



Book Reviews

Richard H. K. Vietor, *Energy Policy in America Since 1945: A Study of Government Business Relations* (Cambridge: Cambridge University Press, 1984), 363 pages.

Vietor has attempted an ambitious survey of major U.S. energy policies. His historic coverage is actually somewhat fuller than this title suggests, for he also traces the prewar roots of critical policies. Understandably, he is selective in what topics are covered, dealing predominantly with three issues—regulation of oil, field price regulation of natural gas, and the effort to develop synthetic fuels. The viewpoint is largely historical, and Vietor's appraisals are quite uneven. He eventually recognizes and supports the economic arguments against price controls. Such recognition comes late in the book, however, and he does not apply similar analyses to other issues.

The postwar period is divided into three phases. The first extends from the end of the war to the collapse of the voluntary oil import quota program in 1958. The middle period covers the 1959–1969 period. Then an energy transition is begun in 1969—the start of the Nixon administration.

Each section of the book deals with oil, gas, and synthetic fuels in the era considered. In all but the last part, each subject is the sole concern of at least one chapter. The exception is that synthetic fuels policy after 1969 is included in a catchall chapter on national energy management.

The book begins with introductory remarks and a discussion of the general energy policy background. The section on post-1969 policy starts with an overview chapter on the upheavals in the energy markets. The energy management chapter is the penultimate chapter, and it is followed by general observations.

The initial energy background chapter sketches critical preexisting policies including taxation, market demand prorationing, federal land law, efforts to promote U.S. involvement in foreign oil, antitrust concerns, and industry-government cooperation. As his subtitle suggests, the last is a recurrent interest in the book. The other issues get less attention. For example, controversy over U.S. policies toward OPEC and public land management debates received little attention.

All the discussions of natural gas deal with various phases of the price control process. He traces this process in four chapters—two in each of the first two sections and two in the last section. It is not until these last chapters that he gives much consideration to the economics and begins to criticize the policy. His first gas chapter seems sympathetic to proregulation advocates such as FPC Commissioner Leland Olds, but later he recognizes the economic defects of arguments raised in more recent debates.

The oil discussion starts with the rise and fall of import controls and then shifts to the price control process. He shows distress at the inefficiencies produced by the price control process at the demagogery that produced the policy. In import control discussion he is more ambiguous, asserting that legitimate national security interest existed but was ill-served by regulations. He effectively reviews the defects of the policies but fails to show what the security problem was and how it could have been

better solved. The discussion of the failure of voluntary quotas suffers from Vietor's neglect of the economic forces that doomed cooperation. He fails to use his later analysis of competitive forces in oil to explain the earlier case and instead accepts complaints about lack of statesmanship.

The synfuels discussions are invaluable history but are marred by the most inadequate of his appraisals. His history reminds us that synthetic fuels programs have been attempted many times without success. He senses the tendency to use synfuels as an alternative to removing supply-retarding regulation but makes little of this tendency. Vietor believes that synfuels would have succeeded had the program been more extensive and continuous. He is unaware of the tendency to rush into production plants using technologies known to be uneconomic rather than advocating that more time be taken to develop new technologies.

An even more questionable argument in these discussions is the contention that the fragmented structure of the coal industry caused its demand to decline in the 1950s. The decline is due to a greater extent to intrinsic economics. Vietor implicitly echoes interwar European slogans on how reorganization would revise European coal. The reorganizations in fact failed to produce the desired outcome.

Thus, the reader gets a good introduction to energy policy but an uneven discussion of the underlying economics. *Given the lack of recent historical surveys, this alone represents a useful contribution.*

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Deverle P. Harris, *Mineral Resources Appraisal* (Oxford: Clarendon Press, 1984), 445 pages.

Appraisal of undiscovered resources is a challenging business, and skeptics might even term it hopeless. The estimation process is based on incomplete and often unrepresentative data, and resulting appraisals are prone to error. Should we even hope to formalize or quantify a reasonable set of expectations regarding unknown resources whose very existence remains speculative? Anyone remaining in doubt about this question would do well to read Professor Harris's excellent account of modern resource appraisal methods.

This book is technical and wide-ranging. It explains the basic concepts (both geologic and economic) involved in the appraisal of undiscovered mineral resources and surveys alternative empirical approaches. Emphasis throughout the book is placed on undiscovered resources. Appraisal of known mineral deposits is a separate topic that Professor Harris deliberately (and justifiably) excludes. The book organizes ideas and concepts well and shows where alternative empirical approaches fit within a unified analytical framework. I found Harris' attempt to maintain a consistent

framework to be a very effective tool for identifying the strengths and weaknesses of alternative appraisal methods and models.

The book is suitable reading for newcomers to the field of resource appraisal, but it is much more than a primer. Professor Harris illustrates various appraisal methods using actual case studies that come close to the state of the art. Several chapters may tax those not mathematically inclined, but the author usually provides well-marked detours around the most difficult material and provides concise summaries of lengthy derivations. Prior knowledge of statistics and probability theory is the most important prerequisite.

The resource appraisal methods discussed in the book are drawn from a literature that, in my judgment, will be unfamiliar to most economists. That in itself might be a good enough reason to read the book. It does pose some small problems, however. The supply of mineral resources, for example, is described throughout the book in terms of the stock of underground deposits rather than in terms of the flow of production. Resource demand, on the other hand, refers generally to the rate of use per unit of time. This is one instance where supply does not equal demand. The book does not describe models of the type needed to reconcile the conflicting supply (stock) and demand (flow) concepts.

Harris classifies alternative resource appraisal methods into categories that follow major branches of the literature. Virtually all of the branches cross disciplinary lines, so it is not easy to summarize the differences. The following titles are only suggestive of what can be found in respective categories: economic resource models, quantity-quality models, deterministic geological models, geostatistical models, occurrence models, crustal abundance models, and compound models. I take exception to the category called economic resource models because it is too broad and fuzzy. As defined, the category includes any model that focuses on historical production data, whether or not economic analysis is applied. Hubbert's analyses of domestic oil resources and related life-cycle models are the centerpieces of this category, despite the fact that most economists object strongly to them.

In addition to learning the details of specific resource appraisal methods, the reader will notice two primary themes that run throughout the book. The first is the importance of framing appraisals in probabilistic terms that reveal the true degree of uncertainty surrounding the resource in question. Uncertainty is inconvenient, but since current economic decisions cannot be delayed until after all exploration results are in, we must incorporate uncertainty into all our planning models. Blind conservatism (i.e., betting on the worst case) is a poor substitute, as Professor Harris points out. Understatement of future resource potential, although commonly mistaken for the prudent course of action, can be just as costly and economically wasteful as overstatement. What Professor Harris provides is a balanced and careful discussion of how alternative research methods and models can be used to reduce and identify the degree of uncertainty surrounding specific mineral resources.

The second primary theme of the book (simply stated) is that resource appraisal is a subject where interdisciplinary work is absolutely necessary. Geoscientists and economists have much to learn from each other, and the success of their undertakings depends on this interdisciplinary teamwork. The two sides will make little headway by artificially dividing their efforts into the separate tasks of physical versus economic appraisal. In practice the two can not be separated. The reason is simple to grasp.

Inference regarding undiscovered resources deviates substantially from the standard statistical paradigm of random sampling with replacement. Resources that have already been discovered are not representative of those undiscovered. Exploration and discovery are economic examples of selective sampling (without replacement) from an (unknown) underlying population of resources. We can expect to appraise the historical evidence generated by physical exploration only if we understand how economic incentives regulate the selective samples process (i.e., exploration).

For a book of this scope, the technical discussion of alternative appraisal methodologies is unusually clear and complete. There are a few technical points, however, that remain unclear to me. For example, the basic building block of the geostatistical deposit model (Chapter 5) is a decomposition of total resource endowment into three multiplicative factors that account for (1) the number of deposits; (2) the size of deposits; and (3) the grade of deposits. Analytically, this decomposition is expressed as: $M = N * T * Q$; where M represents total resource endowment, N is the number of deposits, T the deposit tonnage, and Q the deposit grade. Each term in this expression is regarded as a random variable, and it is shown how a probability distribution for total endowment can be derived from probability distributions for the three components. One must assume from the structure of the relationship that it applies to problems where each of N deposits had identical tonnage and grade. In practice, however, the geostatistical models described in the book typically treat tonnage and grade as heterogeneous over deposits, so the decomposition of probabilities does not strictly apply. I also found it puzzling that number of deposits and deposit tonnage were assumed (implicitly) to be statistically independent random variables, whereas the possibility of statistical dependence linking deposit tonnage and deposit grade was questioned closely.

The crustal abundance models discussed in the book also contain curious features. These models are based on a contrived definition that treats the total endowment of a resource as being nonstochastic, even though it consists of material of varying grade, which itself is regarded as stochastic. These models are estimated by equating total crustal abundance to the mean (or in some cases the mode) of the grade distribution. This estimation procedure seems arbitrary and open to significant biases unless all deposits are of the same tonnage. The problem can be expressed very simply. Let CA represent total crustal abundance:

$$CA = \sum_{i=1}^n m_i / \sum_{i=1}^n w_i,$$

where m_i and w_i represent the amount of metal and total tonnage, respectively, in the i th deposit. The mean of the grade distribution can be expressed:

$$MG = 1/n * \sum_{i=1}^n m_i / w_i.$$

The two expressions will be equivalent if and only if $w_i = \bar{w}$, for all $i = 1, \dots, n$. Professor Harris is not unaware of these difficulties, as his discussion of Brinck's work (p. 210) makes clear:

that *all metal* occurs in *deposits of that specified size*. A proper perspective would be: suppose that all metal occurs in deposits of size t , what would our resources be? Or, what are our resources if grade is lowered to q , given that all deposits have t tonnes of ore?

The crustal abundance models may give proper answers to these hypothetical questions, but they hardly seem the proper questions.

The most significant limitation of the book is that it deals almost exclusively with metal resources and overlooks a large and fairly recent literature on methods of appraising hydrocarbon resources. This exclusion does not seem to be categorical, since selected works on oil and gas are described in some detail. However, those who are interested in the hydrocarbons must look elsewhere for material that goes to the same depth as Harris' treatment of the metals.

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Peter Navarro, *The Dimming of America: The Real Costs of Electric Utility Regulatory Failure* (Cambridge, Mass.: Ballinger Publishing Company, 1985), 127 pages.

Although still a graduate student at Harvard, Navarro has produced an impressive array of popular and scholarly works on electric power and other areas. This book is an effort to provide a popular, short, and self-contained discussion of the problems of electric utility regulation. Navarro perceives that these problems are due to unnecessarily high costs and recognizes that alternatives are available to avoid the blackouts postulated by alarmists.

He delineates three types of costs—an improper fuel mix, excessive costs of capital, and decreased service reliability—attributable to misregulation. Misregulation consists of what he terms *rate suppression*—a failure since the mid-1960s to allow electricity rates to rise with inflation. Suppression, in turn, has produced a reluctance to invest. Navarro calls this a reverse Averch-Johnson effect or capital minimization. This minimization is reflected in the cancellation of ordered plants, a hiatus in new plant orders, an unwillingness to invest in converting plants to coal, and the purchasing of power from cogenerators or Canadian and Mexican utilities.

Having indicated the basic problem, Navarro's development of its implications involves trying to prove that investment curtailment has the expected impacts. Thus, each of his discussions of the three penalties provides the reader with further evidence.

The fuel-cost penalty turns out to be mainly the direct consequence of minimization of capital expenditures. Both reliance on imports and failure to convert plants from oil are deemed as the neglect of attractive investment alternatives. Imports are considered higher in cost than output from new plants. Backing out oil-fired capacity

is argued to be profitable. He also contends that the capital expenditure minimization process discourages efficient conservation. While his argument is too terse, it clearly suggests the desirability of direct utility financing of conservation measures.

Similarly, the capital cost penalty reflects lower ratings and problems in paying for (presumably unwisely) canceled plants. The reliability problem arises because reserve margins will decline to unacceptable levels, and then only high cost options can be brought into operation soon enough to avoid blackouts.

One would expect that rate suppression would ultimately raise rates above where they would otherwise be, and Navarro presents calculations of what these increases will be. These calculations are preceded by more qualitative discussions on how misregulation will lead to less economic growth and higher oil imports.

The existence of rate suppression is explained by the actions of ill-funded regulatory commissions whose own interests (and those of the pressure groups who are most influential in setting policies) lie in preventing windfall profits.

Since deregulation is considered too time-consuming and too problematic, Navarro favors better regulation. States can be given opportunities to act by themselves, but if they fail, the federal government should step in.

Navarro has succeeded admirably in his goal of providing a short and readable introduction to the problems of electric power. The book can be endorsed as a sensible discussion. Several of the arguments are more questionable than Navarro admits. He continues to push conclusions (which he reached when oil price trends looked more unfavorable) about how much oil burning should be backed out and fails to make clear that oil generation has declined sharply. He overemphasizes the desirability of reducing oil imports on national security grounds. At best, he is too summary in advocating utility financing of conservation instead of providing consumers with proper price signals.

On a more subjective level, many would quarrel with his preference for regulatory reform over deregulation. It is not clear that reform is a quicker, more promising alternative. As is made clearer by another of his books—*The Policy Game* (Wilcy, 1984), Navarro has strong but extremely eclectic views. Neither what he supports nor what he proposes to do fits into conventional ideological molds. In simultaneously accepting the attacks on regulation and opting for modest reforms preferred by interventionists, he may overdo the search for balance.

Finally, the book would have been more useful had it stressed simplicity and compactness somewhat less relentlessly. The intended audience would have benefited with another ten to twenty pages more fully developing the terser arguments and discussing other views. This effort also would have broadened the audience by making the book more useful as a supplemental course reading. Nevertheless, it is a helpful contribution to the literature on electric power industry problems.

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