

BOOK REVIEWS

VERLEGER, PHILIP K. JR., *Adjusting to Volatile Energy Prices*. (Institute for International Economics, Washington, DC, 1993). 262 pages, ISBN 0-88132-069-2, \$16.00.

Calls for negotiations between producers and consumers to solve the problem of oil price volatility have repeatedly appeared since 1973. When prices rise, consumers promote the issue, while in weak markets, producers urge talks. Not surprisingly, neither side has been inclined to bargain when in a position of strength, although in recent years, a number of consumer governments have argued for actions to promote oil price "stability."

In his book, Verleger analyzes the oil market structure and the question of oil price volatility and addresses the role of producer/consumer negotiations, both as presently constituted as well as raising the policy issues he feels are more appropriate for any such agreement. Somewhat ambitiously, the book provides a microeconomic analysis of oil markets, including the use of financial derivatives such as futures and options, and a policy analysis of the points of contention between producers and consumers. As such, Verleger provides an excellent review of the relevant issues.

The primary criticisms of the book are relatively minor. Some references are missing, there are a number of typos and minor factual errors, and a list of the many tables and figures would have been valuable. More seriously, a tendency to rely without source or discussion on the DOE Disruption Simulation Model to analyze market behavior under different crisis scenarios and policy assumptions is less than satisfying. Presumably, the publisher preferred to avoid material that was too technical for general readers.

Also, it is true that, in a number of places, Verleger relies on relatively simple calculations, as in his equating the loss to Japanese consumers from protectionism with the difference in Japanese oil product margins and those in other OECD countries, which ignores any downstream cost differentials. But since the author is always quite careful to note that the calculations are intended to indicate the order of magnitude of the solution, rather than be definitive, the reader is not misled. Indeed, imprecise numbers are far superior to the unquantified assertions which typically dominate such policy discussions.

One vital aspect of this book is Verleger's debunking of a number of pernicious myths, including the notion that the oil market is inefficient, or that futures markets have made prices more volatile. His demonstration of the failure of numerous other efforts to stabilize commodity prices (diamonds being the

exception), with "stabilized" prices sometimes proving to be more volatile than free market ones, is invaluable. He concludes that price stabilization is neither necessary nor worthwhile and proposes instead reliance on market alternatives to stabilization, primarily hedging.

Through these means, Verleger suggests solutions not only to the problem of price (and revenue) volatility, but producer investment capital needs. Admittedly, his being forced to assume that large volumes of trades would not affect the price of financial derivatives weakens the argument. And an unfortunate blind spot is the citation of research showing that roll-over of futures contracts permits long-term hedging using short-term contracts. Naturally, Metallgesellschaft's recent troubles suggest that circumstances may arise where such an approach is not appropriate. This is an issue that the author will presumably address in another forum.

Addressing a broad range of conflicts between producers and consumers, the review and analysis generally indicates a preference for freer markets and on both sides. He calculates the gains from opening producer countries to foreign upstream investment, as well as consumer downstream sectors, such as Japan and reiterates others' condemnation of the seeming-permanent coal subsidies in some nations. But he goes further to argue that where countries cannot be persuaded to alter policies for their own good, producer/consumer negotiations could be used to develop tradeoffs between the two groups, through something such as Energy Trade and Investment (ETI) negotiations, patterned on GATT.

Probably most controversial will be his argument about the declining importance of publicly-held strategic stocks, on the grounds that they displace the oil industry's own stocks, and the economic impact of oil price increases has dropped over time. Many will no doubt question, as does this author, the wisdom of relying on producer governments to maintain production, as in 1990, rather than restrict it, as in the 1970s.

Verleger has accomplished two major feats with this book: he has created a basic text on the microeconomics of oil markets and addressed (and answered) many of the questions involving, not only producer/consumer cooperation, but more general consumer and producer government oil policies. As such, the book makes a great text for students of energy economics, a valuable resource for members of the oil industry, and it should certainly be required reading for policy-makers through the world. Aside from being very well-organized, he manages the feat of providing large amount of information and analysis in eminently readable fashion, leaving the book accessible to the general reader, while retaining its utility for the expert.

Michael C. Lynch
MIT Center for International Studies

KNEESE, ALLEN V., AND JAMES L. SWEENEY. EDS., *Handbook of Natural Resources and Energy Economics*, Volume III. (Amsterdam, New York, London, Tokyo: Elsevier, 1993). 599 pages.

Although natural resources and energy have been considered as basic to the economic process since economics as a discipline began, the theoretical approach to studying them has only evolved in this century. The goal of the *Handbooks of Natural Resources and Energy Economics* is to present us with broad surveys of this evolution up to the current state of the art. Volume III, which concentrates on exhaustible resources including energy and nonfuel minerals, follows on Volume I and II, which contained studies on the economics of environmental and renewable resources. The self contained surveys in Volume III, which I will briefly summarize below, are divided into three sections: theoretical issues, modelling and econometric work, and policy and forecasting applications relating to exhaustible resources including energy and nonfuel minerals.

These surveys would be valuable both as a teaching supplement for advanced graduate students as well as a reference volume for use by professional researchers. I found the book to contain a broad range of topics with a nice mix of theory and empirical work and a few pieces with a more philosophical bent. Especially valuable are the bibliographic references to a wide range of articles in each chapter.

Since Volume III was published considerably later than the first two volumes, the Table of Contents has been changed from that published in the first two volumes. The original volume was slated to have 14 chapters while the actual volume has 11. Six papers have been eliminated on (1) intertemporal objectives, (2) market structure, (3) resources and developing countries, (4) economic issues in regulation, (5) resources and innovation, and (6) the aggregate effects of energy price changes. Four papers have been added on (1) theory of depletable resources, (2) optimal use of exhaustible resources, (3) natural resources in an age of substitutability, and (4) the economics of energy security. Other articles have either author or title changes but the flavor of the article appears to have not changed.

Beginning in chapter 17, James Sweeney introduces the book with a theoretical discussion of the theory of depletable resources and considers dynamic optimization models. He includes both competitive and monopoly models and proceeds through a variety of cases including models with prices exogenous and continuing on to models where prices are endogenous and are effected by such things as taxes, technical progress, price expectations, externalities, and interest rates.

Geoffrey Heal continues with a discussion of the optimal use of natural resources from societies point of view by maximizing utility of resource exhaustion in a dynamic framework for various cases including depletion, with capital accumulation, with technical progress, and with a backstop resource. He concludes his chapter by wrestling a bit with the role of discounting in problems of natural resource allocation.

Larry Karp and David M. Newbery, in the most difficult chapter in the book, continue on with intertemporal inconsistency using control theory and dynamic game theory. Such inconsistencies are likely to arise in dynamic optimization models where binding commitments are not possible and there are one or more dominant agents that practice strategic decision making and the nonstrategic agents are forward-looking.

Their analysis includes situations of strategic buyers facing competitive sellers of a non-renewable resource including a monopsony, a monopsony with a fringe, and oligopsonistic buyers and strategic sellers facing competitive buyers.

Margaret Slade, Charles Kolstad, and Robert Weiner consider demand for energy and nonfuel minerals including issues such as aggregation, energy capital complementarity, classical articles in energy demand, technical change, adjustment costs, discrete choice, expectations, demand by time of day, block rates, and price expectations. They conclude their chapter with a nice discussion of forward, future, and options trading, in metals and energy products.

DeVerle Harris considers evaluating and modelling resources and reserves for exhaustible resources from both a geological and an economic point of view with numerous applications. He includes a conceptual discussion of geological models of deposits and crustal abundance along with models that combine economic factors into the analysis such as modelling mineralizability, cost, or exploration. He has model applications to a variety of fuels and nonfuel minerals including uranium, gold, coal, copper, lead, and zinc.

Denis Epple and John Londregan continue on the supply side by considering models of exhaustible resource supply in a more traditional framework. They begin with a discussion and numerous examples of estimated cost functions which are basic to the modelling of resource supply. They continue on to consider various dynamic simulation models with most of the applications in the oil market followed by examples of econometric models of resources supply. In their concluding remarks they suggest a hope that the distinction between simulation and econometric models be eliminated and they become a unified whole.

Partha Dasgupta considers scarcity of a resource as driving substitution and technological change in natural resource use and extraction and considers various measures of scarcity including prices, royalties, and ground rents along with the transition from one resource to another.

David Teece, David Sunding, and Elaine Mosakowski consider natural resource cartels including their objectives, durability, welfare implications, along with a discussion of international oil, mercury, uranium and diamond cartels. They conclude that these viable cartels all had a workable internal structure along with government support.

Michael Toman considers energy security focusing on the oil market beginning with a review of the history of world oil markets. He follows with a discussion of the macroeconomic externalities of supply interruptions and policies that can be implemented to deal with them including tariffs, quotas, and strategic oil reserves.

Charles Kolstad and Jeffrey Krautkraemer consider natural resource use and the environment including: static models of resource environmental interactions, models of environmental regulatory response, measuring environmental damage, cost benefit analysis, dynamic models of resource environmental interactions models (which I found to be especially good), and conclude with discussions of intertemporal and intergenerational efficiency.

Dale Jorgenson and Peter Wilcoxon conclude the book with models of interactions between energy, the environment, and economic growth beginning with a useful summary of a variety of simulation models including neoclassical growth models, intertemporal general equilibrium models, input output models, nonlinear multisector general equilibrium models, and econometric approaches to modelling consumer and producer behavior. They conclude with a description of their intertemporal general equilibrium model of the US economy which they use to model the impact of energy and environmental policies. To determine the effects of environmental control on growth they run a variety of simulations including a base case of their model, a case without existing pollution controls on industry, a case without existing pollution controls on motor vehicle emissions, and cases with higher oil prices as the result of various carbon taxes.

As a modeler I find the following three chapters to be the most interesting: (1) modelling of resource supply, (2) resource environmental interactions, and (3) energy, environment, and growth interactions. Others with a more philosophical or theoretical bent may not agree.

Given the exciting things happening in regulation in energy markets it is a pity that the chapter on regulation was omitted. This would have made a nice addition to the book as would have been a chapter on deregulation. The book is a bit repetitive here and there including multiple discussions of Hotelling and OPEC cartel models. This may not necessarily be a disadvantage in a book with such a variety of topics, however, as it makes the chapters stand alone. More editorial care could have been taken to ensure that inequalities always went the right way, sources included in the text or Tables were included in the bibliographies, and that other minor sins of omission or commission were corrected.

Overall, I liked the book. I think it accomplishes much of its objective of providing state of the art summaries on various resource topics. I have already found it to be a useful reference on my bookshelf, expect to use some of the chapters in a class on energy modelling, and expect it to be valuable reference that many will want to order for their library.

Carol Dahl
Colorado School of Mines

* * * *

ADELMAN, M.A., *The Economics of Petroleum Supply: Papers by M.A. Adelman 1962-1993*. (Cambridge MA: The MIT Press, 1993). 556 pages. \$49.95.

As the subtitle reminds us, for over three decades, M.A. Adelman produced the definitive studies of the world petroleum market. The volume under review provides a selection of 27 of his contributions. The book is divided into three parts — theory and measurement of mineral scarcity and depletion, market control in world oil, and public policy toward international oil.

The first part presents the most critical of Adelman's efforts to develop and apply a better model of petroleum supply than those he had encountered in the literature. The key theoretic points appear in his papers from 1962, 1970, and 1990. The first, an excerpt from a monograph on natural gas economics, explains why the classic economists' view of mineral extraction as involving increasing costs (in the sense of an upward sloping marginal cost curve in every time period) applies to oil. The second, reprinted from *Geoexploration*, is his main statement of his view that oil reserves are a readily replenishable working inventory and that exploration is undertaken more to reduce costs than to increase the inventory.

The 1990 paper, from the *Review of Economics and Statistics*, presents his extension of the analysis to criticize the conclusions many have drawn from Hotelling's analysis of exhaustible resources. (Reading of other papers, notably the *Geoexploration* paper and a 1974 article on world oil, show the 1990 discussion codifies an viewpoint first sketched two decades earlier.) Adelman points out that the Hotelling theory says that if exhaustion threatens, minerals in the ground would rise steadily in value. The available evidence shows no such rise. Thus, he concludes that the economic stock of minerals is not fixed and not going to be exhausted. What matters are the flows of reserve additions. That the flows accumulate to comprise the usable stock tells nothing about supply prospects.

The other main component of part I is ample illustration of how Adelman has coaxed out of the available data indicators of prevailing world oil supply conditions. The examples start with a 1964 demonstration that the then prevalent practice of reserving U.S. markets to small producers was reducing supply and making imports too attractive. The theme of this paper, that public policy perversely encourages high cost production, is reiterated in his examination of international conditions in the subsequent three decades. The later papers document that large supplies of low cost oil existed at the start of his work in the 1960s and, despite predictions to the contrary, have persisted up to when this book went to press.

The bulk of part II consists of five papers published between 1972 and 1982 on the OPEC cartel. This develops the well known Adelman view that world oil prices are set by a strong but imperfect "cartel" of those members of OPEC with large reserves of low cost oil. (Contrary to what some of his critics assert, Adelman always uses the loose definition of cartels that includes the tacit collusion that he argues operates in OPEC.) These reviews are preceded by a 1964 examination of world oil price policy and followed by his 1986 full discussion of another point developed in earlier work, the invalidity and irrelevance of views that OPEC countries use lower discount rates than private oil companies. The invalidity lies in the applicability to the countries of two familiar principles: that the risks of political life produce the need for a quick payout and that undiversified investors face greater risk. Irrelevance lies first in the proposition already stated that exhaustion is not a concern and second in the ambiguity (that I demonstrated in 1966) of the impact of higher interest rates. The commonly stressed effect is reduction of present value of given profit streams that increases over time and thus causes a speedup of exploitation. An offset is that higher interest means higher costs that cause a slowdown in exploitation.

The six papers in the policy section span many years and raise several further recurrent themes. The first is his belief in public stockpiles to provide security of supply. His first presentation of the argument was prepared in 1967, published first in several nonEnglish-language versions, and then used as an appendix to *The World Petroleum Market*. A 1982 paper in *The Energy Journal* updated the argument and stated the case for supplementing private with public stocks. A 1976 article discusses his contention that secret auctions of quotas to sell oil in the United States were a no lose strategy for possibly lowering the cost of oil to the U.S. economy. In other essays, his continuing criticism of the search for cooperation with oil producing countries is applied to suggestions for producer consumer dialogs.

Adelman and the MIT Press have made an immense contribution to energy economics by making these essays available in one place. Adelman has been the prime teacher of the realities of oil. He brought to the subject the

insistence on getting the economics right that had characterized his prior work on other controversial issues. He insists that we see what the economic are and how well they explain the problem before pushing alternative theories. The lesson has proved valuable wherever applied. Many of these essays have been staples of my course reading list for many years, and, with their availability in the book, others will be added.

The book makes clear that Adelman has almost always been correct about oil and certainly far more correct than his detractors. Only one "blot" can be placed on his record, and it is smaller than his critics (and he) assert. He at worst failed to warn forcefully enough that a cartel of oil producers might develop. At least two papers, the 1964 survey of oil price prospects and the 1967 review of security, mention that collusion might occur. However, he failed to anticipate that the U.S. State Department would so ineptly abet the process. He was in good company. Few others including the major oil companies seriously feared cartelization. (The companies talked about dangers but offered contracts that only allowed downward price adjustments.) Adelman immediately correctly recognized that the 1971 Tehran agreements had unleashed rather than curtailed price raising forces.

The only complaint is that Adelman has been too modest. More of his work deserves collection. The whole natural gas monograph, the full discussion of oil reserves in his collaboration on a survey of energy resource data, and the most important of his newspaper articles and congressional testimony could usefully have been included in this or a supplementary volume. His earlier work on nonenergy issues is still worth reading and should be collected into another volume.

Richard L. Gordon
The Pennsylvania State University