BOOK REVIEWS

Ownership and Performance in Electric Utilities by MICHAEL G. POLLITT. (Oxford University Press: Oxford, 1995), 240 pages.

This is a very timely book. Worldwide there is great upheaval in the electricity supply industry with growing moves toward the unbundling of vertically integrated systems and the privatization of large sections of publicly owned systems. The overriding goal of these restructuring efforts is to introduce greater efficiency and reduce costs. Pollitt makes a valuable contribution to the policy debate surrounding these changes by presenting a thorough examination of the empirical support for the efficiency of public versus private ownership.

Pollitt's conclusions are mixed. On the one hand, his evidence suggests that in electricity generation private ownership leads to better investment planning and hence lower generation costs in the long term, but in the short term, when the technology is given, there is no evidence to support the view that private ownership leads to lower costs. Similarly, for transmission and distribution there is no evidence suggesting that private ownership would lead to lower costs either in the short or the long run. The overall conclusion is that the biggest gains are to be made from restructuring publicly owned assets and focusing on better government management.

The conclusions are surrounded by a large set of caveats, which will enable proponents of privatization to ignore these somewhat unfashionable conclusions. This would be unfortunate, since this book not only presents by far the most exhaustive empirical analysis of the issue, it also does an admirable job of summarising the relevant theoretical arguments and previous empirical studies. The material is presented in a clear style, so that even the more complex technical arguments can be readily followed. Thus, the book should appeal to a wide range of professionals interested in the changes overtaking the electricity supply industry.

The first chapter provides a brief overview of the restructuring taking place internationally and argues the need for empirical analysis to provide some underpinning for these moves. This is followed in Chapter 2 by a very useful overview of the insights provided on the issue of ownership mode and productive efficiency by various schools of economic thought. While the property rights and the public choice literatures highlight the scope for relatively

poor investment decisions in publicly owned utilities, Pollitt's view is that this may be counterbalanced by principal agent problems affecting regulated privately owned utilities.

Chapter 3 reviews previous empirical studies on the effects of privatization. Again, the results are inconclusive. While there have been some significant gains in efficiency when government businesses have been privatized, there is evidence that much of the efficiency gain is achieved in the lead-up to privatization as a result of more intense scrutiny by various government bodies and the private investment community. Thus it seems possible to achieve considerable gains under public ownership. However, Pollitt does not consider how governments could maintain an equally intense scrutiny of public enterprises when privatization is no longer being actively canvassed as an option.

The fourth chapter provides an excellent summary of four methodologies which can be used to measure productive efficiency of individual firms and plants—the methodologies being data envelopment analysis (DEA), parametric programming, the deterministic production frontier, and the stochastic production frontier. Only the first and last of these methodologies are commonly used today, but by including the other two methodologies the reader gains a good perspective on developments in the area of productivity measurement.

Chapters 5 to 8 provide the results of the empirical analyses undertaken by Pollitt. Typically, productive efficiency is separated into technical efficiency (maximizing output from a given set of inputs) and allocative efficiency (having the right mix of plant and the right balance between capital inputs and other inputs). Technical efficiency can be further refined into scale efficiencies and pure technical efficiencies. Chapters 5, 7 and 8 present the estimates of these various efficiencies for, respectively, generation firms, baseload thermal plants, and transmission and distribution firms. Chapter 6 undertakes a more detailed analysis of the technical efficiency of generation at the plant level. The methodologies used in the different chapters vary somewhat depending on the available data.

Although dominated by U.S. firms, the data used for these analyses include fairly large international samples. Chapter 5 uses data for 95 firms in nine countries; Chapter 6 uses 768 thermal plants in 14 countries; Chapter 7 uses 213 plants in eight countries; and Chapter 8 uses 145 firms in the U.S. and the U.K.

A common complaint made by managers when presented with the results of analyses such as these is that the analysis fails to take into account special circumstances in the operating environment of any particular firm. Pollitt attempts to overcome such objections by including relevant operating environment variables in his analysis, although the statistical foundations for this are rather *ad hoc* in some cases.

This is the most comprehensive book currently available dealing with the issues of productive efficiency in the electricity supply industry, and public versus private ownership. It succinctly covers the theoretical arguments, previous empirical evidence and the methodologies which might be used to measure productive efficiency. In addition, it presents a considerable amount of new empirical evidence obtained using sophisticated methods. My only disappointment, which is more a lament about the difficulty of empirical work in economics than a criticism of the book, is that despite the author's extensive efforts the empirical evidence about the relationship between ownership and efficiency isn't more clear-cut.

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Indonesia: The Political Economy of Energy by Philip Barnes. (Oxford University Press: Oxford, 1995), 208 pages. ISBN: 0-19-730016-2

The back cover of Barnes' book informs us that it examines the potential for development of Indonesia's energy resources. There is no introductory chapter. The central theme of the book is that Indonesia is confronted with an increasing tension between the need to export oil—to secure its foreign currency inflow—and the country's rapidly growing energy consumption. With current rates of growth (8% yearly), oil consumption should surpass oil production somewhere between 2000 and 2010. Fundamental issues in delaying this are, firstly, encouraging the exploration and production of new oil reserves and sustaining the life of currently productive fields; secondly, the substitution of other sources of energy for oil in Indonesia; and, thirdly, an expansion of the export of coal and natural gas.

In seven chapters, Barnes sketches past developments in the relevant sectors and estimates the feasibility of expanding the current levels of production, based on his own work for the World Bank and other studies. To this end, he considers the political and economic context of Indonesia's energy resources; the development of oil production; the domestic energy scene; natural gas; other alternatives to oil; the organization of the energy industry and of Pertamina, the state oil and gas industry, and the relationship with OPEC. He

concludes with a chapter on Indonesia's future position as a producer, as a consumer, and as an exporter of energy.

A paramount conclusion regarding the expansion of the production of oil, gas and coal is that foreign investment is badly needed in all sectors. Yet, the attitude of the Indonesian state and its oil policy seem to frighten potential investors away. Barnes shows in detail that this is not a new phenomenon. Over the post-war period, Indonesia has not succeeded in attracting substantial foreign investments for operations in new areas—not to mention domestic finance. Indeed, the bulk of production (45%) still comes from the Minas and Duri fields, operated by the long established Caltex Pacific. The message is that, if the Indonesian government wishes to attract sufficient foreign investments for the further development of its oil and gas industry, it must secure the international business' perception of Indonesia as a stable country with a sound and expanding economy.

The book, according to its title, promises an analysis in *political economy*. Therefore, we would like to have been introduced to, first, the author's notion of political economy, and, secondly, the structure of the book. An introductory chapter would have allowed Barnes to suggest how economics and politics are linked in the Indonesian energy sector. Then, the analysis could have shown the consequences thereof for the development of the country's resource base and domestic demand, given the evolution of international oil and energy markets, the economic position of Indonesia in the region and internal shifts in the government's power base. As statements about the institutional structure of the energy sector are deferred to the end of the book, we cannot fully appreciate the references to specific actions of the authorities and developments in energy policy in earlier chapters. Indeed, the context is still missing.

For example, almost every chapter refers to the crucial control of Pertamina over all up- and down-stream activities, despite its low contribution to actual production. It is not until the last chapter, however, that we are informed about the specific relationship between Pertamina and the state, the politics and patronage involved and shifts in the general policy orientation of the Indonesian governments. This information does not really emerge from the preceding analysis—it is new. Placed in an introductory chapter, an outline of the institutional framework could have contributed to a vital background, putting Barnes' further analysis of the Indonesian energy market in an adequate context and structure. Most likely, such an approach would have eliminated the—apparently necessary—repetitions in the current approach and also the sometimes ambiguous evaluations and interpretations of developments.

To conclude, Barnes' book is published by Oxford University Press in a series, *The Political Economy of Oil-Exporting Countries*, together with volumes on Nigeria and Venezuela and hopefully more OPEC-members. The

application of a common framework for analysis in these studies would have yielded a valuable collection of comparable studies on highly important issues, such as the manner in which the oil policy of the several individual countries responds to developments in national and international oil and energy markets, and how this affects production, the relation between the fact that a country exports oil or gas and the manner in which it is governed, the future of OPEC, etc. Now such a framework is lacking, so the book only gives a great deal of loosely organized information about energy economics and policy in Indonesia, without providing sound explanations for what is happening.

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China's Energy Strategy: Economic Structure, Technological Choices, and Energy Consumption by XIANNUAN LIO (Praeger Publishers, 1996), 224 pages, ISBN: 0-275-95306-8.

This study examines the decline of energy intensity in China's economy during 1980s—a somewhat narrower subject that the title would suggest. It will be of interest to students of energy developments in China; those concerned with the relationship between energy and economic and social development in the developing world; and followers of global energy and environmental trends, in which China plays a large and growing role.

The energy intensity of the Chinese economy climbed steadily from the 1950s to the 1970s in line with the experience of other countries undergoing rapid industrialization, urbanization, and structural transformation. In the 1980s, however, China's energy intensity declined sharply and consistently, by about 4 percent annually. This fall runs contrary to expected and well established trends experienced during the development process. Investigation of this unexpected development may therefore contain lessons for other developing countries otherwise resigned to a continuing rapid increase in energy consumption. Perhaps they, too, could follow China's example, and modify the rate of increase in energy consumption while still enjoying rapid economic growth.

The present study examines this decline in China's energy intensity by means of a structural decomposition analysis (SDA) based on input output tables for 1981 and 1987. This analysis aims at identifying how much of the decline

in the energy intensity between the two years was due to changes in the structure of final demand (towards less energy intensive purchases), or to changes in production technology (a decline in the amount of energy used in producing the range of goods and services purchased). The structure of the model is described with exemplary clarity. The author is careful to identify the limitations as well as the strengths of the input output approach. He recognizes important data constraints, especially those which limit the analysis to (a highly aggregated) 18 production sectors. The SDA is supplemented by an excellent case study of experience in China's iron and steel industry over the same period. The author uses his wide knowledge of economic and policy developments in China to interpret the significance of his results.

Despite the complexity of the analysis, its results can be simply stated. Virtually all of the substantial reduction in the energy intensity of the Chinese economy between 1981 and 1987 was due to changes in production technology, or more specifically, improvements in the efficiency with which energy was used in the productive process. Changes in the structure of final demand had very little impact on China's declining energy intensity. To put it another way: if the structure of final demand and production technology had remained unchanged from 1981 to 1987, China's energy consumption, driven by the needs of a rapidly growing economy, would have risen by 515 million tons standard coal equivalent (tsce). As it was, a large energy saving improvement in production technology (224 million tsce), together with a very much smaller (28 million tsce) energy saving change in the structure of final demand, held down the actual growth in consumption to 263 million tsce.

As the author recognizes, his finding that the decline in the economywide energy intensity was due almost entirely to improvements in energy efficiency, differs substantially from the generally accepted view that the decline also owed much to the changing structure of China's industrial output in an energy saving direction—a factor which pre-supposes parallel changes in the structure of final demand. Further discussion of these differences in findings would have been much appreciated. One possible explanation lies in the distinction between "structure" and "efficiency."[1] Thus, the SDA classifies "changes in the types and quality of goods and services produced" within an industry as a production technology or "efficiency" effect. But major shifts within the aggregate category "light industry" (perhaps from the production of clunky bicycles for the domestic market to teddy bears for export) might more appropriately be viewed as a "structural" rather than an "efficiency" effect.

1. In examining these possibilities, two typos came to light. In Table 4.11 the 1981 entry for heavy industry should be 33572 and not 72. Towards the bottom of page 131, data on percentage distribution of furnace capacity in crude steel production is incorrect, though correctly reported in Table 6.12.

This is more than a definitional quibble, as it has implications for policy. The author attributes what he sees as a massive improvement in efficiency to three factors—economic reform which led to improved productivity and efficiency throughout the economy including the use of energy; strong and successful energy conservation programs; and-with some reservations-higher energy prices. Most observers would wholeheartedly agree with the first factor. However, the strength of the endorsement of the energy conservation programs will depend on the extent of efficiency gains. So long as these are in doubt, it is difficult to arrive at a final judgment on their effectiveness, especially as the efficiency improvements may have bottomed out in recent years.

The author finds that the impact of the energy price increases that took place in the years covered by his study was limited due to the small share of energy in total production cost. However, while prices were certainly liberalized over this period—a table showing the extent of price rises would have been useful—they still remained on average well below free market levels. To this extent, the full impact of higher energy prices on the efficiency of energy use has not been tested. Finally part of the decline in energy intensities in the 1980s may have been due to the exceptionally rapid increase in intensities in previous decades. Perhaps they had nowhere else to go but down!

The author in his clear and informed analysis has made a major contribution to our understanding of developments in China's energy sector and opened up many new possibilities for additional investigation.

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The Genie out of the Bottle: World Oil since 1970, by M.A. ADELMAN (MIT Press: Cambridge, MA, 1995), 350 pages.

Professor Adelman's latest book is an ambitious and dauntingly scholarly attempt to analyse events in the oil markets in terms of the economic forces that drive prices. It is fair to infer that, as well as providing description and analysis of the oil industry over the past quarter-century, his intention is to demonstrate that the methodology of economics, rigorously applied, will provide complete understanding even of political events. If successful, we are to conclude that nothing more is, or should be, needed.

It is a bracing and necessary—in Adelman's hands, even exhilarating —discipline and removes the dross (the savvy rumours of insiders and bamboozlement of experts) that surrounds events in this highly-politicised business. Reductive analysis gets bad press in an age of holism although it is the most successful research stratagem ever devised. It has certainly worked for the exact sciences, but can it work as well for economics?

It might have been better to have said above that it is "a necessary preliminary discipline." The thesis of this review is that economics will take us a great distance but can only ever provide a partial explanation of events, setting bounds to probability rather than providing us with a detailed and definitive map. But first, a health warning: this reviewer is neither an American nor a professional economist, although he would claim to be well-acquainted with the events covered and with much of the literature describing it. This detachment from Adelman's core preoccupations will probably give the review a dissident spin. Things can look different to a non-American non-economist.

The book has been kept quite short because the underlying economic assumptions have already been fully spelled out in a recent collection of Adelman's essays *The Economics of Petroleum Supply* (MIT Press 1993). This leaves him free to concentrate on the narrative. After a brief *tour d'horizon*, we are earthed with a 30-page summary of the key economic principles "needed to understand [the world oil market] *and especially how not to see what is not there.*" [Italics mine]. These take the form of statements of economic principle, aphorisms of some density and great authority, that provide the basis for the analysis that follows. The key concept, for which he is famous and to which he reverts several times, is: "Increasing global oil scarcity is an illusion based on the unexamined assumption of a fixed stock and of some value unrelated to investment." (p.27). Another key concept concerns the interventions of producer governments that "discount oil revenues at a much higher rate than do private companies. They have short time horizons." (p.33). All of this is in an area that Adelman has made his own. There can be few if any readers of this journal who do not have at least a nodding acquaintance with his ideas.

The scope of the book is described in the Introduction: "The narrative theme of chapters 3 through 8 is how the owners of most of the world's oil resources have restrained production from an abundant oil supply to raise the price. To restrain production, they must first restrain each other." Hence, "The oil price explosions were unrelated to scarcity and entirely due to the cartel." (p.329). Other themes are discernible, and we shall come to them. The six chapter headings give the structure of the narrative, starting with "The World Oil Market to 1970," moving through "Price Reversal" and "Price Breakout" (i.e., the 1973 crisis) to "OPEC at High Noon" and "The Cartel in Retreat," ending with "Stagnation after 1986." Rarely if ever can an industry of such importance and technical (though not social or political) skills have been

bounced through changes of such magnitude as Adelman describes. It has gone from a long period of oligopolistic control (albeit slackening at the end), through a brief period of cartel hegemony to the present competitive volatility. A triumph of free markets? Not really, because the process has been bedeviled by the unreal spectre of scarcity, Adelman says, leading governments into self-damaging policies. Another of his themes is the willful blindness of the US State Department.

Adelman's refusal to be diverted from attention to documented fact is bracing, although he is also explicit about the lack of information in the industry. He is dismissive of the role and substantive value of the rumours that continually swirl around oil markets, tangling the trade like Laocoon's serpents. Not much gets away from his scrutiny and the book should serve as a warning to policy-makers about their eagerness to grasp any floating theory that serves their current purposes. One example is the surge of optimism around the consensus, crystallising at the turn of the year (1989/90), that OPEC would soon be back in the driving seat. An industry expert "calculated that without a large expansion at the Gulf, oil would be in short supply by 1992, since non-OPEC production would decline and demand was still growing." (p.279). The chairman of BP predicted oil shortages by 1993 or 1994. The producers loved the new consensus and a surprising number of companies also emerged in favour of high prices. A very senior oil company manager told me on returning from a meeting of the Oxford Energy Club at around the same time, "I have just witnessed a change in paradigm," which, given his company's position, turned out to be more an expression of hope than of sober analysis. In the event, non-OPEC production has not declined, and continues to absorb much of any growth in demand.

Adelman's conclusions are distilled into the four pages of chapter 9. Prices are still, and will remain, unstable because "well above the competitive level and far below the monopoly level," a very large space in which to float. But OPEC has been and will remain a successful price guardian. In part this is because consumer governments remain affrighted by "the glow on the horizon" from the abiding myth of scarcity. (It requires some self-restraint not to quote him more often for he is sharp and often funny in his comments, as when he says of one consultancy's egregious forecasts that, "These numbers are not even wrong. They have no meaning"). He thinks "the odds are that non-OPEC output of both oil and gas will keep growing"—investment remains so profitable—and says, "I expect the cartel to be under increasing strain," perhaps even breaking down. [Dream on]. The main obstacle to an efficient industry, and efficient markets, remains the interventions of governments.

His objectives and policy recommendations would surprise no-one familiar with his writings over the period covered by the book. "The political benefits of a lower oil price might be much greater than the economic....The

smaller the oil revenues are, the less is the chance of aggression.... [The producing governments] are undemocratic, and there is no change of regime except by violence or conspiracy....The less hard currency there is in such hands, the better off is the rest of the world." He has mellowed: "[The cartel] has existed for years, and is composed of sovereign states with which the United States wants orderly and correct relations." In the end, the correct policy is "...do no harm. Do not make things worse." which means not intervening in domestic markets and, "Make no agreement with the cartel or any of its members." However, "If some useful measure has the incidental effect of damaging the cartel, so much the better," although "The United States must protect the Persian Gulf nations from invasion or aggression," even when it can expect no thanks. The best of all worlds would be for the cartel to disappear.

If this were a world where consumers need only concern themselves with their own needs, it would be hard to fault his conclusions. They would, in effect, lead back to the golden age of oil major hegemony. The world is more complicated.

There are other themes in the analysis. The 1990 consensus on impending price rises was a blip in the curve, generating more amusement than damage. Far more serious—in Adelman's view, fatally serious—were the consequences of the State Department's stubborn adherence to the myth of scarcity. To cast the most favourable light on it (there are more sinister interpretations), this belief lay behind State's policy of forging special relationships with producers, particularly Saudi Arabia, and led to conflict with the policies of the Executive on support for Israel. Adelman is unsparing in his criticism of this development, repeatedly referring to the unseemly paradox of the most powerful country in the world "grovelling" and "kow-towing" to the weak producers of the Gulf. He is withering in his scorn for the US "special relationship" with Saudi, repeatedly pointing to the lack of any countervailing benefit. It is here that this reviewer must, with a deeply respectful bow in the author's direction, part company with him. Adelman does not acknowledge the inhibiting effect on US policy of lip-service to anti-colonialism. These days, owners of crude must be treated with at least the appearance of respect if you want access, however powerful you are. Gunboats are out. Moreover, scarcity was only one consideration driving State Department policy. Denying access to the Evil Empire was at least as important as securing it for the US. OPEC had to be supported.

There appears to be something acutely distasteful to Adelman in the spectacle of the US government embroiling itself in the affairs of the producers (particularly, it seems, Arab producers), with special deals, trade and political support. He is probably right that this compliant policy had the effect of strengthening them at a crucial moment, and he is uniquely in a position to say that it was not necessary in terms of securing strategic access to scarce resources since he has a record of consistency in attacking the "finite resources" case. But,

even if scarcity was the dominant consideration, Adelman's advice would never have been taken. It is not remotely feasible to suggest that any government of a consuming oil-importing nation could have folded their arms and sat back to let the market elicit supplies and allocate them in any of the oil crises—let alone the US government, with its surrogates (the Aramco companies) already in a position of control in the world's most important producer. How would the political bosses, the people's representatives, have explained themselves to the electorate "as gas lines lengthened?" Would they have counselled patience to the angry car-driving voters? As a policy option, the prospect is hardly worth discussion.

The problems in this analysis are numerous, but we shall concentrate on two of them. First, rationality *per se* is not exhausted by economic analysis. There are many rationalities and, depending where power is to be found, any of them may become dominant at a particular time. The finite resources case is one such, a commonsense view of oil supplies that even Adelman has implicit recourse to in using the geological concept of reserves-production ratios. As a Mr. Micawber (another commonsense figure) of the oilfields might say, "Reserves of *R* and production of *P* means *R/P* years of supply." This is the way people intuitively think and politicians are people, not economists. It may be argued that politicians should listen more closely to their technical advisers. However, when the advisers violently disagree and when the best advice on offer (seen retrospectively) is so profoundly counter-intuitive, the risks of taking it may reasonably seem much higher than those of following instinct—which had plenty of intelligent support at the time.

In the event, reserves were created by investment and new producers entered the market, but would the most prescient Secretary of State have been sure enough in the early 1970s, when the policy damage was being done (in Adelman's view), to have left the US exposed? Many of the scientific and technical changes that have generated the additions to reserves were barely discernible and many more were still to come. Whatever the general considerations, economists were not to know about 3-D seismic, horizontal drilling and what the new and unifying geological theory of plate tectonics would imply for resources. Support for Adelman's point of view was pretty sparse at the time, not least from the companies—themselves not notably short of focussed and intelligent thinkers. I worked with some of them, in the planning department of a major oil company in 1972, on the preparation of a paper intended for the highest levels of oil importing governments to warn them of the risks of heavy reliance on imports from OPEC. The dangers of the cartel were clearly seen. The risk of scarcity was assumed to be part of the argument.

A subset of the "multiple rationalities" problem concerns national sovereignty, and the use of power. An analyst should assume that rational players will *always* act in their own interests, and that these are usually

short-term—in the democratic West no less than the feudal Middle East. Adelman more than once quotes a comment made in 1938 by IPC's General Manager: "The future leaves them cold; they want the money now." Add votes and it sounds like the average parliamentarian. Among the initial considerations of State Department bureaucrats when forging a special relationship with the Saudis may have been less the economic benefits than concerns about the USSR. Deplorable perhaps, but thinking in such terms was what they were paid to do.

The interests of the producers are driven by revenue maximisation; the interests of consumers by secure access at an affordable price. All governments take an interest in such important matters; they make deals in pursuit of national objectives; and break them when it suits. Adelman repeatedly tolls the bell of broken promises, ending "The record of broken agreements in this book is dismal and long." (p.329). Well, yes, and how regrettable; and is it not exactly what might be expected from all governments in realpolitik? I wrote a multiclient study on the subject of government-to-government deals in 1982, analysing what was at the time a completely new development: consumer governments were seeking direct access, and offering all sorts of political goods in exchange for secure oil. But the report was redundant almost before being submitted because the consumers dumped the deals as soon as they became costly and unnecessary. Actions taken in the national interest are always moral, however dishonorable. It was ever thus.

Companies are rational actors too, probably the most rational on the block. Adelman makes much of the way in which producers ratcheted up prices in the first two price shocks and he is perceptive on the mechanisms used, but he does not discuss the part the companies played. If it had not been for their willingness to remain in place after the nationalisations of 1974, in pursuit of the chimera of "owned crude" or a surrogate thereof, it is quite possible that OPEC's price ratchet would not have worked. In discussing the 1979 price rises, Adelman does not mention that BP's decision to declare *force majeure* on some third party sales contracts following expropriation in Nigeria and Iran triggered Exxon into announcing in March 1979 it was withdrawing from long-terms third-party sales. This in turn was a major contribution to the determination—rising to a pitch of hysteria—of many refiners, Japanese leading, to buy crude directly. All were rational company decisions and soon the marketing departments of every crude exporter had rows of suits in the outer office, brief-cases in lap (some of them stuffed with money), begging for the opportunity to offer high prices for secure supplies of crude. But to Adelman the whole episode was simpler: another case of producer squeezing, "...the Saudis' renewed squeeze on output made prices surge even more in May than in January and February..." (p.173). True, but not the only truth. The marketing managers were not to be blamed for drawing the conclusion that they were in a sellers' market. They were, and they charged accordingly.

It is now a matter of faith that there was only a "perceived" not a "real" shortage in 1979, which brings us to the second main problem: information (and hindsight). At several points, Adelman refers to the poor quality of information available to the industry for analysing the market—incomplete, inaccurate and late—but it does not lead him to the obvious conclusion: decisions are taken in the light of information available and, for these purposes, perception is reality. Writing from a distance in time, Adelman is able to see where people were misled but only on the strength of information which was not available at the time. It is useful to have these late corrections, but it would have been much better to have had good information. For this the companies' own policies are to blame: efficiency is the enemy of trading margins; poor physical data and unverifiable price reports are the stuff of traders' dreams. Again, perfectly rational but lamentably short-sighted.

The result of poor information is that a number of incompatible theories can coexist within the same information framework. Which one dominates can be no more than a matter of personal choice, leading to alarming instability. Manifested in companies' inventory management policies, this perceptual instability is a source of volatility in the markets. It helps understanding to know who is paying the bills, and as any student of religion knows, all theories can be fitted to a random data series (and vice versa).

Adelman's own use of sources is often puzzling although, as might be expected, methodologically meticulous. Every fact is docketed, at times to a point that is not helpful. Did he really need to cite the *New York Times* for an unexceptionable statement like "Libya remains [Italy's] biggest supplier of crude oil"? (p.241). "Decades of inaction brought energy gap" (p.122—also from the *NYT*) distinguishes an expression of opinion rather than usefully taking the reader to a source of information. There are many other examples that clog the narrative. In fact, the sources are mostly journalistic. No harm in that, Adelman's own assessments and opinions, based on decades of research and analysis, are more worth hearing than those of yesterday's reporters. It is noticeable that there are very few references to *Middle East Economic Survey*, which would have helped in the political analysis, nor to *Weekly Petroleum Argus*, which would have helped with the markets.

To conclude with an answer to the question asked at the beginning of this review, economic rationality cannot be enough to describe complex changes. It takes us a large part of the way—sets bounds to probability—but to exclude considerations of other rationalities, the pursuit of power, sovereignty and national self-interest as well as the effects of imperfect information and domestic political realities not to mention the caprice of scientific discovery and technical breakthrough leaves the bounded area too large for its intended purpose. Adelman provides us with a bracing corrective to the often sloppy and self-regarding (not to say dishonest) explanations offered by other experts. But

the assumptions of perfect information and economic rationality needed at the start if the enterprise is to be launched are enough to scupper it.

Two last points: it is understandable that Adelman does no more than mention the role of corruption in passing, but it is a major imperfection—enough by itself to vitiate many of the assumptions underlying economic analysis. Second, although his theme is that the "oil price explosions were....entirely due to the cartel," he does not explain how prices were kept so high before the cartel was effective. Returns of more than 100 percent on capital invested are not usual in a free market. There was a good deal more continuity between oligopoly and cartel (and now) than he appears to concede, and it could have been usefully addressed. We have reason to be grateful for this rigorous, meticulous book but it cannot be the last word.

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