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ECONOMIC THEORY AND SOME DISOBLIGING ASPECTS OF ELECTRICITY TRADING AND DEREGULATION

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Abstract

The main purpose of this note is to make a few up-to-date remarks about electricity deregulation. As things have unfortunately turned out, instead of reducing the price of electricity, the deregulation of electricity has often resulted in escalation. Recent examples of this phenomenon are Sweden and the state of Montana in the US, where prices suddenly spiked to record levels, and then stabilized at twice the original price. (The Montana deregulation failure was examined in considerable detail on the well-known news program "60 Minutes"). Of course, where the US is concerned, the most important event associated with electricity deregulation is probably the California Utilities Commission terminating the deregulation experiment after unambiguously labelling it a failure, and the same thing has happened in Ontario, Canada.

Keywords: Electricity trading, Physical investment, Price volatility, Derivatives.

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Introduction

There are many ways to approach the bad news about electricity deregulation, and one of them is to take a look at the trading of electricity.

The business press invariably calls the failure of electricity trading the failure of "energy trading" (see recent issues of the Financial Times), but I prefer to be more precise: energy trading that involves commodities such as crude oil and oil products is alive and thriving, while that having to do with electricity is in extremely poor health just about everywhere.

In the United States, it appears that 8 of the top 10 electricity traders have "either stopped trading or are scaling way back," and at the Midwestern Cinergy hub (Cincinnati, Ohio), the most active power marketplace in the country, trading has fallen more than 70 percent. This is important to note, because a few years ago Cinergy was confident that it would become the largest energy trader in the world. As I have pointed out (Banks (2002, 2000b) and my energy economics textbook (2000a)), unexpected traumas of this type have "thinned" the electricity market to an extent where volatility is not only excessive, but also destructive. Business Week (December 9, 2002) quotes John E. Olson, the chief investment officer of Sanders Morris Harris Inc. as saying, "We're going to see power trading shrink to a shadow of itself."

In all my lectures and papers on deregulation I try to repeat as often as possible a dictum from John Stuart Mill, which first appeared in 1848 and helped to move microeconomics at least part of the way toward the status of a genuine science, "The laws and conditions of production partake of physical truths. There is nothing arbitrary about them." Nothing arbitrary, that is, until there are millions of dollars on the table. Then, where issues like electricity trading are concerned, mainstream economic logic is unfortunately set aside.

As alluded to above, derivatives exchanges, such as those in New York and Chicago, have enjoyed remarkable and well-deserved success with their future and option contracts on petroleum, currencies, interest rates, stocks and bonds, and the theory associated with these instruments has been documented in full in at least a dozen high-quality books and several hundred articles in learned journals. On the other hand, over the last decade, the electricity market has been almost entirely absent from these thousands of pages of exposition. The reason is the unfortunate history of electricity derivatives. Moreover, despite declarations to the contrary, even a thorough modification of the trading structure to accommodate sophisticated new players endowed with state-of-the-art electronics, has failed to revive a lack-lustre market characterized by considerable confusion on the part of some sellers and many electricity buyers.

"We believe that the energy trading model is fundamentally flawed," observed John Diaz, managing director of the power and energy team at Moody's Investors Service. This does not mean, however, that energy trading as I interpret it here is passé, because it is not humanly possible for transactors to always avoid being over or under committed for power on, for example, bilateral contracts. When this happens, there must be recourse to spot and formalize balancing markets, and it may be both convenient and economically sensible to use futures or options (or most likely "swaps") to hedge price risk, if and when these derivatives function as advertised.

According to the Financial Times (December 6, 2002), management consultants Todd Bessemer and Francis Shields say that electricity trading is being transformed as a prelude to its resurgence. What we learn from these observers is that "proprietary platforms such as EnronOnline will not make a comeback, as there are always better deals on platforms with multiple buyers and sellers, where pricing is transparent. Indeed, volume is already growing on such platforms, such as the Intercontinental Exchange."

Enron probably won't make a comeback, because it went bankrupt – and, in addition, any of its components that were still functioning and worth anything have been purchased by Warburg-UBS. However, the idea that there are "always better deals" for electricity buyers and sellers in exchanges that feature an up-to-date, open display of prices (transparency), as opposed to arrangements fashioned in the trading rooms of firms like EnronOnline, or in bilateral deals, is at best highly problematic. The initial goal in California for wholesalers, or generators, was a total shift from bilateral trades, which were scheduled to be prohibited, to spot trading (of one sort or another) in auction markets, along with a high tolerance for various "proprietary platforms". Eventually, however, these intentions had to be greatly modified or even abandoned. What happened then was, that while to a certain extent electricity trading remained a viable activity, it eventually converged toward a minor role, with a similar fate befalling "mega-exchanges" of the type mentioned by Messrs, Bessemer and Shields, or even more modest establishments. Instead, the emphasis returned to contracts whose terms were negotiated directly between counter parties, or even via intermediaries such as Enron. A similar phenomenon has been observed in the UK and Scandinavia.

Deregulation Difficulties

The ongoing problems with electricity deregulation are to some extent a reminder of the work that academic economists still must carry out. It has often been suggested that deregulation focuses on creating conditions of competition that will prevent firms from merging unnecessarily, or from engaging in certain anti-competitive

practices, such as colluding to set monopoly prices. Basically, the intention is to create the most competitive market structure possible.

There is no country in the world, to my knowledge, where this agenda has been successfully carried out, although in some places it may appear that all has gone according to plan. Scandinavia is particularly interesting here because, although a few energy economists in this part of the world have pronounced deregulation a roaring success, the retail electricity price in Sweden just increased to the highest level in 50 years and, after a series of buyouts and manipulations, almost 90 percent of the wholesale electricity purchased by distribution companies originates from just 3 generating firms, whose profits are attaining a record level. Similarly, the many and varied non-productive activities of the Swedish government have received a boost from the revenues that they have received from the value-added tax on electricity. The real deregulation winner in Sweden is the Swedish government.

In the US, increased energy trading was envisioned as being an integral part of the deregulation package, and it was for this reason that a highly efficient (and spectacular) firm like Enron did everything possible to move power supply in the US and globally away from the domain of regulated monopolies and oligopolies to what they called "competition". What they failed to understand was that their remarkable success in creating and using markets did not apply to electricity because of its non-storability, the importance of increasing returns to scale and the transmission problems caused by "loop-flow," or electricity following the paths of least resistance. These factors kept arbitrage from being the straightforward operation that many economists and journalists thought that it could and should be.

The superb traders and technicians of Enron were encouraged by their supervisors to understand either engineering or economics, and the kind of arbitrage that they indulged in was occasionally brilliant. Even so, these efforts were to no avail, because the only way that the dreams of Enron and similar organizations could have come true was for tens of billions of dollars to have been invested in extending and "expanding" electricity networks (or grids) to a point where, most of the time, something close to conventional arbitrage could have been practiced, and even that might not have been sufficient. In other words, the electricity grid had to be made more "robust".

Of course, from a social point of view, some question must be raised about the advisability of spending billions of dollars to make possible the transmission of massive amounts of electricity over very long distances, just to humor ideologues that believe that electricity can be produced and sold in the same manner as pizzas or designer clothing. For instance, when an american Energy Minister said that the US had a Third World transmission network, he meant that with deregulation just under way, there were not enough wires to support an

amount of arbitrage that would have made the trading community happy.

Furthermore, and equally important, what must be understood is that just as deregulation was essential for the health of trading, deregulated markets cannot function properly if energy trading works badly. This crucial point was noted, ex-post, by Rebecca Smith in the European Wall Street Journal (November 30, 2001). If this is clear, then the reader is in position to ponder the right and wrong solutions to organize the California electricity sector. The right solution would have been to speed up the installation of most of the new power plants that the California utilities wanted to build, and forget about deregulation.

The wrong solution, which was adopted, was more complicated and involved the following factors. Fully integrated utilities were turned into regional distribution and wire companies that would buy power from generating companies, including those which once belonged to them and they had been forced to "divest", as well as out-of-state producers that the governor of California later chose to designate "out-of-state criminals". This power could only be traded on spot markets, because the theory was that long-term contracts involving distribution firms and generators might lead to various socially undesirable liaisons. Operating in the spot market did not bother the distribution/wire companies in the least, because they believed the "experts" when they said that competition would result in wholesale prices declining. In addition, in order to show the consumers – the voters – that they were doing the right thing, the retail price of electricity was to be immediately lowered by 10 percent, with a promise that eventually it would be capped at an even more favorable level.

Now we have a situation where the distributors are buying at variable (spot) prices, but selling (short-term or long-term) at a fixed price. Although it seems to have gone unnoticed, this is the kind of situation that got so many savings and loan banks in trouble in the US a decade or so ago. The question then becomes how to promote the continuation of this arrangement, and to refine it so that a majority of consumers, distribution companies, generators and trading companies like Enron feel that they are winners.

Exactly who said or did what and when is unknown to many, including myself, but the logical first step – in California as in all the rest of the world – was to start cutting costs, which inevitably means getting rid of employees. This is why, in a large part of the world, any talk of deregulation immediately leads to labour unrest. If this did not suffice to reduce costs to the desired level, relative to the expected fall in prices, the door would be opened for cost-reducing mergers. The amazing thing here is that it was widely believed that wholesale (generation) prices would fall because demand was supposed to be

stagnating and, in any case, new independent power producers utilizing the newest technology would burst onto the scene. As it happens, even if they had appeared, the right strategy for them, as well as incumbent generators, was to restrain output. As Swedish journalist Mattias Lundbäck (2002) pointed out, "profit maximization and plentiful electricity were a contradiction in terms".

Finally, if prices did not move the way that various actors wanted them to move, the new freedom and flexibility would inspire the appearance of a full set of derivatives markets. What was missed here, however, was that futures and options were completely inadequate for dealing with the kind of volatility experienced in electricity markets. While many deregulation theorists and students find swaps, or "contracts for differences", objectionable because they are not traded on exchanges, and therefore lack the transparency that means so much in seminar rooms.

To put the finishing touches on this masterpiece of self-deception, the deregulation bill that was easily passed in the California legislature was so enthusiastic about its projected economic miracles that legislators believed what would follow in its wake would be – in the fashion of King Canute ordering the tide not to come in – an alleged 20 percent decline in power prices. In other words, the eventual price-cap would aim for a nearly impossible 20 percent decline.

A number of commentators on the subsequent meltdown in California have claimed that deregulation could have succeeded if the authorities had not lost their nerve and engineered a full as opposed to a partial deregulation, but in San Diego, where electricity pricing was turned over to market forces, the price at one time increased by several hundred percent and a large number of otherwise law-abiding consumers refused to pay their bills. Thus, the deregulation experiment in the US economy – as in Brazil, Ontario and Alberta (Canada) and Sweden – turned out to be an unambiguous fiasco that cost the two largest regional electricity companies billions (and there is talk of billions having to change hands in the Ontario fiasco).

Before looking at this matter in a slightly different perspective, it should be noted that a few years ago the value of trades was said to have reached two trillion dollars in notional terms, which may or may not be true, and there are still predictions in circulation that by 2007 notional transactions could exceed seven trillion. How is all this possible? One explanation is the naiveté of many clients of the trading firms. As one of them put it, "All traders offered us was manipulation. My position is goodbye and good riddance." (Business Week, December 9, 2002)

There was optimism in other quarters too before the chickens came home to roost. There was a notice in Business Week not too long ago (December 11, 2000) reading, "Zap! Here comes Energy Trading!" and the reference was to various trading operations that were

scheduled for the continent, and particularly for Germany. "The pace and scope of change is amazing," assured a director of one of London's exclusive power-market research consultancies, "The sophistication of the market is growing, and trading volumes are soaring." Statements of this nature are best dismissed as a case of mistaken identity.

Theory and Facts

In his Nobel Prize lecture at Uppsala University on 13 December 2002, Professor Vernon Smith vigorously defended the idea that economics was now an experimental science. As far as I am concerned, however, it is far too early to make this claim. One of the things that Professor Smith noted was that he was part of a "team" that had been involved in convincing several state governments in Australia to restructure their electricity sectors.

Interestingly enough, Professor Smith has discovered that his experiments do not work particularly well when applied to financial markets because, as he admitted, of the volatility of such things as share (stock) prices. As we now know, electricity prices are just as volatile as stock prices, and from time-to-time even more so. Therefore, why did Smith decide that he should inform Australians that his experiments provided irrefutable evidence that deregulation and an increase in trading would make their lives better?

The first reason is that Professor Smith believes that everyone is a natural trader, virtually from childhood participating in trading of one type or another. Therefore, regardless of other deficiencies, whenever a system is adjusted so that there is more trading, it will assuredly be a better system. This may indeed be so, however I suspect that passing a few dollars back and forth among bosom friends is not quite equivalent to the kind of investigations that Smith and I performed in our engineering studies; the kind that could teach us something useful about the activities taking place on real-world markets.

Even more important, in Australia – when the working day is concluded and the beer bottles are being uncapped at a record pace – both light and heavy drinkers are prone to ignore many easily provable facts. What happened in the deregulated Australian states was similar to what happened in the UK and Germany. The price of electricity to households fell somewhat because large numbers of electricity industry personnel lost their jobs. In Germany, for instance, unemployment was close to 70,000, and in the UK perhaps a quarter of the electric industry's work force was laid off. In Sweden, there was also a decrease in the number of electricity industry employees, and consequently there was a fall in reliability. (It also needs to be added that in Australia the derivatives markets have performed abominably, which is very bad news indeed, considering that there have been short

periods when the electricity price has fallen as low as zero (Australian) dollars per megawatt hour, and moved as high as the price-cap of five-thousand dollars per megawatt).

Some observers might therefore be inclined to argue that, although thousands of persons are ushered into unemployment in these restructuring exercises, which are almost always accompanied by some loss in reliability, this might turn out to be an acceptable price to pay in return for a palpable drop in the average electricity price for final consumers, and for both small and large businesses. The matter of price volatility will be skipped here, as well as situations of the type noted in Montana, where many employees also lost their life savings because of being locked into inflexible equity investments. After all, if household real incomes are increased as a result of the decline in electricity prices, and the energy costs of industries and commercial establishments decrease, then eventually there could be a general increase in employment that conceivably would be able to absorb the electricity sector employees who were "retrenched", as well as many others. What we have here is a basic description of how markets work; one you might find in the early chapters of a Economics 101 textbook, as it would be called in the West Wing of the White House by honorary president and economics professor Josiah (Jed) Bartlet and his hard-working staff.

All this is strictly an expensive illusion, and on the basis of the above discussion my argument as to why this is so begins with a simple hypothesis that I have derived from mainstream economic theory: When regulated monopolies are replaced by unregulated monopolies or oligopolies, prices are almost certain to go up – sooner or later. There are several reason for this, with two of them being:

1. Deregulation means increased uncertainty, and increased uncertainty means "ceteris paribus", reduced investment. (The expression here is regulatory uncertainty, or what David Buchan, an editorial writer for the Financial Times, has called "commercial turbulence" (2000).) The thing to understand is that comprehensive trading, which includes the use of derivatives, is supposed to provide a means to reduce or hedge this uncertainty and thus keep the lack-of-investment wolf away from the door. Since it is undeniable that trading has failed everywhere, and derivatives are inadequate in one sense or another, then we cannot avoid the conclusion that sooner or later investment will fall. (As far as I know, none of the most important business publications – regardless of their partiality to deregulation – have attempted to deny the increased volatility that accompanied electric deregulation).
2. Deregulation raises the possibility of electricity prices declining since this is the prospect used by deregulation optimists to sell this

medicine to Mr and Ms Consumer. Regardless of whether this outcome can or cannot take place, attempts will often be made to reduce costs by mergers, which is a procedure that will not only absorb funds that could be used for an aggregate increase in productive capacity, but also greatly increase the market power of the merged units. For example, the ability of these firms to manipulate prices.

Readers who desire an elaboration on these themes can easily obtain one, because publications like the Financial Times have been spreading the bad news about deregulation for the last three years. An interesting point of note is that one of the reasons that it was possible to convince many academics that electricity deregulation had a future was because some influential persons believed that the demand for electricity was stagnating. This is definitely not the case, however if this was true, then attempting to take advantage of the increasing returns to scale that might exist in a technological sense (since the long-run average cost curve is 'U' shaped) was not advisable from an economic point of view. If large generating plants were constructed, it would take many years before they were operating at the minimum point of their long-run average cost curve. Consequently, an appreciable part of the argument that electricity generation is a natural monopoly, and thus regulation is justified, loses its impact.

As an aside, let me note that in Italy, where the European Union's liberalization directives are being carried out to a considerable extent because they might reduce the cost of energy at the expense of French consumers, and perhaps even those as far away as Scandinavia, some new plants are being constructed that will be based on 400 Megawatt (= 400 MW) gas turbines. Given the present cost of gas, the ability to install one or more units of these relatively small pieces of equipment only slightly in advance of the time when demand for their most economic operating capacity will appear, and to operate these 'modules' under one management, makes it possible to take full advantage of (technical) increasing returns to scale.

Conclusion: The Meaning of It All

As share market billionaire Warren Buffett once said, "When dumb money becomes aware of its limitations, it loses its dumbness." Applied to Brazil, where after deregulation the shortage of electricity became so extensive that the government forced heavy energy users to cut consumption by 25 percent, it was finally decided that deregulation was not going to bring about the scenario dreamed up by deregulation theorists, which consisted of private investors reinforcing the country's generation capacity by extensive investments in gas-based facilities. Bids were then taken to build 8 hydroelectric plants that are expected to greatly add to capacity within six years. The World Bank and the

International Monetary Fund almost certainly found this decision regrettable, but the Brazilian government is now aware that guaranteed investment, and not counting on what John Maynard (Lord) Keynes called the "animal spirits" of private investors, is the most valuable medium for pulling that potentially very rich country out of the economic doldrums, as well as avoiding another energy crisis of the type that led to power rationing a year ago.

When I informed Professor Smith that the evidence showed that electricity deregulation was not working, not surprisingly he assured me that by holding that opinion I was playing a losing hand. Electricity consumers in Sweden prefer to believe that the price of electricity has reached a near record height because of a shortage of water in the country's hydroelectric magazines, although it can be easily shown that if the water magazines contained the normal quantity, it is far from certain that this would suffice to produce a 'normal' average price. The problem here, as in Brazil, is a shortage of investment, but it is simpler for politicians to speculate on the absence of water than to deal with the incredible mistake involved in closing one of the safest nuclear facilities in the world and not initiating the construction of several more of these installations.

Of course, the most striking observation here is that in June 2002, there was an adequate amount of water in the Swedish water magazines. What happened though was that a large part of this water was turned into electricity and exported, which became possible without regulation. Something else that became possible was the unlimited right of generating companies to buy distribution companies.

David Buchan (2002) says that industrial countries should not compound their energy security concerns by a "rush into deregulation despite the allure of ever-cheaper prices." In addition, where this matter is concerned, I like the approach taken by General Charles de Gaulle when he was president of France. The General was adamant in his belief that "the great common sources of wealth" belonged to the nation and should not be used for individual profit making. Where electricity was concerned, de Gaulle, in conjunction with the Conseil de la Resistance, made it unmistakeably clear that French industry and households were not to be denied the electricity they needed and it was to be made available at modest prices. This is one of the reasons why France has the largest nuclear sector in the world - French scientists knew then, just as they know today, that best-practice nuclear installations can provide cheaper electricity than any alternative. Swedish scientists also know this, although the Swedish government has succeeded in keeping them from sharing this knowledge with the television audience.

In these circumstances, we are still some years from a point where any French government would feel comfortable trivializing the electricity generation assets of that country in order to curry favour

with important persons in Brussels who often give the impression that they do not understand some of the simplest concepts in energy economics, although the importance of this subject is increasing virtually every day.

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