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Pages 1-29

The Dynamics of Commodity Spot and Futures Markets: A Primer

by Robert S. Pindyck (Professor, Massachusetts Institute of Technology, Sloan School of Management, 50 Memorial Drive, Cambridge, MA, USA)

Abstract

I discuss the short-run dynamics of commodity prices, production, and inventories, as well as the sources and effects of market volatility. I explain how prices, rates of production, and inventory levels are interrelated, and are determined via equilibrium in two interconnected markets: a cash market for spot purchases and sales of the commodity, and a market for storage. I show how equilibrium in these markets affects and is affected by changes in the level of price volatility. I also explain the role and behavior of commodity futures markets, and the relationship between spot prices, futures prices, and inventory behavior. I illustrate these ideas with data for the petroleum complex – crude oil, heating oil, and gasoline – over the past two decades.

Pages 31-54

Adelman's Rule and the Petroleum Firm

by Robert D. Cairns (Department of Economics, McGill University, Montreal, Canada) and Graham A. Davis (Division of Economics and Business, Colorado School of Mines, Golden, CO, USA)

Abstract

Observing that net prices do not rise as predicted and that resource stocks are not fixed, Adelman questions Hotelling's model of an exhaustible resource. He cites a rule of thumb for valuing oil reserves which is about one-half that given by the Hotelling valuation principle. We apply an optimization model to a stylized characterization of an oil reservoir. Adelman's valuation rule is confirmed. An r -percent rule emerges as well, but it is not Hotelling's rule. We end the paper with our interpretation of Hotelling's rule. We also consider the role of investment in augmenting the quantities of a resource currently extracted.

Pages 55-77

An Analysis of Market Power Mitigation Strategies in Colorado's Electricity Industry

by David M. Quick and Janis M. Carey (Division of Economics and Business, Colorado School of Mines, Golden, CO, USA)

Abstract

We apply an algorithm that optimizes the generation dispatch for a dominant firm to Colorado's electricity market and show that the dominant electricity generation firm can strategically congest transmission into the region to receive a maximum price over 50% of the time. When it does not get the maximum price, the dominant firm still receives an average markup more than 10% over the competitive price. We use this model to show how mitigation strategies such as enhancing the transmission grid, divesting the dominant firm's generation assets, and promoting entry into the generation market can lower prices in a wholesale electricity generation industry by limiting a dominant firm's market power.

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Uncertainties in Responding to Climate Change: On the Economic Value of Technology Policies for Reducing Costs and Creating Options

by Demetrios Papathanasiou and Dennis Anderson (Imperial College of Science, Technology and Medicine, Centre for Energy Policy and Technology, 4th floor RSM, Prince Consort Rd, London, UK)

Abstract

The paper presents a simplified model of the form often used to project long-term emissions of carbon dioxide from energy production and use. It then considers three uncertainties in parameters of the model concerning (a) the rate of improvement in energy efficiency, (b) the costs of environmental damage, and (c) the rate of technical progress in the development and use of technologies for abating CO₂ emissions. Monte Carlo analysis is used to estimate the frequency distributions of costs and benefits under different policy assumptions. The results suggest that the possibilities of an economic surprise cannot be ruled out and that 'technology policies' to support the development of non-carbon technologies directly are robust under uncertainty. Such policies can also be defended by reference to their option value, to their environmental benefits, and to the positive externalities of innovation.

Pages 115-145

Self-Sufficient Energy Supply for Isolated Communities: Wind-Diesel Systems in the Canary Islands

by Jose Antonio Carta and Jaime Gonzalez (Department of Mechanical Engineering, Universidad de las Palmas de Gran Canaria, Campus de Tafira, Las Palmas, Canary Islands, Spain)

Abstract

This paper describes the technical and economic methods used to select a wind-diesel power system in the Canary Islands. The project was implemented with the aim of meeting the complete energy requirements of a small isolated fishing village, while minimizing fuel consumption and CO₂ emissions. We focus on the decisions taken and lessons learned during configuration of the hybrid system. The project offers a working model for the application of renewable energy to an isolated community where there is no external electricity supply. We analyse nine hypotheses for the system's configuration and operation including the option of using diesel only as a base for comparison. Our results show that the hybrid systems, though employing high percentages of wind energy, were actually more expensive in terms of units of energy produced than the diesel only option. Therefore, a reduction in CO₂ emissions implies additional costs in the energy supply system.

Pages 147-169

The Kyoto Protocol, Emissions Trading and the CDM: An Analysis from Developing Countries' Perspective

by Jyoti P. Painuly (UNEP Collaborating Centre on Energy and Environment, Risø National Laboratory, Roskilde, Denmark)

Abstract

In this paper the Kyoto Protocol is analyzed from the perspective of developing countries. The literature on the Protocol's impact indicates that Annex B countries will benefit from an emissions trading regime and the benefit is highest when non-Annex B countries are also included in the trading system. The paper addresses the issue of allocation of gains to developing countries from the Clean Development Mechanism, when the CDM simulates emissions trading. It was found that gains to non-Annex B from participation in GHG mitigation might vary from \$6 billion to \$29 billion, about 7% and 20% respectively of the global gains in an emissions trading system. However, several institutional issues related to CDM design and implementation will have to be resolved before developing countries can optimize their gains. Indirect impacts of the Kyoto Protocol through trade, although expected to be significant, have not been included. To optimize their gains, non-Annex B countries need to actively participate in the design and implementation aspects of the CDM.