this model to continuous trading in the forward markets produces the remarkable result that the mere existence of the opportunity for forward trading completely eliminates market power.<sup>19</sup>

There are at least two possible conclusions that might flow from this analysis. One is that we have a silver bullet that produces a surprising and unintuitive result that market power cannot coexist with the opportunity for forward trading. The other conclusion is that we have a very peculiar knife-edge kind of result that depends completely or strongly on the special structure of the game theory formulation; change the assumptions of the game formulation in seemingly innocuous ways and the conclusions might change completely. Those familiar with game theory would probably pick the second explanation as their first guess.

This latter view is the explanation of Allaz and Vila who identify at least two critical assumptions. First is the so-called Cournot behavior where generators act as though the quantity offered by the other competitors is fixed and the only problem is balancing the changes in market demand. Second is the connection to another famous game known as the prisoner's dilemma.

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<sup>17</sup> Blaise L. Allaz, "Strategic Forward Transactions Under Imperfect Competition: The Duopoly Case," Ph. D. Dissertation, department of Economics, Princeton University, October 1987.

<sup>18</sup> Blaise Allaz and Jean-Luc Vila, "Cournot Competition, Forward Markets and Efficiency," Journal of Economic Theory, Volume 59, 1993, pp. 1-16.

<sup>19</sup> In this model, the buyers are perfect competitors. This does not treat the case of buyers exercising market power that balances the power of the producers by withholding final consumption or subsidizing high cost output to lower market prices, which does not appear to be the MSC argument.

As for the Cournot formulation, Allaz and Vila point out that the assumption is "crucial."<sup>20</sup> In fact, in Allaz's earlier dissertation the point appears that changing the response assumption from fixed quantity to fixed market share completely reverses the conclusion; there is no forward contracting and we would have the completely collusive monopoly outcome.<sup>21</sup> In another attack on the same problem, Newbery describes an alternative approach to sidestep the "implausible outcome" of Allaz and Vila, by examining a supply function equilibrium and contestable entry to preserve the strategic incentive to forward contract.<sup>22</sup> Contestability of entry does not seem relevant to the California case, but the supply function formulation has greater appeal; in this model generators assume their competitors' supply functions, not outputs, are fixed. Here the work of Green is important in showing that keeping all the assumptions of the Allaz and Vila argument but changing only the nature of competition in the spot market to a linear supply function equilibrium again completely changes the result and produces no forward contracting.<sup>23</sup> Green's special case does not exhaust all the outcomes, but his analysis highlights the importance of the structure of the interaction in the game theory formulations and the necessity that the forward contracts affect the strategy, not just the outcomes, in the spot market.

On balance, therefore, the net implication of these various game theoretic formulations is at best mixed, and there is no compelling theoretical argument that would support the conclusion that generators possessing market power would unwittingly surrender that market power simply because customers came asking for long-term contracts.

The theoretical prediction of market power mitigation appears even more "implausible" when we consider the incentives of the one-shot game that is described in all these analyses. Allaz and Vila note that in their model "the trading decisions give rise to a prisoner's dilemma: each producer has incentives to trade forward but when they both do so, they end up worse off."<sup>24</sup> This is a famous dilemma, and almost equally as famous is the recognition that the outcome depends importantly on the assumption that the game is played only once. Repeated play of the prisoner's dilemma game could produce a very different outcome that would be indistinguishable from collusion. "There is ample evidence that firms in some industries have understood the role of repeated play in allowing such collusive outcomes... ." <sup>25</sup> Given the repeated nature of electricity

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<sup>20</sup> Blaise Allaz and Jean-Luc Vila, "Cournot Competition, Forward Markets and Efficiency," Journal of Economic Theory, Volume 59, 1993, pp. 12.

<sup>21</sup> See also, Blaise Allaz, Oligopoly, Uncertainty and Strategic Forward Transactions," International Journal of Industrial organization, Vol. 10, 1992, pp. 297-308.

<sup>22</sup> David M. Newbery, "Competition, Contracts and Entry in the Electricity Market," RAND Journal of Economics, Vol. 29, No. 4, Winter 1998, pp. 726-749.

<sup>23</sup> Richard Green, "The Electricity Contract Market in England and Wales," The Journal of Industrial Economics, Vol. XLVII, march 1999, pp. 107-124.

<sup>24</sup> Blaise Allaz and Jean-Luc Vila, "Cournot Competition, Forward Markets and Efficiency," Journal of Economic Theory, Volume 59, 1993, pp. 3.

<sup>25</sup> Drew Fudenberg and Jean Tirole, Game Theory, MIT press, 1992, p. 155.

markets, it would be prudent to at least require some demonstration or argument that this critical feature of the one shot prisoner's dilemma does not apply here.<sup>26</sup>

Apparently the theoretical literature is at best ambiguous in supporting the forward hedging contract recommendation of the MSC September Report, or even in pointed conflict with its implications. Furthermore, the favorable theory rests upon an assumption that there is a price responsive demand function in order to make the incentives associated with contract positions produce aggressive spot market bidding behavior by generators. However, and as emphasized elsewhere in the MSC report, this has not been the case in California. Even where appropriate metering is available, the California market design combined with the retail rate cap effectively shields loads from market-clearing prices at their respective locations. This dilutes the incentives for appropriate demand responses from price-sensitive loads, especially in those transmission-constrained regions in which the exercise of market power is most likely. In the absence of a price sensitive demand response, the incentive to bid less aggressively does not require a large uncontracted demand. Even a 1 MW "pivotal" generator (in the terms of the MSC) would be foolish to accept a price below the willingness to pay at the margin. Hence, with shortages and a price cap we would expect competitive suppliers to seek the price cap.

For both the empirical and theoretical literature, therefore, we find that a closer look produces little or no support for the most important interpretation of the recommendation in the MSC September Report. The empirical evidence of the importance of contracting in mitigating market power relies on cases where the generators largely were forced to sign the forward contracts. The theoretical models are interesting but ambiguous in their predictions and seem to have little relevance for the California market. We are left with the common sense question: if the generators have market power, why would they voluntarily act to surrender that market power through forward contracting at low prices?

Notably, the MSC identifies the tension underlying its own analysis about the efficacy of forward contracting. First, from the perspective of the buyers: "In making their forward contracting decisions, load-serving entities must trade off the benefits of reduced average spot prices against the increased prices that they may need to be pay in forward markets to purchase a sufficient amount of forward energy to cause generators to bid aggressively in the spot energy markets."<sup>27</sup> This seems to acknowledge the long-term forward contracting might be expensive, but it raises the notion that buyers might somehow be willing to act individually to exercise a form of market power to the benefit

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<sup>26</sup> Henry Thille, "Commodity Futures Markets With Imperfectly Competitive Producers, Ph.D. Dissertation, Department of Economics, University of British Columbia, 1995. This work examines the sensitivity of the results of Allaz and Vila in various dynamic settings. However, these are always finite horizon models with certain end-points, which "eliminates additional equilibria that arise when  $T=\infty$ ," (p. 41) or when the end point of the repeated game is uncertain. Hence, this dynamic analysis is not the same as the repeated game argument summarized in Fudenberg and Tirole.

<sup>27</sup> MSC September Report, p. 10.

of the market as a whole.<sup>28</sup> If this is the argument, we should examine the likelihood of success in the face of the obvious free-rider problems.

And for the generators, the dilemma remains: "Generators must bear in mind that signing significant long-term financial forward commitments to supply energy, even at very attractive prices, commits them to be very aggressive suppliers of energy in the spot market, which can reduce average spot prices."<sup>29</sup> As discussed above, contracts at "attractive" prices may or may not produce aggressive bidding depending on the other market reforms. But it is clear that generators will understand the incentives and will not be likely to volunteer for forward contracts at low prices that reduce their total profits.

If the generators do not have market power, or if the forward contracts are not at low prices, then there is no strategic advantage to buyers in changing the incentives in the spot market. Furthermore, in what is already a strong seller's market it would seem that putting pressure on market participants to enter into forward contracts would create even more of a seller's advantage. The MSC's proposed reserve and scheduling penalties do not address the incentives on generators to sign long-term forward contracts. If this is the case, the MSC's recommendation and pressure on the UDCs could produce exactly the opposite of its intended outcome by raising average prices and repeating the problems of the regulated past with long-term contracts at high prices that could not be supported in the market.

## **COMPREHENSIVE MARKET REDESIGN**

If simple removal of restrictions on forward contracting would do little to mitigate market power, we need to look elsewhere to improve the performance of the market. The attractions of hedging contracts for reducing risk would remain. As the MSC concludes, "... competition between generation and loads in the forward and spot markets and over the terms and conditions of forward financial arrangements is an essential component of a robust and fully competitive wholesale electricity market. Removing all restrictions on UDC forward contracting will allow this essential component of a workably competitive electricity market to develop."<sup>30</sup> But the fundamental problem would remain to address the fundamental flaws in the market design.

It would be appropriate to identify and remove any market design features that cause market participants to enter into fewer forward contracts than they would otherwise perceive to be in their individual interest. For example, we could ask if there are market design barriers to the efficient level of forward contracting by retail suppliers to customers no longer under price caps? Or for forward contracting by UDCs whose customers are still under price caps, given that these customers do not have an incentive to forward contract on their own? But there is a potential question of whether the efficient level of forward contracting is feasible under the current market design.

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<sup>28</sup> This is not the same thing as the usual monopsony argument which envisions changing the final pattern of consumption to influence prices.

<sup>29</sup> MSC September Report, p. 10.

<sup>30</sup> MSC September Report, p. 10.

For example, the separate sequential market design of California energy and ancillary service markets may hinder forward contracting because the value of capacity may be quite different if used to provide energy or reserves, thus complicating forward financial hedge contracts and increasing the risk premium. A fundamental problem of the California market is the flawed design and the perverse incentives it creates. These design problems complicate everything.

The discussion of the flaws in the current California market design and the options for reform goes beyond the scope here.<sup>31</sup> Without engaging all these details, it is straightforward to agree with the MSC report that design flaws can complicate market power mitigation. "Market power mitigation measures that place restrictions on generator behavior without altering their [sic] incentives may simply result in the exercise of the same or greater amount of market power, but in a different manner."<sup>32</sup>

The prudent policy choices will require the kind of comprehensive market redesign that is now under discussion in California. Importantly, the use of penalties to compensate for incentives inherent in bad design would be inferior to the correction of the design itself.

There is agreement that market design flaws are the heart of the problem, and the need for comprehensive market redesign is supported by many other analyses of the problems in the California market. This should be the focus of the reform effort. With or without market power, the design is flawed. The presence of market power would complicate the reforms, but there is ample evidence that reform is needed. However, the evidence does not support the other companion conclusion of the MSC that "eliminating restrictions on UDC forward financial contracting can significantly limit the ability of generators to exercise market power."<sup>33</sup>

## CONCLUSION

In summary, forward contracting may be advantageous and the literal recommendation to remove restrictions on forward contracting has merit. But there is little evidence here to support the notion that the availability of hedging contracts per se would reduce average electricity prices. Any implication that the responsibility for mitigating market power of sellers should fall on the buyers is not supported. The real focus should be on fixing the many market design flaws, and if market power exists to mitigate it the old fashion way with a focus on those who possess market power. Creating the opportunity for forward contracting by itself is not the easy way out of the real dilemma.

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<sup>31</sup> John Chandley, Scott Harvey, and William Hogan, "Congestion Management Reform," Report Submitted to the CAISO Board, August 31, 2000.

<sup>32</sup> MSC September Report, p. 15.

<sup>33</sup> MSC September Report, p. 15.