

SPECIAL ISSUE

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The Changing World Petroleum Market

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Preface

by G. Campbell Watkins (Charles River Associates, Boston, MA, USA)

[Editor's Note: The Preface was kindly provided by Campbell Watkins who has previously served as president of the IAEE, and also as vice-president of publications.] This special volume is intended to provide *The Energy Journal's* readership with a *tour d'horizon* of various aspects of the world oil market -- that most crucial of markets for energy. The volume also has another important function. It is to commemorate the achievements of Helmut Frank in founding the Journal fifteen years ago. Helmut tended and nourished the Journal during its first decade in which it swiftly established a reputation as the premier publication dealing with energy economics -- a position it retains today under the fine editorship of Helmut's successor, Leonard Waverman.

Pages 1-2

Editor's Introduction

by Helmut J. Frank (Department of Economics, University of Arizona, USA)

Since the early seventies, the world has experienced two sharp increases (plus one that was short-lived), a major price decline in the last few years, a period of relative price stability. Also, the oil industry has undergone significant institutional and structural changes. Many questions have been raised as to hows and whys of these changes, in an effort to better understand what the future may hold. Some of these questions have been answered quite fully, others only tentatively and incompletely, and still others remain wide open. Readers of *The Energy Journal* comprise persons of diverse backgrounds and interests, all of whom share a common desire to know and understand more about the workings of the energy industries. This Special Issue is directed in the first instance at this same readership with at least a working knowledge of the discipline of energy economics and/or closely related fields of expertise. Most papers in this volume, however, are designed to be accessible to persons with little technical training. It is thus hoped that the volume will appeal to many with a broad interest in the oil and energy

industries by virtue of their management, administrative or policy making positions in the private or public sectors.

Pages 3-11

The World Oil Market: Past and Future

by M.A. Adelman (Massachusetts Institute of Technology, Cambridge, MA, USA)

Abstract

Private owners of world oil resources eventually failed to restrain abundance and keep an above-competitive price. The OPEC nations had far greater market power, but overestimated it. Short time horizons drove OPEC nations to raise the price too much. They retreated to a more tenable level. But like all cartels, they find it hard to reconcile group welfare with short-run individual interest. Oil continues abundant, so far. The main obstacles to noncartel expansion are man-made such as taxation and state companies. They are very slowly yielding. Depending on how fast they erode, world supply will grow, and price pressure will be downward.

Pages 15-38

Business Cycles and the Oil Market

by Knut Anton Mork (Norwegian School of Management, Sandvika, Norway)

Abstract

The last twenty years have seen a number of oil-price changes with macroeconomic effects. Oil price increases spur inflation and produce recessions. Oil price declines dampen inflation, but do not necessarily boost real activity. The correlations can be traced back to World War II. The paper gives a survey of oil market events with macroeconomic consequences. It also discusses hypotheses about the nature of the link and efforts to incorporate oil in macroeconomic models. Business cycle research has recently advanced sectoral imbalance and uncertainty as leading hypotheses to explain the apparent in the macroeconomic effects of oil price changes.

Pages 39-67

Oil Demand in the Industrialized Countries

by Joyce Dargay (Transport Studies Unit, Oxford University, UK) and Dermot Gately (Economics Department, New York University, NY, USA)

Abstract

This paper surveys OECD energy and oil demand over the past three decades, analyzing the different paths of transportation oil, non-transportation oil, and non-oil energy -- both over time, and relative to income growth. We review both the OECD as a whole, and make regional comparisons within the OECD. We focus especially on the price-irreversibility of oil demand: why oil demand has not surged now that oil prices have returned to pre-1974 levels. Among our conclusions are the following. There has been an asymmetric, smaller demand response to the price decreases of the 1980s than to the price increases of the 1970s. We expect a smaller demand response to future price increases than to those of the 1970s. The demand response to future income growth will be not substantially smaller than in the past. Finally, given the prospect of growing dependence on OPEC oil, in the event of a major disruption the lessened responsiveness of demand to price increases could cause dramatic price increases and serious macroeconomic effects.

Pages 69-85

Oil Demand in the Developing World: Lessons from the 1980s Applied to the 1990s

by Carol Dahl and Meftun Erdogan (Department of Mineral Economics, Colorado School of Mines, CO, USA)

Abstract

Oil consumption in the developing world increased 37% over the decade of the 1980s. The 1990s promise to be more dynamic yet. In this paper we trace the evolution of these changes in the 1980s for Asia, Africa, Latin America, and the Middle East. Econometric work is used to determine how well growth in income, prices, and population explained growth in the 1980s, comparing forecasted with actual values for 1990. We find that the forecasts are quite good at the global level while consideration of additional facts such as urbanization, vehicle stocks, balance of payments, interfuel substitution, and industrialization helps explain some of the regional variation. The econometric estimates along with a discussion of other variables are used to forecast consumption to the year 2000. The forecasts suggest that growth in oil product consumption during the 1990s is likely to be at least double that of the 1980s with Asia leading the way.

Pages 89-114

World Oil Resources, Reserves and Production

by Peter R. Odell (Erasmus University, Rotterdam, The Netherlands)

Abstract

Recent estimates of limited oil resources as constituting a constraint on the future of oil, lack validity. The issue is unimportant for the oil market for 50 years. Similarly, fears for the adequacy of annual additions to reserves are unfounded: the world is running into oil, not out of it. By contrast, the geography of reserves development is important. Two-thirds of reserves are in the Middle East, but 85% of these are irrelevant to global production to 2010, given the potential in OECD and non-OPEC developing countries, and the maintenance of the current oil price. Thus, demand for Middle East oil will remain frustratingly modest. Efforts to expand production, necessarily in cooperation with major oil corporations, will regenerate fears elsewhere for supply security and create prospects for regionalizing global oil around the three groupings of OECD countries, to which the non-Middle East OPEC members will adhere.

Pages 115-132

OPEC Production: The Missing Link

by James M. Griffin (Department of Economics, Texas A&M University, TX, USA) and Lawrence M. Vielhaber (Marathon Oil Company, Houston, TX, USA)

Abstract

The future of oil depends critically on the production decisions of OPEC, which in turn depend on a variety of factors internal and external to the cartel. This paper uses a simulation of the world oil market to compute the payoff to OPEC members of alternative price and production profiles, focusing on the incentives to cooperate as well as to cheat. A 'tit-for-tat' strategy by the Saudis significantly reduces the incentives to cheat, but the payoff for cheating is still positive for the smaller OPEC producers. Accordingly, prices well below the cartel's joint profit maximizing level seem most likely.

Pages 133-156

Unravelling a Riddle: The Outlook for Russian Oil

by Campbell Watkins (Charles River Associates, Boston, MA, USA)

Abstract

Russia's oil output has been declining. Yet the potential for new discoveries and development remains huge. Whether these opportunities will be seized and current attrition arrested depends on the hydrocarbon sector regime now evolving. Uncertainties on legislation, jurisdictional boundaries, pricing policies and political structures make the investment climate less than benign. Such uncertainties lead to a very marked spread in expectations about future levels of Russian oil output.

Pages 157-176

Oil Production Outside OPEC and the Former Soviet Union: A Model Applied to the U.S. and U.K.

by John V. Mitchell (Royal Institute of International Affairs, London, UK)

Abstract

Oil production in the area outside OPEC and the Former Soviet Union (FSU) has grown steadily for the past 30 years. This growth is expected to continue, despite the decline in oil prices since 1985. The steady growth in production contrasts with dramatic swings in oil prices. Non-price factors such as policies, enterprise behavior, and technical phenomena are important. This article sketches a model for tracing their interaction over time. The model is tested against the very different histories of oil production in the U.S. and U.K. The main conclusion is that non-price factors are important and differ between countries: in the U.S., environmental policy, and in the U.K., tax policy have been critical in determining oil production. The model may be extended to countries dominated by state oil enterprises, which account for most of the remaining production in this area, but this would require country-by-country analysis.

Pages 179-191

The Refining Industry in The North Atlantic

by Keith Hamm (Petroleum Economics Ltd., London, UK)

Abstract

By 1993, refining capacity in Western Europe and North America was about in line with demand. The massive surplus in capacity evident in the early 1980s had been eliminated by reductions in capacity and increases in demand. This rebalancing, together with changes in the structure of crude pricing have laid the basis for a more sound economic performance than has been the case hitherto. Against this background there is a substantial investment requirement in the coming years, both positive, to take account of new business opportunities, and negative, needed just to stay in business. These latter investments stem from environmental legislation, tightening the specifications required both for finished products and operations of refineries. These requirements, coming on top of the poor profit performance of the last ten years have led to continued rationalisation by the industry despite evidence of emerging bottlenecks.

Pages 193-216

Refining in the Far East: Its Potential and Constraints

by Hoesung Lee (Korea Energy Economics Institute, Korea) and Dennis Eklof (Cambridge Energy Research Associates, Cambridge, MA, USA)

Abstract

This paper explores the outlook for oil product demand growth in the Far East, and the implications for future refinery capacity requirements. These requirements are compared to the industries announced expansion plans to evaluate potential future market positions. The potential for increased supplies from other geographic regions, mainly Middle East, is also explored. Finally, estimates of the required capital investments are discussed.

Pages 219-236

World Demand for Natural Gas: History and Prospects

by Marian Radetzki (SNS Energy, Stockholm, Sweden)

Abstract

This paper briefly surveys the history of natural gas use and describes the main features of current gas consumption. The share of gas in total energy consumption, and the sectoral distribution of its use in major consuming regions are discussed. The main changes in the pattern of gas consumption since 1980 are reviewed and explained. I analyze the likely implications of (a) the emergence of the combined cycle gas power generation; (b) the rising environmental premium of gas; and (c) the transformation of the West European gas market structure. The paper concludes that natural gas will substantially increase its share of global energy consumption in the next 15-20 years.

Pages 237-250

Gas Supplies for the World Market

by James T. Jensen (Jensen Associates Inc., Boston, MA, USA)

Abstract

The ability of natural gas to compete with other energy sources is increasingly favored by environmental and technological developments. From a worldwide perspective, the gas reserves needed to satisfy this growing market are large (relative to gas demand) and are growing more rapidly. However, gas, unlike oil, is expensive to transport and many of the world's present gas reserves are in deposits that are too small or too remote to be of commercial value at present price levels. As a result, much of the supply will prove

difficult to deliver to the markets that most need it, and the price consequences of market growth will vary from market to market.

Pages 253-276

Oil Industry Structure and Evolving Markets

by Joe Roeber (Joe Roeber Associates, London, UK)

Abstract

Of all the changes in the oil industry over the past 20 years, the most radical have taken place in the market, and in the formation of prices. These are both a response to and a cause of changes in industry structure. From plannable supplies at relatively stable prices, companies have had to learn to handle short term supplies in condition of extreme volatility. Management of the resulting price risk has become a central role of the companies' supply departments, and the use of paper markets (forward, futures and derivatives) has become an integral part of price formation. It is not impossible that the changes would be reversed, if the conditions that brought them into being -- surplus production and de-integrated supply structures -- were reversed in conditions of scarcity, but it is highly unlikely. Far more likely, is that risk management and the use of paper markets will increase in importance.

Pages 279-288

The Role of Futures and Other Energy-Linked Financial Instruments

by Matt Rogers and John Elting Treat (Booz Allen & Hamilton, San Francisco, CA, USA)

Abstract

Significant volatility has become a way of life in the oil markets. Traders find this level of market volatility attractive. Managers find the uncertainty inherent in this complex and volatile environment both unsettling and expensive. It creates significant economic risk, managerial risk, and capabilities risk. The dramatic explosion in the size and sophistication of oil-linked financial instruments represents a response to volatility. These markets have forced companies to adopt new strategies, business processes, information systems, and organizational structures to remain competitive. We expect the future will see many oil-linked financial markets and products which will provide new risk management tools. These trends will reward firms that can successfully manage risks associated with credit, liquidity, complexity, and financial evaluation.

Pages 291-309

International Petroleum Taxation in the 1990s

by Alexander G. Kemp (Department of Economics, University of Aberdeen, UK)

Abstract

Since the major oil price explosion and collapse over the last 20 years, host governments in producing countries have made substantial changes to their petroleum tax systems. In many cases, these changes have resulted in more profit-related systems being established. These have an inherent flexibility which is more appropriate for an environment of fluctuating prices. They are generally not accurately targeted on economic rents, however, and if oil prices remain low further discretionary changes may be required. In some important countries, reliance on old-style systems targeted on gross revenues still remains. These are not well adapted to an era of low oil prices, and investment disincentives are present.

Pages 310-328

LDC Cooperation in World Oil Conservation

by Stephen P.A. Brown (Research Department, Federal Reserve Bank of Dallas, TX, USA) and Hillard G. Huntington (Energy Modeling Forum, Stanford University, CA, USA)

Abstract

Environmental concerns are leading many industrialized countries to consider measures which would reduce their consumption of oil, as well as other energy sources. The reluctance of the developing countries to join in these conservation efforts will reduce the policy's effectiveness. This paper explores the conditions under which the exclusion of important oil consumers (like developing countries) would weaken unilateral OECD actions to conserve oil. Oil conservation undertaken unilaterally by the OECD can lead to lower world oil prices, and offsetting increases in oil consumption elsewhere. We provide estimates of these offsetting effects and how they influence the costs of participating in the policy. We also examine the effect of adding and excluding countries to a coordinated policy of oil conservation.

Pages 329-346

Oil Imports and National Security: Is There Still a Connection?

by John H. Lichtblau (Petroleum Industry Research Foundation, New York, NY, USA)

Abstract

This article examines the impact of oil imports on U.S. national security, It reviews oil's links with national security, and questions the arguments for curbing imports. Debated since the 1950s, the links are based on oil's unique role in fueling the economy, its role for the sparring superpowers during the Cold War, and the political instability of the Middle East. The article challenges the "military externality" argument that U.S. imports require military protection. It compares U.S. import dependency with the much higher import dependency of most other industrial countries, none of which have expressed a national security concern similar to that of the U.S. It also points out that the source of imports is irrelevant, as the petroleum market functions globally with respect to volume and price: a shortage anywhere is a shortage everywhere. Finally, the article discusses the oft-used balance of payments argument for reducing oil imports, questioning the calculations on which it is based. It concludes that any argument for reducing oil imports for balance of payments reasons applies equally to other imported commodities.

Pages 349-356

What Does It All Mean?

Edward W. Erickson (Department of Economics, North Carolina State University, NC, USA)

Abstract

Three hypotheses about future market balances in the world petroleum market are identified in this paper. Two are relatively benign and one is more harsh. Examination of constraints upon OPEC behavior and increasing market and policy sophistication in consuming countries suggests that some combination of the more benign hypotheses is apt to prevail.