



BOOK REVIEWS

Electricity Deregulation: Choices and Challenges, by JAMES M. GRIFFIN AND STEVEN L. PULLER, EDS. (University of Chicago Press, US: 2005), 446 pages, ISBN 0-226-30856-1.

Plato's ship-of-state analogy is a penetrating and discomfiting critique of politicians and policymakers who focus their attention on who is steering the ship rather than looking outside the ship to evaluate the weather and stars so they can navigate safely. This collection of papers is directed at policymakers who understand that there are both a science and an art to restructuring electricity markets and want to learn more. It also includes a chapter of remarks by former policymakers.

The philosopher-kings in this context are economist-policymakers, and the contributors to this volume are some of the leading economists in this industry. For scholars in this field, the themes and papers in this collection are not new. For policymakers, this collection is understandable without eliminating the complexity of the subject.

This volume approaches the subject matter not ideologically but from an analytical perspective. The introduction, a primer on the topic written by the editors, is among the best I have read. It introduces and integrates the critical issues of natural monopoly, loop flow, transaction costs and vertical integration, price volatility, market power, and the political economy of restructuring. These concepts, in my opinion, must be understood individually and as a package if successful restructured markets are to be designed and implemented.

Professor Paul Joskow leads off with an historical review and analysis of restructuring's difficult transition. His main conclusion is that the transition to competitive wholesale and retail electricity markets is a work-in-progress with visible signs of both success and failure. He emphasizes the importance of solid empirical work on the performance of the industry in states that have restructured to inform policymakers in other states, particularly regarding whether there have been long-term benefits to consumers. At present, the United States does not have a single restructuring approach, and different regions and states vary dramatically in their development of wholesale and retail electricity markets.

The next section of papers review restructured electricity markets – England and Wales by Richard Green, California by Frank Wolak, and Texas by Ross Baldick and Hui Niu. There have been many papers and books on the experiences of particular restructuring efforts and work should continue in this vein. Of the three regions reviewed, Texas has had the least experience with restructured markets and is likely to undergo further transition. It provides an interesting case study of whether centralized unit commitment and dispatch—the centerpiece of

markets in the Mid-West, Pennsylvania-New Jersey-Maryland (PJM) power pool, New England, and New York—is necessary, desirable, or not required for successful markets.

The second part of the book addresses policies for successful market design. Professor Catherine Wolfram reports on her work with colleagues on the efficiency of electricity generation in the United States prior to and after restructuring. There has been much theoretical discussion regarding how a utility regulated under cost-of-service rates would invest, maintain, and operate a power plant versus how owners in a market would do so. This paper summarizes the empirical research to date and provides a framework for filling out missing elements and should be incorporated into the larger project of evaluating, using cost-benefit analysis, whether restructuring has been a net gain.

One discussion element this paper initiates is the use of power plants by regulated utilities to provide services other than the production of electricity (megaWatt-hours). Regulated utilities obviously used power plants primarily to produce electricity, but in many situations also used them to avoid transmission investment and to provide reliability-related services. Removing the vertical link between generation and transmission has important implications for who should provide these services and how they should be compensated, but also with respect to whether power plants are being built, maintained, and operated more efficiently now than in the past.

Three papers address related themes regarding market power (James Bushnell), oversight of electricity markets (Alvin Klevorick), and time-varying electricity prices (Severin Borenstein). The last topic is a critical, but not the only, means of reducing market power. The concerns regarding market power raises the need for oversight. Unfortunately, not enough progress has been made at the state level to link retail electricity rates with wholesale market conditions, in part because of the political reluctance of state regulators. Even the perception of small price increases for some customers is usually sufficient to thwart or limit time-varying electricity price efforts. In my view, more detailed work is needed to explain to state public utility commissions the benefits of time-varying prices and to link those benefits to other state policy goals, such as energy efficiency and environmental improvements.

The final two papers on specific policies are William Hogan on transmission-market design and Shmuel Oren on ensuring generation adequacy, both at the forefront of current U.S. policy debates. These two topics have in common the issue of when the regulatory process, either directly or through the design of specific market rules, should intervene in electricity markets to mandate investment. In the case of generation adequacy, the argument is that a minimum level of generation capacity is required to satisfy the reliability requirement that demand does not exceed supply more than one time in ten years. In the situation of transmission, the argument for mandatory investment (here as a backstop to the market) is both for reliability and to reduce congestion costs on the grid. The debate on the ground on generation adequacy has moved substantially since the publication of

this book to include whether specific types of capacity, such as quick start units, and location requirements for capacity, such as in load pockets, should also be part of a generation adequacy policy regime.

One aside: this book is a reminder that engineers should be playing a much greater role in restructuring efforts. For the most part, economists have recognized the important technical constraints on electric power systems that engineers have articulated, and incorporated these limitations into their analyses. The contribution of economists, however, has gone somewhat unnoticed by engineers. That contribution is that people and organizations respond to incentives, whether those incentives are part of a market system, a regulated system—or, as in the case of the restructured electricity industry—a hybrid.

Overall, this book is a timely contribution to the discussions among serious policymakers interested in penetrating much of the rhetoric surrounding restructured electricity markets and honing in on the substantive issues.

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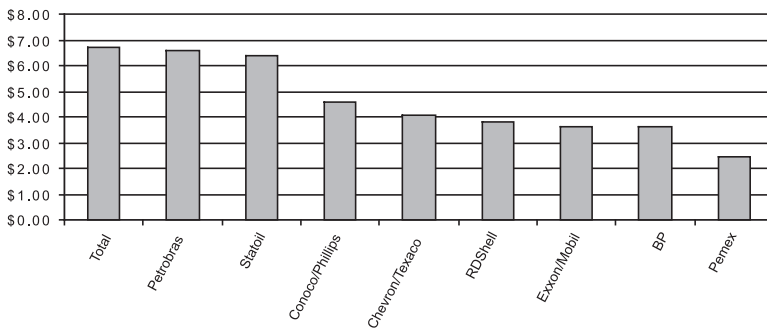
Energy and Sustainable Development in Mexico, by JOHN R. MORONEY AND FLORY DIECK-ASSAD. (College Station: Texas A&M Press. 2005). 154 pages, cloth, price \$48.50; ISBN 1-58544-462-6

This is a book without a happy ending, but then the ending is not yet finished and it could go either way. After some 132 pages of facts, figures, analysis, and discussion, what the reader most wants to know, but the authors cannot say, is whether there exists a viable path by which the enormous wealth embodied in Mexico's trove of oil and gas resources can be transformed into an engine for constructive social and economic change. If so, then the espoused goal of "sustainable development" might be attainable. If not, the future looks much gloomier for Mexico and not so different than its past. Although the authors do not provide an answer to this ultimate question, they do manage to shine some light on important political and economic forces that constrain the petroleum industry in Mexico, and they provide a fresh demonstration of the scope and size of organizational and financial difficulties that beset the managers of Pemex, the Mexican national oil company.

Pemex is at the center of everything in this book, it constitutes a struggling corporate protagonist, one that provides a proper and compelling subject for study. By its own account, Pemex is the 9th largest integrated oil company in the world, the 3rd largest oil producer, Mexico's largest company, and a key supplier of crude oil to the US market. But, its budgets and investment projects are subject

to direct Congressional approval, and its revenues are heavily taxed (providing roughly 1/3 of the federal government's total tax revenue). The obvious but naïve strategy of cutting back investment funds and raising taxes has, so far, proven irresistible to the government as a means for meeting short-run financial exigencies. The downside of this strategy is apparent when one examines the level of capital expenditure. Relative to its peers, Pemex invests only half as much per barrel of oil produced as the others—\$2.45 per barrel of oil equivalent in the case of Pemex versus \$4.65 for others (see Figure 1). This meager level of investment is not for lack of good prospects. The untapped exploration potential is immense; Pemex geologists have so far studied only one-quarter of the country's prospective area, and the deepwater Gulf of Mexico comprises an especially attractive target. Due to constitutional restrictions that prevent foreign firms from participating in upstream oil projects anywhere in Mexico, if Pemex is held back, an important opportunity will be lost.

Figure 1. Capital Expenditure Relative to Production
(\$ per barrel of oil & gas equivalent)



Source: Petroleos Mexicanos (2006).

The first three chapters of the book serve as prologue and attempt to outline what is at stake. Although a robust and efficient petroleum industry is undoubtedly vital to the wealth of the nation, I would have preferred that less emphasis be placed on the concept of “sustainable development”—an ambiguous phrase at best that is likely to confuse the debate and distract policymakers from the more practical and immediate issues at hand. The reader is introduced on page one to the four basic aspects of sustainable development currently being emphasized by the Mexican government: (1) long-run growth in living standards, (2) providing electricity to more people, particularly in rural areas, (3) increasing the production of energy, and (4) reducing air pollution. One problem with attempting to evaluate any industrial strategy against this diverse set of objectives, as the authors duly note, is that although some can be achieved harmoniously, others pose basic conflicts. Moreover, as Robert Solow (1993) noted in what is

surely one of the most cogent discussions of the meaning and economic implications of sustainability:

There has been very little analysis of sustainable paths for a modern industrial economy, so that we have little idea of what would be required in the way of policy and what sorts of outcomes could be expected. (p. 167)

It is just too easy, as Solow recognized, for discussions of sustainability to devolve into nothing more than the recitation of a slogan or the expression of an emotion. A clear-cut analysis predicated on the goal of maximizing the net present value of Mexico's oil and gas resources would expose and inform the same fundamental long-run issues that plague Mexico's petroleum industry, without risking the distractions of a three-ring circus. Having said that, the authors' Chapter One does provide a useful overview of the economic and social milieu in Mexico, the role of energy within the broader economy, and the particular role of oil and gas in meeting specific social goals.

Also tucked away in Chapter One is a small blunder that one would not expect to find in a book of this caliber. When discussing the giant Cantarell oil field located in the Bay of Campeche, the authors conclude that the field's original oil in place (35 billion barrels) is "astonishingly large" when compared to total U.S. reserves (22 billion barrels). But, this is a comparison of resources in place with proved reserves, which is further compounded by mixing original with remaining resources. To avoid any possible misunderstanding, I would point out that, according to the most recently tabulated figures from British Petroleum (2005), the proved oil reserves of Mexico are only half those of the U.S. If care is not taken when using these terms, lay readers are apt to draw unintended conclusions.

The conceptual link between energy and living standards is outlined in Chapter Two, where the role of commercial energy in achieving increases in capital and labor productivity is explored. A vintage capital model (by Solow) is augmented to include energy inputs as an additional factor of production, and based on statistical analysis of annual data over the interval 1965-2000, the authors argue that growth in utilized capital and energy have been equally important in spurring labor productivity. In Mexico, GDP per worker stagnated during the period 1979-2000, and the authors' finding that this stemmed largely from a decay in utilized capital and energy per worker seems to be on target.

Chapter Three delves into the finances, budgetary authorities, and investment policies that govern Pemex. As the authors would say, the determination of which projects will be funded and at what level results from a Byzantine process that involves direct approval not only by Pemex's internal Finance Committee, but also the Secretary of Energy, the Secretary of Finance, and the National Congress. Financial crises within Mexico (and there have been a few) have had direct adverse repercussions on the very types of investments (reserve development and production) that would be expected in the longer run to alleviate the underlying financial

problems, leading to a vicious budgetary cycle that drove total drilling rates down by 85% between 1980 and 1994. More recently, a special system of privately funded loans (the so-called PIDIREGAS mechanism) has been adopted to augment Pemex's reliance on government funds. The result has been a significant increase in drilling rates, but also the added pressure on Pemex of meeting external debt service requirements that have threatened to overwhelm its available cash flow.

The focus of the volume switches (somewhat abruptly) in Chapters 4-8 to the econometric development of an "integrated model of oil and gas supply" in Mexico. These chapters are tightly integrated with each other, but less so with the rest of the book. For example, one gains the impression in Chapter One that "sustainable development" all but requires aggressive development of Mexico's non-associated natural gas resources, but development of those resources is entirely ignored in the econometric model. Further, the effective tax rate levied on Pemex, which was described in Chapter Three as being the endogenous result of Congressional budgetary decisions and the company's own operating results, is treated in the econometric model as an exogenously determined explanatory variable. Beyond Chapter Three, there is little discussion of alternative energy sources or the net impact of petroleum investments and increasing energy consumption on environmental resources or sustainable development (as that term was used earlier in the book).

It is not necessary in a brief review to give a detailed description and critique of the authors' econometric model of oil and gas supply. However, an overview might be useful. The structure of the model is recursive: the export price of crude oil (net of tax levies) determines annual drilling activity, which in turn determines annual reserve additions, which determines annual production. These "driver" variables are determined endogenously, but each is treated as an exogenous explanatory variable in the next step along the way. Nonetheless, ordinary least squares is used to separately estimate each equation in the system. In truth, there are hardly enough data to apply more sophisticated estimation techniques, but one is left with serious doubts about the consistency of parameter estimates and the statistical properties of the predictions that result.

The goal of the econometric analysis is to construct a simulation model that can be applied to infer the impact of reduced tax rates on drilling, reserves, production, and ultimately federal tax collections. A number of dummy variables are appended to the basic model to account for various historical aberrations, but while dummy variables help to achieve a better fit to the historical data, their contribution falls into the "unexplained" component as far as future predictions are concerned and the apparent explanatory power of dummy variables goes directly to the standard error of resulting forecasts. Although the oil production forecasts (based on a hold-out sample) for years 2000-2002 are said to be "reliable," I am not convinced. The total production forecast for a given year may come within a few percentage points of the actual level, but that is not a stringent test with respect to a process like oil production, which in the near term is mostly driven by the inertial force of the starting reserve level. Comparing actual year-to-year

changes in production to predicted changes provides a stiffer test of the model's accuracy. In this respect, the model's performance is not so impressive. Although actual oil production increased by 3.5% in 2001, and again by 4.5% in 2002, the model predicts that oil production would have declined in both years. In the case of natural gas, actual production declined in 2001, when it was predicted to have increased, and increased in 2002, when it was predicted to have decreased.

Chapter 8 applies the simulation model to test the consequences of reducing the effective tax rate on Pemex revenues from 61% to 50.2% over the period 2003–2008. The question is whether or not a reduced tax rate would stimulate drilling and production sufficiently to maintain or increase total tax revenues despite the reduced rate. For reasons that are not explained, some components of the econometric model are set aside for purposes of this exercise, and alternative assumptions are substituted in their place—most notably with respect to the volume of gross reserve additions per successful well, and determination of the success rate itself. Of greater concern, however, is the manner in which the simulation results are interpreted. For example, the most important conclusion the authors draw from the exercise (“a permanent reduction in the tax rate from 61% to 50.2% could cause production tax revenues to decrease for only two years, then to increase for an indefinite future”) seems to contradict their tabulated results. The impact of the tax reduction, which in terms of the rate amounts to some 16%, is to slowly increase oil and gas production—but the impact on production is small. By the end of the simulation—year 2008—oil and gas production have each responded by rising less than 2% compared to their level under the higher-tax-rate baseline. The net result must be a reduction in total tax collections relative to the base case, not only for the first two years, but for all years of the simulation. Yet, the authors claim that the tax cut would actually increase tax collections beginning in 2005 and boost annual cash flows (to Pemex?) by 34%. Something seems to be seriously amiss, either in the calculations or their explanation. As a reader and reviewer, I would like to sort it out, but there is not sufficient documentation to do so.

After summarizing the main conclusions in Chapter 9, the authors have appended a brief Epilogue, prepared after the main text was completed, which notes the impact of the higher level of crude oil prices that began to take hold during 2004, and a stated commitment by the Mexican Secretary of Energy to achieve dramatic increases in the rate of drilling. Today, a second Epilogue would be in order, taking into account the new petroleum tax reform, passed by the Mexican Congress by a vote of 330 to 131 and put into effect on January 1, 2006. Analysts estimate that this reform may reduce Pemex's fiscal burden by some \$2 billion to \$3 billion annually. The ultimate impact of this tax reform on drilling and production remains to be seen.

Stylistically, the authors' argument and presentation tend to the academic/technical/statistical side, which is not inappropriate for the subject matter—especially since the book is the imprint of a university press. However, lay readers might find themselves reading the first few paragraphs of each chapter, then quickly skipping over the meat of the arguments, which are rendered using

econometric jargon and statistical tests that are presented and evaluated in the terse and stilted manner of most scholarly research. In some sense, it is Mexican government officials who are the most important potential readers of this volume, but most of them will never get through it. If you have been intrigued by the Mexican petroleum industry, you probably should make the effort.

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