
NATURAL RESOURCES JOURNAL

Volume 22
Issue 2 *Spring 1982*

Spring 1982

Imperfect Competition in the World Oil Market: A Computerized Nash-Cournot Model, Stephen W. Salant and The Impact of Oil Import Price Shocks on Domestic Prices, Robert A. Feldman

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IMPERFECT COMPETITION IN THE WORLD OIL MARKET: A COMPUTERIZED NASH-COURNOT MODEL

STEPHEN W. SALANT
Lexington, Mass. and Toronto, Lexington Books, 1982. Pp. 170 + xx

THE IMPACT OF OIL IMPORT PRICE SHOCKS ON DOMESTIC PRICES

ROBERT A. FELDMAN
Boulder, Westview Press, 1982. Pp. 189 + xiii

These two books are aptly reviewed together: they have a great deal in common. Both are concerned with a problem relating to the world oil market and pricing by OPEC. Both are relatively short monographs, with most of their space given to technical details of model construction and results. Both are addressed to the professional economist or advanced economics student with extensive quantitative training. The first forecasts rising real oil prices through the year 2050; the second estimates the effects of the sharp rise in oil prices of 1973–74 on the product prices of numerous industries in the United States.

The sub-title of the first book, by Salant, is most important. The book is not concerned with whether there is imperfect competition in the world oil market, but rather with the properties and output of a model, based on game-theoretic principles, that can properly deal with imperfect competition. Chapter 1 consists of a short overview of the model. Chapter 2 reports the results of hypothetical forecasts of the model and estimates of sensitivity of results to changes in assumptions regarding market structure, interest rates, demand elasticities and other parameters. Chapters 3 and 4, which together with their appendices make up the bulk of the book, provide highly technical discussions of the conditions that must be satisfied simultaneously in forecasts by the model and of the computer strategy used to solve the system of conditions. Chapter 5 is concerned with limitations and possible extensions of the model. There is a lucid and sympathetic foreword written by Darius Gaskins.

A major contribution of the book lies in its treatment of the standard assumption that firms attempt to maximize profits. First, it is explicitly recognized that the profit opportunities of the imperfectly competitive firm are affected by the current decisions of other firms as well as by future market conditions. Second, agents are assumed to have some degree of foresight and to respond to such diverse prospects as expropriation

or a quadrupling of oil prices. The first point is generally recognized in the profession, but debate exists over how noncompetitive firms forecast the initiating and responsive behavior of rival firms. The second point is significant in view of the fact, pointed out by the author, that numerous contributors to the literature assume no foresight whatsoever.

For purposes of forecasting the trajectory of future oil prices, Salant assumes a base case in which key parameters include 0.75 income elasticity of demand, −0.5 price elasticity of demand, 2.0 percent annual demand growth, 1,306 billion barrel-equivalent of oil and gas resources and a 2.0 percent real after-tax riskless rate of interest. In the base case the world oil price is projected to rise from about $22 per barrel (1979 dollars) in 1980 to slightly more than $50 per barrel (1979 dollars) in 2050. In comparison with the base case, the assumption of full monopoly in the world market raises the world price through 2030 and lowers it slightly thereafter. The assumption of lower price elasticity predictably raises the world price throughout the period. A lower interest rate raises prices through 2020 as it encourages a shift of production from "present" to "future." Finally, the assumption of the unavailability of heavy oil resources raises the world price throughout the period, as one would expect. In short the model predicts in a qualitative sense what standard economic theory predicts. In this, it passes a major test.

Gaskins observes (p. xvi) that "the model tends to underpredict the oil-price path observed since 1973, suggesting that it fails to capture or characterize accurately all of the behavioral attributes of the producing entities." Nonetheless, he concludes, the model "fares well" under the tests of capturing "enough of the significant attributes of the market to make workably accurate estimates" and permitting "the systematic investigation of significant variables."

The second book, by Feldman, investigates the effect on individual product prices of the oil shock of 1973–74, using the input-output scheme of relationships among industries. This scheme enables him to trace out indirect as well as direct effects on supply and demand in the affected industries. After a brief introduction in Chapter 1, Chapter 2 provides a technical discussion of the analytical framework, the fixed-coefficient input-output technology. Chapter 3 gives a compilation of estimated domestic price effects, using the fixed-coefficient model. Chapter 4 enlarges the analytical framework to allow for interfuel substitution; and Chapter 5 reports the price effects estimated in the expanded framework. Chapter 6 is the concluding chapter.

The domestic price effects are given in terms of percentage changes under six different basic assumptions. Two of these have to do with macro policy assumed, "macro 1" assuming that domestic spending remains constant and "macro 2" assuming that domestic output is held constant.

"Natural gas 1" assumes no change in the price of natural gas, while "natural gas 2" assumes price change proportional to imported oil price change. The assumptions "finite" and "infinite" refer to domestic supply elasticities. Effects are also reported with and without price controls.

The results indicate that most domestic prices rose as a consequence of the oil shock. In general, the increases were larger when output was assumed held constant (macro 2), when domestic supply elasticities were assumed finite, and when gas prices were assumed to rise with oil prices. There were some surprises, however, resulting from indirect effects, including exchange rate effects in the international sector. One significant surprise was how little price controls held down price increases.

Also surprising was the fact that interfuel substitution had little effect in holding down prices on average, although it did affect the distribution of price changes among industries. These results suggest highly inelastic short-run supplies of substitute fuels and great variation among industries of substitution opportunities.

This reviewer was bothered by the author's failure to reconcile his results with standard macro and micro theory. The letter says that, from one equilibrium to another, a rise in oil prices should have altered *relative* prices, but not the general price level so long as aggregate spending remains constant. Feldman's results show considerable change in relative prices, but they also suggest a rise in the general price level even when aggregate spending is held constant (macro 1). This result is consistent with a temporary fall in aggregate output, but it is not a result that one would expect to appear in a new equilibrium. Which raises the question, how long a time is assumed to elapse between the oil shock and Feldman's results? Are we assuming a period of time long enough to restore general equilibrium? Do the results reflect short-run disequilibrium?

Despite these doubts and questions, it is clear that Feldman has made an important contribution to our understanding of the relative price effects of the oil shock of 1973–74. Particularly through his tracing out indirect effects, including those in the international sector, he has revealed the complexity of those effects and suggested the host of adjustments in output and resource employment associated with them. He has indicated some of the valuable things that can be done using input-output technology.

Both of these are significant books reflecting advanced analytical work. They are specialized, technical books, however, and not for the general reader.

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