

THE QUEST FOR COMPETITIVE ELECTRICITY MARKETS

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CAN COMPETITIVE MARKETS FOR ELECTRICITY offer lower prices and innovative new services while maintaining the high levels of reliability that we have traditionally enjoyed? This question remains under debate. However, we have learned a lot from the various efforts at reform undertaken around the world. In this paper, I present 20 observations and lessons learned.

In recent decades, policy-makers in many corners of the world have sought to restructure electricity markets. By unleashing the forces of competition upon this stodgy “old economy” industry, it was hoped that innovation would be encouraged and consumers would ultimately enjoy lower prices, as well as innovative new products and services. The innovation that initially followed liberalization of the telecommunications industry would be mimicked here.

So far, efforts to reform this industry have not fully lived up to their promise. The transition from regulated to competitive markets has been difficult. Retail prices have not yet declined in the markets targeted for restructuring. Market manipulation by dominant players in the imperfectly-competitive markets that resulted from restructuring has been a recurrent concern. The long-term adequacy of investment in new sources of generation remains an issue.

Nonetheless, there is some cause for cautious optimism. At least at the wholesale or generation level of the industry, there is evidence of efficiency gains. The centralized market-level coordination necessary to “keep the lights on” has been demonstrated. A wide variety of pricing plans are now available in markets

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where retail competition has proven relatively successful. Under the right set of conditions, restructured markets can entice the entry of generation companies and retailers, which is necessary for meaningful competition to occur.

Each restructured market differed with respect to its initial market structure, regulatory constraints, extent of public ownership, infrastructure, size, and supplier concentration. Restructuring has taken a different path in each market. And the outcomes have ranged from a “colossal and dangerous failure”¹ (e.g., California) to successful, at least on some criteria (e.g., Texas and the U.K.). Despite the great diversity of experiences, some common themes are beginning to emerge, as reported in this essay.

BACKGROUND AND CHALLENGES

Interest in reforming electricity markets followed efforts in the 1970s and 1980s to bolster competition in a variety of other industries in the U.S. and Western Europe, which had previously been subject to considerable government regulatory oversight. Targets of reform in the U.S. included trucking, aviation, railroad, and telecommunications industries. Regulatory restrictions over banking and agriculture were similarly relaxed.

The reform of trucking, airlines, and railroads in the U.S. achieved some success, along with some early efforts to foster competition in telecommunications markets. Consumers benefited from greater choices and prices generally declined. On the other hand, efforts to relax regulatory oversight over savings and loan institutions in the U.S.,² pension funds in the U.K.,³ cable television in the U.S.,⁴ along with later telecommunications market reforms in the U.S.⁵ failed to achieve their policy objectives.

Reforming electricity markets has proven to be a formidable task for a variety of reasons. The industry is immense. Power generation and supply accounted for \$288 billion of gross output in the U.S. in 2005.⁶ The industry requires very large long-term investments in power plants and transmission and distribution infrastructure. In some nations, a government-owned electric utility is the nation’s largest employer. In this industry (as in the airlines and telecommunications industries), competition requires an enormous degree of centralized coordination to ensure that demand is reliably met both on a real-time basis and over the long-run.

Certain segments of the industry (e.g., the transmission and distribution of electricity) exhibit natural monopoly characteristics,⁷ while competition may be readily introduced into other sectors (e.g., the wholesale generation sector and, arguably, the retail sector). This implies that vertically-integrated utilities must be “unbundled” into separate companies or divisions engaged in different functions to foster fair competition in competitive markets, while permitting the utility to conduct monopoly operations in other sectors.

Transmission networks were traditionally constructed to enable local electric utilities to reliably serve consumers within the utility’s service area. Consequently, large new investments in transmission infrastructure may be necessary

to facilitate transfers of power among numerous buyers and sellers participating in large competitive markets for electricity.

Simply tracking electricity is difficult. Electricity is injected into a transmission grid by generators. It is withdrawn by consumers. Within the network, there is no way to distinguish the electricity generated by various generation sources. The electricity grid is analogous to a pond where water suppliers add water to the pond while consumers withdraw it. Or it might be thought of as a grain elevator, where farmers deposit their produce and purchasers withdraw it. Thus, the amount of electricity injected by each generator and the quantities purchased by all consumers must be carefully tracked. In contrast to those examples, electricity cannot be cost-effectively stored. In real time, it is necessary to ensure that the total amount of electricity injections and total amount of electricity withdrawals remain close. This makes electricity markets different from many other industries.

In many countries, electric utilities have historically been owned and operated by federal governments. In such nations, privatization must precede the establishment of competitive markets.

Traditional monopoly utility providers are in a natural position to continue to dominate the generation of electricity and retail functions in their traditional service areas for some period of time after the introduction of competition. This legacy necessitates the imposition of safeguards to limit the market power abuse of the successors to the incumbent utility.

Inelastic demand for electricity exacerbates many of the problems inherent in efforts to reform electricity markets. The natural tendency for price to seek short-run marginal cost in a competitive market bumps into some practical roadblocks in this industry. Retail prices seldom adjust to reflect the frequent real-time changes in the value of electricity generated, transmitted, and distributed by the utility system and sold to an ultimate retail customer. At least for smaller consumers, tariffs reflect the long-term average cost of providing electricity to a class of consumers. For smaller electricity consumers, the costs of metering energy usage at less than monthly intervals thwart pricing schemes to reflect changes in the value of electricity in retail prices in hourly or 15-minute intervals on a wide-scale basis. Consequently, most consumers fail to see prices that reflect the marginal cost of providing electricity to the consumer, and the market cannot measure consumption in 15-minute or hourly intervals anyway.

In the U.S. and in some European countries, jurisdictional issues further complicate efforts toward reform. Federal and state regulatory authorities exercise control over various linked or overlapping functions of the industry in the U.S., frequently leading to inconsistent policies among states and clashes between state and federal regulators. In addition, municipally-owned utilities and rural electric cooperatives are often exempt from regulatory oversight, thus further impeding the establishment of consistent policies.

Despite the obstacles, competition has been introduced into various sectors of electricity markets in many regions of the world, with varying degrees of success.

COMPETITION IN MARKETS FOR ELECTRICITY GENERATION

Reform of wholesale generation markets generally precedes initiatives to reform other segments of the industry. Initiatives to foster competition in this segment of the industry may be traced to energy conservation legislation in the U.S. following the energy price shocks of the 1970s.⁸

The Carter-era Public Utility Regulatory Policies Act removed barriers of entry in generation markets to independent power producers and industrial facilities using cogeneration or combined heat and power (CHP) technologies. This was primarily intended as a conservation measure, to encourage the conversion of waste heat into electricity generation in industrial processes. The policy provided industrial facilities with a market for electricity generated in excess of their needs. Yet, in retrospect, this policy's greater importance was that it greatly introduced competition in the generation sector. It forced regulatory commissions to establish mechanisms for valuing non-utility generation and policies to ensure that independent power producers had non-discriminatory equal access to the transmission network. The successful implementation of this policy in Texas (which became the leading state in CHP generating capacity) and some other states was widely copied outside of the U.S.

The Energy Policy Act of 1992 removed barriers to the entry of independent power producers to U.S. markets. It also expanded the Federal Energy Regulatory Commission's authority to foster competition at the wholesale level.

Integrated resource planning policies introduced further competition. Under these policies, independent power producers and energy services companies (offering demand-side reductions in usage) were offered opportunities to meet resource needs identified by a utility if they could do so at a lower cost than the utility.

Electricity financial markets developed in the 1990s. Trading hubs and the financial instruments necessary to facilitate trading were established. These markets provided opportunities to speculate, arbitrage, and hedge risks associated with wholesale electricity transactions and created financial markets through which the value of electricity could be determined.

A theoretical framework for restructuring this industry was earlier provided by Joskow and Shmalensee (1983). Scheppe, Caramanis, Tabors, and Bohn (1988) provided a framework for retail and wholesale electricity pricing that reflected short-run marginal cost, which in turn led to the establishment of sophisticated locational marginal pricing (LMP) wholesale market structures.

The creation of independent system operators (ISOs) or regional transmission organizations (RTOs) provided independent coordination of physical bulk power transactions among various generators and load-serving entities. Bulk power transactions are coordinated by an entity independent from a utility, providing non-discriminatory access to the grid by all generators. Such organizations have sufficient authority to enforce rules and take actions in the event of an emergency. Transmission planning was placed in the hands of the ISO. The establishment of market rules is often a collaborative effort among the main participants in the market. The degree to which generation is centrally dispatched varies

among markets, although there is clearly a trend toward ceding more operating decisions to the ISO or RTO.

Many areas of North America are now served through ISOs or RTOs, including New England, New York, the remainder of the Northeast and upper Midwest (through the PJM ISO), California, and most of Texas. Competitive markets have evolved in England and Wales, Australia, New Zealand, the Canadian provinces of Alberta and Ontario, Argentina, Chile, Spain, and the Nordic countries.

It is common for ISOs to also operate formal markets for power. Day-ahead markets typically clear in the afternoon prior to an operating day. Real-time or dispatch markets clear just ahead of hourly, 30-minute, 15-minute, or 5-minute intervals.

Often, utilities are ordered to divest their generating assets, in order to create some initial competition and to prevent a single dominant generation owner (the incumbent utility) from controlling the market. In the U.S., California, Connecticut, Maine, New Hampshire, and Rhode Island all passed laws requiring divestiture.⁹

In 1987, Chile was the first to undertake a restructuring of its wholesale market. England and Wales followed in 1990. Colombia's restructuring began in 1994-95. California's ill-fated experiment was launched in 1998. The Pennsylvania, New Jersey, Maryland (PJM) market was restructured in 1998-99, followed by New York in 1999.

Significant policy changes were also introduced in Australia, New Zealand, Alberta (Canada), and South Korea beginning in the late 1990s. In the U.S., there has been little restructuring activity since Texas (the Electric Reliability Council of Texas or ERCOT market) in 2002.¹⁰

Today's restructured wholesale markets operate as reliably as areas with a monopoly supplier. There is some evidence of efficiency gains as a result of competition at the wholesale generation level. However, the exercise of market power and long-term resource adequacy remain of concern, as discussed later.

RETAIL CUSTOMER CHOICE

While the introduction of competition into the generation sector has generally proven to be successful, or at least a manageable task, providing consumers with a choice of retail providers has proven far more difficult and has achieved mixed results.

Retail competition involves the introduction of competitive retailers who compete with the traditional utility provider for retail sales to consumers. The retailer associated with the incumbent utility continues to have its prices and services regulated for some period of time. New entrants compete on the basis of price, services, or marketing strategies in order to recruit customers.

A competitive wholesale or generation market provides a platform for a competitive retail market. Competitive retailers might acquire the rights to generation from various providers of generation through either formal or informal centralized markets or through bilateral contracts with power generators. Retailers are typically responsible for billing. Some organization (e.g., the traditional utility

supplier or the ISO) assumes responsibility for tracking which retailer is serving which retail consumer.

The market reforms in Chile in 1987 introduced some retail competition, but only for large users of power. Norwegians were able to switch retailers in 1995. The reforms introduced in England and Wales eventually provided all consumers in that market with retail choice in 1998.¹¹

Beginning in 1998, California was the first large-scale effort to introduce customer choice in the U.S. While many of the problems in the California market stemmed from market conditions and design flaws in the wholesale market, the consequences were certainly felt at the retail level. California's electricity crisis began in May 2000, lasting 12 months. California faced the perfect storm. Restructuring coincided with a five-fold increase in natural gas prices in North America. A drought in the Pacific Northwest limited the import of hydropower into California. The exercise of market power by Enron and other participants in the wholesale market was amplified by a power exchange through which all transactions were required to pass.¹² Environmental restrictions, making it difficult to build power plants and transmission lines in the state, had left California with tight reserve margins, reliant upon power imports, and with limited transmission capacity to accommodate power imports. Retail prices were not allowed to adjust to wholesale price increases due to regulatory restrictions. This imposed financial stress on the dominant retailers (the three investor-owned utilities who were formerly the monopoly providers) who incurred high costs but were unable to pass those costs along to energy consumers. Consumers faced prices that failed to reflect the true wholesale prices. Pacific Gas and Electric Company filed for bankruptcy protection and Southern California Edison Company was on the verge of financial ruin when wholesale prices surged from about \$30 per MWh in 1999 to over \$150 per MWh during the crisis.

Before the collapse of the California market, about a dozen states in the U.S. had implemented or were considering policies to introduce retail choice. Most of these states were in the Northeast, where high electricity prices had traditionally been faced. Massachusetts and Rhode Island led the way in 1998. New York, New Jersey, Maine, and Pennsylvania soon followed.

Following the California electricity crisis and the (completely unrelated) blackouts in the restructured areas of the American Northeast in August 2003, many policy changes stalled. New Mexico, Oklahoma, Montana, Nevada, and Arkansas have reversed, suspended, or delayed restructuring activities.¹³ In the restructured states of Connecticut, Delaware, Illinois, Maine, Maryland, New Jersey, Pennsylvania, Rhode Island, and Virginia, concerns have arisen that prices may have increased faster than they would have under traditional regulation.¹⁴ Restructuring efforts were quickly reversed in the Canadian province of Ontario after retail competition had been introduced and retail prices skyrocketed due to market design flaws, inadequate competition, and other problems.

Despite the setbacks, some efforts to introduce competition at the retail level are regarded as fairly successful. These include Texas (ERCOT) and New York in North America.¹⁵ The England and Wales retail market has also proven successful by many counts. Table 1, adapted from Sioshansi (2008), summarizes

the experiences of some key markets with restructuring at either the wholesale or retail levels.

OBSERVATIONS AND LESSONS LEARNED

While it is still too early to fully answer the question of whether electricity markets can be successfully restructured, some findings are becoming clear at this point. We have certainly learned much from the efforts undertaken to date. Presented in this section are 20 findings or observations based on the outcomes of the restructuring activities conducted to date.¹⁶

1. *A competitive generation market can be successfully operated.* The information technologies, models, databases, and accounting systems necessary to coordinate, price, and account for wholesale power transactions involving numerous generation suppliers in a reliable manner are available. Centralized ISOs or RTOs preserve reliability as well as system operators at vertically-integrated utilities. Further, there is some evidence that competitive generation markets have achieved efficiency gains.¹⁵ The establishment of independent power production can shift certain market risks away from consumers, which may also provide benefits. Yet, concerns regarding market power and long-term resource adequacy remain, as noted below.
2. *Competition requires considerable centralized coordination.* A misnomer, so-called “deregulation” involves substantial government involvement in the design of a market and continued regulatory oversight over many functions. Describing commodity markets in general, Vogel notes “modern market systems are not natural phenomena that arise spontaneously but complex institutions that must be created and sustained by the visible hand of government.”¹⁷ This certainly rings true with respect to electricity markets.
3. *In wholesale markets, market power is often a problem, particularly if the traditional utility supplier continues to own and operate a considerable share of the generating capacity.* Absent some policy restrictions, the incumbent utility providers are likely to hold some initial market power or an ability to raise and sustain market prices above the price levels that would be produced by a more competitive market. The restructuring plans of some markets required forced divestiture of generation assets from the traditional utility supplier, as noted earlier. Other markets have placed limits on the quantity of generating capacity that can be owned and operated by a single entity. Even with such safeguards, wholesale markets for generation never meet the standards of perfect competition. The high costs of storing electricity, inelastic demand, barriers to market entry, and transmission bottlenecks can further limit the number of generators available to supply electricity to a given area at a given time. Consequently, it has been difficult for policy makers to

remove constraints and safeguards on price-setting in wholesale markets, resulting in price caps, constraints on bidding behavior, and market monitoring activities.

4. *Market monitoring and enforcement are necessary.* Until the perfect wholesale market can be designed—a market immune to games and loopholes, with vibrant demand response, and with perfect competition among suppliers—there will be some need for on-going oversight of supplier pricing behavior and operational decisions followed by effective enforcement actions for anticompetitive behavior and non-compliance to market rules.
5. *More attention must be paid to fostering the response of the demand side of electricity markets to changes in the cost of generating, transmitting, and delivering power to the consumer.* It is widely recognized that demand response is essential to the success of competitive electricity markets.¹⁹ In markets with relaxed regulatory oversight, demand response assures that prices are constrained to economically efficient levels.²⁰ A small amount of demand response can yield significant reductions in wholesale electricity prices.²¹ But it is difficult to implement such badly needed demand response in practice. In the absence of either demand response or a high degree of competition among suppliers, wholesale price caps and aggressive market monitoring and enforcement are necessary.

Recent analyses suggest that despite all the recent policy pronouncements, advances in technology, and other attention afforded demand response, the actual amount of load involved in formal demand response programs has fallen in recent decades.²² About 5percent of customers in the U.S. and Canada are involved in some type of demand response program.²³ This amount is lower than in the mid-1990s. The U.S. DOE reports that total potential load management capability in the U.S. has fallen by 32 percent since 1996, although concerns have been expressed over some of the self-reported data contained in that report.²⁴ It is also insightful to note that the electricity markets which have experienced the greatest declines in demand response capability are those markets which have undergone the most extensive restructuring. In many of these markets, regulated interruptible tariffs were terminated, energy efficiency activities were disrupted, and load management infrastructure became a stranded cost as a result of restructuring. It has proven difficult to re-build these types of resources to their pre-restructuring levels.

6. *There is no one single successful blueprint.*²⁵ Each region which has pursued restructuring has approached it with its own unique legacy infrastructure, needs, customer mix, and traditional regulatory or government policies. In the U.S., FERC's Standard Market Design sought to

advance a standard set of principles.²⁶ Despite being rather general in nature, those principles met with great opposition by policy makers in the Southeast and Northwest states.

7. *Given the role of political processes in the design of markets, reforms tend to include many features that have nothing to do with fostering competition.* A lot of social and environmental programs get added into the mix to make restructuring more palatable to those who are concerned about likely inequities. Thus, it is quite common for restructuring policies to include goals for energy efficiency, renewable energy, low-income family assistance, and compensation to any party that might be adversely affected by the policy change. There have been many claims that restructuring has successfully promoted energy efficiency and renewable energy development. However, these resources are often developed as a result of a legislative or regulatory mandate designed to alter the expected competitive outcome.
8. *There is no guarantee that restructuring will result in lower prices to consumers.* Often, restructuring is sold on the premise that competition will place downward pressure on prices. Yet, this is not an inevitable consequence of market reform. Restructuring induces a fundamental reorganization of the industry and introduces new activities and functions that are not required of vertically-integrated utilities (e.g., customer marketing, the tracking of which retailer is serving which consumer, and some ISO functions). These additional activities can be expensive. Given the economies of scope traditionally associated with this industry, it does not necessarily follow that a non-integrated series of markets and regulated monopolies can meet consumers' needs better than a vertically-integrated utility.

A concern that market restructuring may be responsible for price increases has stymied restructuring efforts in many states in the U.S. and Canada. Concerns regarding rising prices in areas of North America opened to retail competition have been widely reported in the press. Example articles include Varrionuevo (2007), Wilder (2007), and Johnson (2006). Apt (2005) compares industrial rates among states within these two categories within various regions and finds no evidence that restructuring has led to lower prices of electricity to industrial energy consumers. Rose and Meeusen (2005) find no discernable overall benefit to consumers from restructuring. Joskow (2006) found no consistent pattern in the trends in real industrial prices for states that implemented retail competition compared to states that had not.²⁷ Even in Texas—the most successful restructured market in the U.S.—electricity price levels have clearly increased at a greater pace in areas of the state that have been restructured than in areas where customer choice has not been introduced.²⁸

Table 1
Select Countries with Electricity Market Reform

Country	Market Reform Highlights and Comments
Argentina	Has experienced problems due to external economic crises.
Australia	Various dates in various states, some states have privatized, others corporatized, resulting in un-level playing field. Generally considered a successful market despite some remaining problems.
Brazil	Initial market reforms continue to be modified due to problems with initial market design.
Canada	Alberta and Ontario introduced competition. Ontario has rescinded following public pressure after price increases. Alberta has succeeded. Progress stalled in other provinces.
Chile	First to introduce market reform in 1987; continues to evolve.
Colombia	Introduced market reform in 1994-95, is experiencing problems in retail, wholesale and capacity markets, reform of reforms in progress.
England and Wales	Introduced radical privatization and restructuring in 1989, has gone through at least three major phases of reform, continues to evolve, has been widely studied and copied as a successful model.
European Union	25 members of EU continue to make slow progress. Various deadlines for unbundling and introduction of retail competition have been set but not fully implemented. The goal of a fully integrated Pan European market remains elusive despite the best efforts of the European Commission policy-makers.
Japan	Has introduced limited competition to date with a cautious pace; Japan Electric Power Exchange (JEPX) is in place but there is limited volume of trading.
South Korea	Has created Korea Power Exchange (KPX) and broken up the Korean Electric Power Company into several generation companies. Full liberalization, however, has stalled due to political and labor opposition.
New Zealand	Experienced some problems in the absence of a regulator, which has been introduced. Has a rather complicated nodal pricing scheme.
Nordic Countries	Considered among the most successful markets based on bilateral trading. Has expanded to include all Nordic countries. Market survived a major drought without meltdown.
Singapore	Considered successful despite a small market, limited number of players, and a complicated nodal pricing regime.
United States	Wholesale competition encouraged since 1992 with passage of Energy Policy Act and considered successful; retail competition introduced in selected markets since 1998 with mixed results. Progress stalled after California electricity crisis in 2000-01; no retail progress since opening of Texas retail market in 2002.

Sources: Compiled from various chapters of F. Sioshansi and W. Pfaffenberger in *Electricity Market Reform: An International Perspective*, Elsevier, 2006, and other sources. Adapted from F. Sioshansi (2008) with the permission of Dr. Sioshansi.

However, high prices are not an inevitable consequence of restructuring. Market restructuring has tended to increase the sensitivity of retail electricity prices to changes in the price of natural gas, the marginal fuel used for generation in many regions. Consequently, the rapid increases in the commodity price of natural gas that followed restructuring in many regions led to increases in electricity prices. In contrast, price changes in regulated utility service areas tend to reflect the utilities' average fuel costs (as opposed to marginal wholesale power costs). Average fuel costs represent a mix of fuel sources, and nuclear fuel, coal, and lignite costs have increased at much lower rates than natural gas prices in recent years. Thus, had natural gas prices declined during this period, electricity prices in competitive areas might have declined relative to the price levels in areas not opened to competition.

9. *Efficiency benefits appear to be showing up at the wholesale level, but improvements in other areas of the system are ambiguous.* It is not yet clear whether the creation of a competitive retail sector adds sufficient value to the industry, relative to the increased costs and confusion associated with retail competition. Retailers incur costs for customer recruitment activities and the market bears considerable costs in order to switch consumers between retailers and track which retailers are serving which consumers.
10. *In restructured markets, there are strong incentives to better measure and communicate prices and to charge just and reasonable rates as opposed to prices that are averaged over time with numerous cost-subsidies.* Under regulation, there was a long regulatory lag between cost changes and price changes. Given the cost and time required to change rates, it was not unusual for prices to remain fixed for many years (aside from the occasional fuel cost adjustment).

In competitive retail markets, pricing is much different. The prices quoted to a commercial or industrial consumer tend to change every day, depending upon the current cost of the marginal fuel source. Residential prices often change on a monthly basis. Consumers are provided with fixed contracts or variable price agreements as options. With respect to pricing, there are many similarities between electricity contracts and home mortgages. This yields a couple of benefits from an economic perspective. Prices tend to better reflect costs on a medium-term (over months or years) basis. And, consumers can better self-select the degree to which they want to hedge price risks, by selecting the term of their contract with the retailer and by selecting among fixed-price or variable-price options.

11. *Innovation is occurring, but we are seeing a lot of innovation in re-regulated markets as well.* In competitive retail markets, retailers seek to differentiate themselves based on pricing options (e.g., spot market pric-

ing, new billing options, and hedging mechanisms) and added services (e.g., energy efficiency services and coupons for discounts on other products). Yet, much of the innovation in pricing has been coming from California, a state where re-regulation was imposed. And it has been difficult for retailers to provide consumers with new metering equipment, in-home networking equipment, load-control capabilities, and other advanced equipment when there is a probability that the equipment will become stranded if the consumer switches to a different retailer in the future.

12. *It is not clear how to ensure long-term resource adequacy.* Monopoly providers of electricity have a responsibility for ensuring that adequate resources are available to meet the demand for electricity over the long run. But in a competitive market with entry and exit, there is not a single generator or market participant to which such responsibility can be assigned. The approaches being tested range from the “energy-only” approach of letting the forces of supply and demand resolve the problem (in Australia and Texas) to requiring load-serving entities to hold a sufficient quantity of tradable capacity credits (in the New York and PJM markets, and to some degree in Chile). It is not yet clear whether either of these solutions will work.²⁹ It is questionable whether markets can properly value long-term reliability.
13. *It is best to restructure retail markets when resources are adequate.*³⁰ Timing matters. When there is a surplus of generating resources in a market, there is less opportunity for wholesale markets prices to rise either due to the tightness of market or market manipulation. When wholesale prices are in check, retail prices are less likely to rise and there is less opportunity for financial harm to any retailers under price caps (e.g., the California investor-owned utilities following the opening of the retail market).
14. *IT and logistical requirements are enormous.* The high degree of coordination required of competitive wholesale markets requires a daunting amount of information and data processing capability. The failure to fully appreciate and implement the systems necessary to track “who is serving who” and billing information created chaos following the introduction of retail choice in Texas and other restructured retail markets.
15. *There are stages in evolution toward a competitive market.* Competition is always introduced in stages, for good reason. Markets are designed, and flaws in the initial design must be recognized and corrected. Joskow refers to this as the “reform of the reforms.” As the market develops and competition becomes more prevalent, safeguards such as price caps may be relaxed. The same is true regarding the introduction of competition at different market levels and for different classes of customers. Texas is a great example in this regard. The wholesale competition in the electricity market was introduced in September 1995. It

took seven more years before retail competition was introduced. The regulated price protection for smaller customers (residential and small commercial customers with load smaller than one MW) remained in place for five more years before being completely eliminated in January 2007.

16. *Restructuring is often accompanied by policies mandating artificial rate cuts for some period of time.* In the U.S., there has emerged a tradition of promising some short-term price relief by reducing and capping the prices offered by the dominant retail supplier. This can help sell the restructuring policy, but also financially distress the dominant supplier or produce rate shock when the caps are lifted and the dominant retailer seeks to recover past costs.³¹
17. *Retail prices must be free to adjust to wholesale prices.* Not only can pricing constraints place financial stress on a retailer, they prevent consumers from seeing the true cost of power. This removes any conservation signal from prices during high fuel costs or resource adequacy, resulting in over-consumption.
18. *The need for both bilateral contracts and a spot market.* California's experience with a power exchange suggests that requiring all power to be bought and sold through a spot market introduces extreme volatility into markets. Load-serving entities are unable to hedge risks. The Nordic market and others that are dominated by bilateral contracts, with a smaller real-time market to address imbalances and some form of a day-ahead market, tend to be more sustainable.
19. *Need for some competitive headroom.* It takes a unique set of market conditions to entice competitors with sufficient profit opportunities to support entry while avoiding a political backlash that could result from increased prices. Specifically, generation must be available to new retailers at a cost at or below the cost at which generation can be acquired by the incumbent provider, and the retailer's overall cost of providing service must be lower than the prices charged by the incumbent provider.
20. *Ultimately, the fate of restructuring is in the hands of politicians and policy-makers who have imperfect knowledge and imperfect foresight.* The design of markets is a political process and some market participants have greater influence over the political process than others. After surveying restructuring efforts across a wide variety of industries, Landy and Levin note "the single greatest impediment to successful marketization policy is the sheer amount of political interference in the market design process."³² Describing why many of the efforts to reform electricity markets have failed, Paul Joskow notes:

The experts did not, and in many cases still do not, agree on exactly how best to proceed with these structural and institutional

reforms. This situation reinforced the natural inclination of policymakers to treat the details of the restructuring program as a political rather than a technical problem. This in turn resulted in numerous political compromises over restructuring and market design issues and the mixing and matching of pieces of alternative restructuring models that did not fit very well together.³³

The political process tends to introduce a focus on short-term gains and success, which is a particular problem for volatile electricity markets. Can policymakers tolerate volatility and the fact that there will be winners and losers—the natural outcomes of a competitive market? Indeed, it is important to focus on the macro level—the health of the market—and acknowledge that Schumpeterian creative destruction will take its toll on individual market participants who fail to design or implement a successful competitive strategy.

For electricity markets to succeed, policy makers must make long-term commitments to policy directions. Abrupt changes are detrimental to an industry with very long-term investment and planning horizons. This in turn places considerable political pressure upon regulators and policy makers to put the best face upon problems and may lead to considerable interference by policy makers in the market. This is highlighted by recent allegations by the market monitor in the PJM market of undue political interference in the performance of his activities.

What will the future hold? If prices in restructured markets fail to at least come back into line with prices in traditional markets, it will be difficult for policymakers and regulators to resist the temptation to impose new regulatory controls. While new pricing plans and options among suppliers may provide some value to consumers, the bottom line is the bottom line. The impetus to restructure electricity markets was originally prompted by complaints of high prices, and competitive markets for power must ultimately deliver lower prices and innovative new services in order to survive.

NOTES

1. These words were used by former California governor Gray Davis to describe his state's disastrous experiment with electricity market restructuring during 2000-01 period.
2. See Jonathan Macey, "Regulation in Banking: A Mechanism for Forcing Market Solutions," in Marc Landy, Martin Leven, and Martin Shapiro, eds., *Creating Competitive Markets: The Politics of Regulatory Reform*, The Brookings Institution, 2007.
3. See Alan Jacobs and Steven Teles, "The Perils of Market Making: The Case of British Pension Reform," in Marc Landy, Martin Leven, and Martin Shapiro, eds., *Creating Competitive Markets: The Politics of Regulatory Reform*, The Brookings Institution, 2007.
4. "F.C.C. Set to Issue Rules Opening Cable Market," *NY Times*, November 10, 2007.
5. The success of earlier efforts to foster competition in telecommunications markets were largely reversed by the Telecommunications Act of 1996.

6. U.S. Department of Commerce, Bureau of Economic Analysis. Available at: http://www.bea.gov/industry/xls/GDPbyInd_GO_NAICS_1998-2005.xls.
7. The contention that transmission is a natural monopoly is sometimes challenged. See, for example, Walter Primeaux, *Direct Electric Utility Competition: The Natural Monopoly Myth*. Praeger, 1985.
8. A history of efforts to introduce competition into the generation sector in the U.S. is provided in Richard O'Neill and Udi Helman, "Regulatory Reform of the U.S. Wholesale Electricity Markets," in Marc Landy, Martin Leven, and Martin Shapiro, eds., *Creating Competitive Markets: The Politics of Regulatory Reform*, The Brookings Institution, 2007.
9. Richard O'Neill and Udi Helman, "Regulatory Reform of the U.S. Wholesale Electricity Markets," in Marc Landy, Martin Leven, and Martin Shapiro, eds., *Creating Competitive Markets: The Politics of Regulatory Reform*, The Brookings Institution, 2007, p. 152.
10. Competition in wholesale electricity market in Texas began in September 1995 before any other states in the U.S. opened their electricity market to competition.
11. For a history of electricity market restructuring in the U.K., see: Richard Greene, "Restructuring the Electricity Industry in England and Wales," in *Electricity Deregulation*, eds., Griffin and Puller, Bush School Series in Economics and Public Policy, University of Chicago Press, 2005; or RJ Greene and DM Newberry, "Competition in the British Spot Electricity Market," *Journal of Political Economy*, 100 (5): 929-953.
12. A good description of some of the trading games and loopholes in the California market design is offered in Charles Cicchetti, Jeffrey Dubin, and Colin Long, *The California Electricity Crisis: What, Why, and What's Next*, Kluwer, 2004.
13. Scott Potter. *After the Freeze: Issues Facing Some State Regulators as Electric Restructuring Transition Periods End*. NRRRI Report No. 03-18. December 2005.
14. See Sioshansi, Fereidoon P. "US Electricity Market: Is it Broke and Can it Get Fixed?" *EEnergy Informer*. 2007. 18(1).
15. See Center for Advancement of Energy Markets (CAEM), *Retail Energy Deregulation Index 2003*, 4th Edition; and Nat Treadway. "The Dawn of Electricity Competition: Efficient Prices and Efficient Choices." *EnergyPulse*. June 6, 2007. Available: http://www.energypulse.net/centers/article/article_display.cfm?a_id=1496.
16. For some other interesting lists of lessons learned, see Pat Wood, "Remarks by Pat Wood III," in *Electricity Deregulation*, Griffin and Puller, eds., Bush School Series in Economics and Public Policy, University of Chicago Press, 2005; Paul Joskow, "Markets for Power: An Interim Assessment," *The Energy Journal*, 25(1), 2006, 1-36; Paul Joskow, "The Difficult Transition to Competitive Electricity Markets in the United States," in *Electricity Deregulation*, Griffin and Puller, eds., Bush School Series in Economics and Public Policy, University of Chicago Press, 2005; and Stephen Littlechild, "Foreward: The Market versus Regulation," in *Electricity Market Reform, An International Perspective*, Fereidoon P. Sioshansi and Wolfgang Pfaffenberger, eds., Elsevier, 2006.
17. See Richard O'Neill and Udi Helman, "Regulatory Reform of the U.S. Wholesale Electricity Markets," in Marc Landy, Martin Leven, and Martin Shapiro, eds., *Creating Competitive Markets: The Politics of Regulatory Reform*, The Brookings Institution, 2007; and Kira Fabrizio, Nancy Rose, and Catherine Wolfram, "Do Markets Reduce Costs? Assessing the Impact of Regulatory Restructuring on U.S. Electric Generation Efficiency," *American Economic Review*, vol. 97, no. 4, pp. 1350-1277. 2007.

18. Steven Vogel. "Creating Competitive Markets: The Politics of Market Design," in *Creating Competitive Markets*. Marc Landy, Martin Leven, and Martin Shapiro, eds. Washington, D.C.: Brookings Institute, 2007.
19. For a discussion of the critical importance of demand response in restructured markets, see Energy Policy Act of 2005, Section 1252(f); U.S. Department of Energy, *Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them: A Report to the U.S. Congress Pursuant to Section 1252 of the Energy Policy Act of 2005*, February 2006; NARUC, *Resolution Regarding Equal Consideration of Demand and Supply Responses in Electricity Markets*, July 2000; and Jay Zarnikau, "Demand Participation in Restructured Markets," in *Competitive Electricity Markets: Design, Implementation, Performance*, F.P. Sioshansi, ed., Elsevier Press, 2008. 297-324.
20. Michael Rosenzweig, Hamish Fraser, Jonathan Falk, and Sarah Voll, "Market Power and Demand Responsiveness: Letting Customers Protect Themselves," *The Electricity Journal*, May 2003.
21. Ahmad Faruqui and Stephen S. George, "The value of dynamic pricing," *The Electricity Journal*, July 2002; Caves, Douglas, Kelly Eakin, and Ahmad Faruqui (2000), "Mitigating Price Spikes in Wholesale Markets through Market-Based Pricing in Retail Markets," *The Electricity Journal*, April 2000; and Eric Hirst, *Barriers to Price-Responsive Demand in Wholesale Electricity Markets*, Edison Electric Institute, June 2002.
22. Larry Barrett, "Load Response Resources Still Lagging," Barrett Consulting Associates Report, July 2006. See also FERC (2006).
23. FERC (2006), p. viii.
24. U.S. DOE, 2006, p. xii.
25. It should be noted that Paul Joskow has written that he believes that a blueprint is beginning to emerge.
26. FERC, "Standard Market Design and Structure, Notice of Proposed Rulemaking."
27. This study also uses average statewide price data, which fail to distinguish restructured from non-restructured areas within a state.
28. Jay Zarnikau and Doug Whitworth. "Has Electric Utility Restructuring Led to Lower Electricity Prices for Residential Consumers in Texas?" *Energy Policy*. N. France, ed., Elsevier, 2005, pp. 2191-2200; Jay Zarnikau, Marilyn Fox, and Paul Smolen, "Trends in Prices to Commercial Energy Consumers in the Competitive Texas Electricity Market," *Energy Policy*, 2007.

While most studies have identified higher growth in prices in areas opened to competition, some studies report different results. Analysis sponsored by the Edison Electric Institute (Brattle Group, 2006) concludes that "since restructuring discussions were initiated in the early-to-mid 1990s, rates in restructured and non-restructured states have trended similarly." It should be noted that this particular study has a variety of limitations. There is no recognition that state markets have been restructured to various degrees. States like California that have abandoned their restructuring efforts are nonetheless categorized as restructured states. The study assumes that all states committed to restructuring their markets at the same time. This study also assumes that the entire electricity industry in each restructured state was restructured, although roughly one-third and one-fourth of the electricity consumers in California and Texas, respectively, have not been offered retail choice. Axelrod, DeRamus, and Cain (2006) actually claim that restructuring has lowered retail rates.

29. See Shmuel Oren, "Ensuring Generation Adequacy in Competitive Electricity Markets," in *Electricity Deregulation*, Griffin and Puller, eds., Bush School Series in Economics and Public Policy, University of Chicago Press, 2005.
30. A similar conclusion is reached in Paul Joskow, "The Difficult Transition to Competitive Electricity Markets in the United States," in *Electricity Deregulation*, Griffin and Puller, eds., Bush School Series in Economics and Public Policy, University of Chicago Press, 2005.
31. Scott Potter, "After the Freeze: Issues Facing Some State Regulators as Electric Restructuring Transition Periods End," NRRI Report No. 03-18, December 2005.
32. Marc Landy and Martin Levin. "Creating Competitive Markets: The Politics of Market Design," *Creating Competitive Markets*, Washington, D.C.: Brookings Institute, 2007.
32. Paul Joskow, "The Difficult Transition to Competitive Electricity Markets in the United States," in *Electricity Deregulation*, Griffin and Puller, eds., Bush School Series in Economics and Public Policy, University of Chicago Press, 2005, p. 40.

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