BOOK REVIEWS

Jacques Crémer and Djavad Saleihi-Isfahani, *Models of the Oil Market* Vol. 44 of the series, *Fundamentals of Pure and Applied Economics*, C. Henry (ed), (Chur, Switzerland: Harwood Academic Publishers, 1991), 106 pages.

This monograph is the latest in a series of surveys intended to acquaint economists in academia, government, or business with the current litérature in a subdiscipline outside their own area of specialty. Out of the wide range of possible topics associated with the world oil market, this survey is limited to studies dealing with market structure, and is therefore primarily concerned with alternative models of OPEC behavior. The authors are well-qualified for this task, as they have made significant contributions to this body of literature over the past several years. Overall, their presentation is clear, insightful, and well-written.

However, Crémer and Salehi-Isfahani are widely known as proponents of a competitive interpretation of OPEC behavior, which they eventually admit (on the next-to-last page) is a minority position. Accordingly, their summary conclusion of nearly two decades of modeling OPEC behavior is that "there are reasonable competitive scenarios that yield an outcome not too different from the actual observed outcome" (p. 97). For a discerning reader already familiar with the literature, their heterodox viewpoint can be clearly seen throughout their analysis. However, to the uninformed reader for whom this volume is intended, this bias may not be obvious. Crémer and Salehi-Isfahani recognize that there have not been many "conversions" from one side to the other among energy economists, so this rare opportunity to present the terms of the debate to the uninitiated may allow them to attract some new "believers" to their viewpoint.

After a brief introduction in Section 1, the authors then provide a quick thumbnail sketch of recent oil market history in Section 2, where they lay the foundation for their subsequent discussion of competing models of OPEC. The wide range of models found in the literature is divided for separate consideration into three categories: Section 3 discusses "informal" models (which focus on institutional aspects and are relatively free of detailed mathematical statements); Section 4 discusses "simulation" models (quantitative models used primarily for prediction); and Section 5 discusses "theoretical" models (highly mathematical models concerned primarily with optimal extraction and price paths under various market structures). Econometric studies of OPEC behavior are reviewed separately in Section 6, as they typically involve empirical testing of competing theories, rather than the advancement of completely new explanations. Section 7 summarizes the previous sections, while suggestions for future research are provided in Section 8. A one-page epilogue was appended at press time to briefly address the implications of Iraq's unexpected invasion of fellow OPEC member Kuwait in August of 1990.

Crémer and Salehi-Isfahani carefully critique each group of models, endeavouring to show the strengths and weaknesses of each. The main issue, as they see it, is whether the obvious excess of market price over marginal extraction cost can be attributed almost entirely to market power by producers or instead reflects only a scarcity rent premium for the use of a non-renewable resource — they are inclined to believe the latter, of course.

The primary suggestion made by the authors for future research is that researchers should adopt the so-called "new" game-theoretic approach to industrial organization analysis in order to better explain the strategic aspects and structure of the oil market. In particular, more attention should be paid to the proper modeling of expectations, response lags, and uncertainty. One additional suggestion is that greater attention be paid to the possibilities for *monopsonistic* behavior by the consuming countries, including their strategic use of stockpiles to soften sudden price shocks, rather than to focus entirely on the possibility of *monopolistic* behavior by producers. Greater use of simulation models is also recommended, not for prediction, but to provide valuable insights into certain aspects of market behavior through sensitivity analysis.

In conclusion, I think this monograph would make a nice supplemental text for a course in energy economics. It provides a thought-provoking alternative to the traditional cartel interpretation of OPEC.

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Grubb, Michael. *Energy Policies and the Greenhouse Effect Volume One: Policy Appraisal*, (Brookfield, Vermont: Darmouth Publishing Company, 1990). 294 pages.

Grubb, Michael. Peter Brackley, Michele Ledic, Ajay Mathur, Steve Rayner, Jeremy Russell, and Akira Tanabe. *Energy Policies and the Greenhouse Effect Volume Two: Country Studies and Technical Options*, (Brookfield, Vermont: Darmouth Publishing Company, 1991). 450 pages.

In the midst of significant scientific uncertainty about climate processes, many countries are seriously considering and debating limits on greenhouse gas emissions. Too often, this issue is reduced to comparing climate change costs with abatement costs, contend Michael Grubb and his collaborators. They argue that political and institutional factors, not economic costs, will govern the response of individual countries to the global climate change challenge. They present several scenarios to show that aggressive abatement policies—reducing carbon emissions by about 1 percent per year over the next several decades—can be achieved at very little additional cost.

These books will be applauded by skeptics of economic analysis and advocates of low-energy futures but criticized by those favoring a more deliberate response to the global warming problem. They were prepared as part of a four-year study conducted by the Energy and Environmental Programme at the Royal Institute of International Affairs in the United Kingdom. Both the writing and the broad coverage of diverse topics are impressive, but these volumes fail to adequately address the potential interactions between emissions policy and energy markets and economic activity. This shortcoming casts doubt on the conclusion that emissions can be abated at relatively little if any cost.

Despite this limitation, nonspecialists interested in climate change policy will find much useful background information on the climate change policy debate. Volume 1 is a readily accessible appraisal of greenhouse policy and will appeal to a larger audience due to its wider coverage of topics and policy focus. Volume 2 provides an interesting integration of various technical options and country experiences that can be read as a stand-alone supplement to the policy appraisal.

Volume 1 delves with considerable depth into a range of important topics: technical options, country studies, carbon taxes, tradeable permits, energy end-use standards, utility regulatory reform, barriers to energy-efficiency investments, and long-run trends in energy service demands and energy use. Unfortunately, the policy appraisal begins by sweeping aside much of the significant scientific uncertainty that remains about climate change processes. In contrast, the cost of controlling emissions appears to be highly uncertain, at least as reflected in the wide range between estimates based upon economic models and those based upon engineering evaluations of specific technologies. (Actually, Grubb may have all this backwards; a convincing case could be made that the uncertainty about the economic costs of abatement pale next to the scientific uncertainty about greenhouse gas processes.) The discussion clearly favors the lower cost estimates, thus making the study's policy prescriptions obvious.

Grubb also argues that problems of selecting an appropriate discount rate invalidate any analysis that tries to compare future benefits and costs. Yes, discounting remains a nemesis, but how can thoughtful decisions be made about how quickly and how far we should go in limiting emissions, if benefits of abatement policies are not to be evaluated at all? The need for including measures of benefits becomes readily apparent, when one realizes that the limits most frequently proposed by politicians are completely arbitrary and have no relationship to either the scientific or economic evidence on the subject.

True to its subtitle, the second volume provides a very readable and well integrated discussion of the technical options and individual country experiences that can provide useful background information for interested policy analysts. Here, too, however, its unequivocal policy message—that aggressive abatement policies are not costly—needs to be tempered by the volume's narrow focus on technologies to the exclusion of broader resource allocation issues and the interactions between abatement policies and energy markets.

Part 1 of this second volume discusses the technical options and concludes that: the energy problem is not one of insufficient world energy resources but rather their regional distribution and environmental effects (Chapter 1); new technologies for heating buildings and more efficient electric motors promise big improvements in end-use energy efficiency at little cost (Chapter 2); and electricity generation holds the main opportunities for improving energy supply conversion efficiencies, with steam-injected gas turbines (STIGs) having a major role (Chapter 3). Chapter 4 discusses the uses and limitations of two competing approaches for estimating abatement costs: detailed analyses of individual technologies and more aggregate analysis and modeling of how energy markets respond to economic conditions and policy environments. The authors believe that the technology-specific "bottom-up" analysis provides insights into cost-free or low-cost technical opportunities for reducing emissions that are obscured in aggregate "top-down" modeling.

These chapters are based upon extensive research on various abatement technologies by others. Unfortunately, there is no discussion of how costs and energy savings are measured. The reader does not know whether the costs of saving energy include the significant implementation costs (e.g., incurred in acquiring information and maintaining the equipment) and whether the estimated energy savings are based upon engineering design estimates or audits of actual energy use.

Based upon these cost- and energy-savings estimates, the authors conclude that consumers forego economically attractive energy-saving investments because these technologies are not being chosen even though they have short paybacks under "ideal" investment conditions. The authors acknowledge that this behavior may partially reflect consumer resistance or dislikes, unavoidable hidden costs, and the "rebound" effect in which lower operating costs induce more use, but they conclude that overall economics has "a lot of explaining to do." Their discussion ignores recent economic analysis that emphasizes the illiquid nature of investments with large sunk costs (see the summary articles by Pindyck, 1991, and Dixit, 1992). Uncertainty about fuel prices, capital costs, and "in-use" performance criteria could discourage energy users from investing in energy-saving technologies.

Part 2 of the second volume explains how political rather than technical or economic constraints inhibit more widespread adoption of abatement policies in six key countries. Curiously, more energy efficient countries, where further abatement may be more costly, are often more willing to curtail emissions. One major omission from the discussion is the effect of population growth on a country's political reluctance to impose limits based upon current emission levels.

Abatement policies will have to overcome many political barriers in developed market economies. In the United Kingdom (Chapter 5), an apparent free-market orientation is skewed against conservation with such policies as the exclusion of domestic energy from the Value Added Tax. Political inaction in the United States (Chapter 6) stems from a combination of free-market policies, relative energy abundance, and fragmented public decision-making caused by decentralization and conflicting interests. Past gains in industrial energy efficiency and pent-up household demands create a cautious view towards abatement in Japan (chapter 7), although the government has shown a willingness to intervene in past energy decisions.

The prospect for abatement control in developing or transitional economies is even more formidable. There, as discussed in the last three country studies, the critical needs are price reform and investment, which suggest that abatement policies might not be as costless as was argued in Part 1. The need for economic growth and restructuring and the push towards more decentralized decision-making, rather than climate change concerns, are expected to induce a steady improvement in energy efficiency within the former Soviet republics (Chapter 8). China's (Chapter 9) dependence upon coal will be difficult to change, particularly given recent political trends away from price reform. And India's (Chapter 10) abatement efforts will be seriously constrained by her ability to import capital for energy-saving investments.

Each country study is integrated through a set of common scenarios that examine possible carbon emissions levels for the years 2000 and 2030 under different policy environments: business-as-usual and different combinations of emissions abatement through fuel switching and energy efficiency. These projections are based upon detailed assumptions about activity levels and energy efficiency for individual technologies. Assumptions about energy prices and about the response of energy demand and the fuel mix to prices and economic growth are implicit in these technology-specific trends, obscuring which factors contribute most to the relatively low levels of estimated energy demand and carbon emissions.

Saturation rates are emphasized, and these assumptions, rather than simply choosing a "bottom-up" versus "top-down" methodology, probably explain the relatively low demand levels. Over the next several decades, consumers simply run out of ways to use energy. While saturation of individual appliances can be expected, rapid economy-wide saturation need not occur if new energy services and energy-using appliances are constantly emerging. The volume offers no evidence, historical or otherwise, for its assumptions about saturation rates.

Abatement policies are unlikely to reduce global emissions as much as is indicated in these scenarios due to inconsistencies between country studies. China reduces emissions within her borders by exporting coal elsewhere. Russian gas must play a significant role in reducing emissions not only domestically but also abroad in Europe and China. The energy-sector impacts of these assumptions are not explored.

The informative discussion of technology opportunities and the political environment in six major countries demonstrates the value of assembling knowledgeable analysts with different expertise. The uninspiring simplification of economic costs and energy markets shows what happens when such efforts are not made. In this respect, the book's strengths and weaknesses reveal much about how future studies in this area should be conducted.

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