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## Announcements

The Benelux Association of Energy Economists, with the support of the Energy Directorate of the European Economic Commission, will hold a regional conference on "Gas and Electricity Markets in Europe: Practices and Policies." This conference will take place at the E.E.C. Conference Centre in Luxembourg, September 22-25, 1985. The Program Chairman will be Professor Peter R. Odell of The Rotterdam Centre for International Energy Studies, Erasmus University, Postbus 1738, 3000 DR Rotterdam, The Netherlands. Details concerning arrangements are available from The Secretariat, B.A.E.E., Benelux Secretariaat General, Regentshapsstraat 39, B-1000, Brussels, Belgium.

The International Association of Energy Economists will hold its Seventh Annual North American Conference in Philadelphia, Pennsylvania, December 10-13, 1985. The topic of the conference will be "World Energy Markets: Stability or Continued Cycle?"

The International Association of Energy Economists' Eighth Annual International Meeting will take place at the Keidanven Kaika in Tokyo, Japan, June 5-7, 1986. For further information, contact Joan W. Cassedy, I.A.E.E., 1133 15th Street, N.W., Suite 620, Washington, DC 20005.

The IAEE Council has tentatively decided on the following sites for future meetings: Fall 1986 North American Meeting—Boston; Spring 1987—Calgary.

To better serve the interests of its worldwide readership, *The Energy Journal* solicits suitable manuscripts from authors around the world. Papers with a non-North American focus will be given particular consideration. They should be of the highest professional quality, clearly written, and not excessively technical. Three double-spaced copies of each manuscript must be submitted.

We remind potential authors that manuscripts submitted to *The Energy Journal* must be accompanied by a check (made payable to the IAEE) for \$25.00. Jointly written papers do not require checks for each author. Submission fees may be waived (especially for overseas contributions) at the discretion of the Editor.



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## Editor's Introduction

This volume begins with “Energy Taxes and Optimal Tax Theory” by Michael J. Boskin and Marc S. Robinson. It concludes with “Tax Issues in Petroleum Industry Reorganization” by E. Allen Jacobs and Stephen T. Limberg. These are two solid bookends between which twenty-two other excellent papers are gathered. The papers are about evenly split between those that focus on U.S. energy taxation and those that focus on energy tax issues in other countries or that address general questions of energy taxation.

Section I examines the critical aspects of national tax policies for the United States (Boskin and Robinson; Sweeney and Boskin); Canada (Watkins and Scarfe); Australia (Bradley); the Federal Republic of Germany (Luhmann); developing countries that hope to become oil-exporting countries (Blitzer, Cavoulacos, Lessard, and Paddock); and oil-importing countries in general (Mork). Throughout this volume the principal focus is unabashedly on oil, although certain of the papers — and all of the principles of standard economic analysis — extend to natural gas, coal, and other fuels as well.

Boskin and Robinson use the framework of optimal tax theory, together with accumulated evidence on empirically estimable parameters, to show that the simplistic case for heavy taxation of energy is clearly overstated. Watkins and Scarfe review Canadian oil and gas taxation and the interrelationships between the federal and provincial roles. For those who believe the hallmark of solid economic analysis is the ability to predict, special attention is called to the section entitled *New Policy Directions* in the Watkins and Scarfe article. Bradley examines the analytical and practical dimensions of the current Australian consideration of a resource rent tax. His careful, concise, and evenhanded analysis sets the tone for an important theme of this volume: because rents are so hard to identify, efficient energy taxation is easier in theory than in practice. Luhmann reviews the history of taxation in Europe to place current energy tax structures in a social and economic context. He concludes that an elastic response to higher taxes on energy use or on pollution of the environment is a special kind of inefficiency because it takes the form of reduced energy use or reduced pollution.

Blitzer, Cavoulacos, Lessard, and Paddock argue that the concentration of oil and gas exploration in developed non-OPEC countries is due in part to the fiscal and financial impediments in developing non-OPEC countries. They conclude that recognition of this in the contracting process may allow for more efficient allocation of risks and increases in exploration and development activity in oil-importing LDCs. All oil-importing nations, however, face macroeconomic

adjustment problems when the price of oil fluctuates due to supply disruptions. Adjustment problems are greater when oil imports are more important and world supplies are more variable. Mork argues that western economies should use tax instruments as a partial shield against the shock effects of oil supply disruptions.

Sweeney and Boskin rely upon a well-developed body of data and modeling approaches to analyze the effects on a national economy when it increases tax rates on the energy sector and subsequently faces a supply disruption. The specific example they consider is the U.S. economy and the original, early-1985 tax proposals of the U.S. Treasury Department. But the structure of their analysis is applicable to any market economy and to any set of proposed tax policy changes. Under the circumstances they examine, Sweeney and Boskin find that increases in taxes on energy production — followed by oil supply disruptions — lead to higher oil prices and to more severe economic consequences than would otherwise have been the case.

As with any classification system, there are arbitrary judgments at the boundaries. For example, Section 2 examines the issues of taxation affecting oil and gas operations in the North Sea (Kemp and Rose; Stauffer and Gault; Flam and Olsen). These papers could just as easily have been included under the general heading of national tax policies, but the North Sea is such an important new area with its own idiosyncratic tax regimes that these three papers stand alone. The North Sea is of particular interest. It is a large, new play in the context of mature economies with well-established legal and general fiscal regimes. It also has geological diversity in a hostile physical environment. This situation is a recipe for a vexedly wide variation in unit costs. Difficult tax policy questions are made from such real world vexations — whether they be in the North Sea, the United States, or in a country whose geology is still classified as rank wildcat.

Kemp and Rose have performed an imaginative comparative survey of the effects of petroleum taxation in all four North Sea petroleum-producing countries. Integrating field size and financial models allows them to focus on the degree to which the regressivity of tax regimes varies by field size across countries. In many higher-cost instances, they find that the real present value of government take may exceed 100 percent of the present value of the resources generated. They conclude that the severe regressivity in the structural design of existing tax systems is so imperfect that further modifications will have to be made in response to changing conditions. Stauffer and Gault present an ingenious numerical model that focuses on an important aspect of the same problem: to what extent do tax regimes, the distribution of field sizes, operating costs, and companies' risk perceptions interact to distort exploration and development decisions to the mutual disadvantage of countries and operators? They conclude that it is generally possible to play a positive-sum game that improves existing tax regimes from the standpoints of countries and private operators. Flam and Olsen further develop the analysis of taxation in the North Sea with a tightly reasoned analysis concentrating specifically on the Norwegian tax regime. They focus on the feature of the Norwegian tax structure that requires foreign firms

to carry the Norwegian government through the exploration campaign. They conclude that this Norwegian tax feature discriminates against prospects having high exploration costs, relatively short processing periods, and/or uncertain reserves.

Section 3 addresses effective tax rates in the United States. Two fine papers (Gravelle; Fry) illustrate the divergence in results occurring when different but equally competent analysts focus on different aspects of a common problem. Gravelle uses a well-established approach that incorporates the effects of the Windfall Profits Tax under the assumption that oil prices rise at the inflation rate. However, she does not explicitly include state severance taxes. Gravelle concludes that there are differences in effective federal tax rates for independent producers and integrated corporations. She also concludes that independent producers may face negative effective tax rates, but that integrated corporations are taxed at effective rates that are about the same as those for other investments in other than oil and gas equipment (although considerably below the effective rates applying to structures). These results rely on the application of historical ratios based on data used to set regulated natural gas prices and data on the use of capital assets by industry from the national income and product accounts. Fry explicitly includes the interaction between capital taxes and excise taxes such as severance taxes. He also assumes that real oil prices are approximately constant but abstracts from consideration of the Windfall Profits Tax. Relying upon the well-known concept of excess burden, Fry concludes that oil industry capital taxes are sufficiently more distortionary than had been previously believed. Thus, the marginal excess burden relative to marginal tax revenue for the U.S. oil industry exceeds that for a typical U.S. industry. Fry also concludes that it is possible — given plausible parameter values — for an increase in the capital tax rate in the oil industry to decrease total tax revenue.

The U.S. Windfall Profits Tax (WPT) itself is examined in Section 4 (Jorgenson and Slesnick; Blankenship and Weimer). The WPT is a complicated version of an ad valorem federal severance tax. It is widely agreed that the WPT was a political necessity in the United States at the time of crude oil price decontrol. Jorgenson and Slesnick use a measure of social welfare that can be decomposed into money measures of efficiency and equity. Blankenship and Weimer apply a standard analytical framework to actual production statistics and engineering data from a specific site to examine the social and fiscal efficiency of the WPT. Each set of authors shows that a WPT rate of zero would now be the most efficient policy. Jorgenson and Slesnick also show that, in general, efficiency effects dominate equity effects.

State levies are the more usual form of severance taxes. Section 5 is a tour of the severance tax horizon. In Morgan and Mutti the subject of differential severance taxes as a means for interregional energy tax exportation is surveyed. Lohrenz and Pederson then examine the distinct economic incentive effects of severance taxes as they impact upon searchable versus developable versus producible oil and gas prospects. Complicated economic rent collection arrangements in the context of U.S. coal production are described and critically

analyzed by Gordon. The general incidence of any increases in a particular state or country's severance taxes are reviewed in the context of the world oil market (Danielson and Cartwright).

Morgan and Mutti conclude that important interactions may occur between state and local severance taxes and federal tax liabilities, particularly when energy products are purchased as intermediate fuels. Lohrenz and Pederson caution taxing authorities that raising severance taxes on oil or gas that was economically producible yesterday may severely chill today's search for resources that otherwise would be developable tomorrow. Gordon notes that the traditional case for rent collection rests on unworkable assumptions regarding the feasibility of identifying and taxing economic rents. He therefore concludes that U.S. experience with coal taxation must be taken as an example in the case for tax simplification. Given conditions in world oil markets, Danielson and Cartwright show that the most likely short-run response to an increased severance tax is a tax-induced reduction in non-OPEC production and a consequent increase in the residual demand for OPEC oil at constant nominal prices. The incidence of an increase in severance taxes initially would fall entirely on non-OPEC oil resource owners and on owners of capital and labor inputs that are specialized in oil production. In the longer run, the withdrawal of resources from oil production outside OPEC would increase OPEC latitude for future price increases.

In Section 6 tax policy and natural gas regulation effects for operations on the U.S. Gulf of Mexico Outer Continental Shelf (OCS) are analyzed (Mead and Muraoka; Jacoby and Smith). The OCS is now a very significant source of U.S. oil and gas production and will be even more important in the future. Mead and Muraoka review the preferential tax treatment given the U.S. oil and gas industry prior to 1969 and contrast it to the nonpreferential treatment since 1969. Then, using the DCF model identified with Mead and his associates, they examine the impact of potential tax changes to determine that tax increases will reduce OCS supplies, while tax reductions will increase OCS supplies. Jacoby and Smith integrate geological, engineering, and economic aspects of gas field development into a simulation framework that clearly shows that any reimposition of binding ceiling price regulation for natural gas would have serious adverse effects upon OCS supplies of new gas. Their analysis also shows that a Windfall Profits Tax for gas similar to that levied on oil would cause significant distortion in development and production decisions for natural gas.

In Section 7 unitary taxation is evaluated (Conrad; Johnston and Reynolds). These papers focus on unitary taxation as an American phenomenon, but the effects of such unitary taxation are worldwide. A simple statement of the basic notion of unitary taxation is that individual states define tax bases that include a corporation's nationwide or worldwide activities, and they tax the thus-apportioned profits as though they had been derived from activities within the boundaries of the state. Conrad demonstrates that no simple statement is appropriate in the context of the tax code. He argues that when all states are considered together, the application of unitary taxation may increase the extent

of double taxation and discrimination. Thus, he does not see the value of the unitary concept and concludes that use of unitary taxation as a cure for nonuniform attribution may, in turn, create distortions that are worse overall than the illness. Johnston and Reynolds review unitary taxation from the basis of a distinction between states that are and are not well-endowed with natural resources. These states are in competition with each other to attract economic activity. Their hypothesis is that if the medicine of unitary taxation is counterproductive, the patient will notice it and change the prescription. They see movement away from unitary taxation but are puzzled by why those states that still appear to favor unitary taxation seem to prefer a form of it that favors foreign multinationals over U.S. multinationals. Moreover, Conrad notes that if unitary taxation increases the effective tax rate on the petroleum industry, then fewer resources will flow to the energy sector relative to other sectors.

Section 8 (Adelman; Jacobs and Limberg) considers tax issues that interrelate with broad issues of the industrial organization of the petroleum industry. Adelman reviews how the structure of arrangements between host countries and concession operators has changed over the last quarter of a century. He concludes that while it may once have been appropriate to regard the international companies as excise tax collectors for OPEC, this notion, together with the notion of access, is a dead letter. Producing countries and companies are price-takers, taxes are income taxes, and negotiations occur over the division of rents. However, as Adelman chronicles, the structural transformations accompanying these developments were tremulous.

The tax issues in petroleum industry reorganization analyzed by Jacobs and Limberg have also shaken the earth for some companies. They develop a model of the tax incentives for and consequences of petroleum industry mergers and apply it through an analysis of explicit capital market valuation and tax effects. They conclude that the 1984 tax law changes may have forestalled what would otherwise have been a dramatic restructuring of the oil industry through royalty trust spinoffs. But developments since the passage of the 1984 tax law suggest to them that unresolved agency and efficiency problems persist. So the adjustment process may not be over, but its form will be different.

Taken as a whole, these papers cover a wide variety of tax issues for a significant number of important tax systems. Taxes matter. This is particularly true for smaller fields in costly environments where fiscal regimes are uncertain, but it is a general principle that is universally applicable. There is important evidence that the petroleum industry is not undertaxed. Higher taxes would have adverse consequences, and current tax rates may, in some situations, be fiscally and economically inefficient. Some fiscal regimes are already adjusting to such considerations. The ebb and flow of such adjustments and readjustments will be the raw material for the next special edition on energy taxation.

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*Edward W. Erickson*