RESOURCE NATIONALISM MEETS THE MARKET
Modeling Political Risk and the Value of Petroleum Reserves

Reid W. Click and Robert J. Weiner*
George Washington University
Washington DC USA

Abstract

In the oil sector, emerging economies appear to be moving in the opposite direction from that assumed in the conventional wisdom on their integration into the world economy – as oil prices have soared, institutions such as regulatory stability, and contract sanctity and enforcement appear to be in decline, while political risk appears to be increasing. The trade press (e.g., Petroleum Intelligence Weekly 5 Feb 2007 and 8 Jan 2007) refers to these phenomena as "resource nationalism."

Does resource nationalism harm the value of the very natural resources on which these countries depend? This paper models the cost of political risk by estimating the discount on the value of real assets – petroleum (crude oil and natural gas) reserves – associated with the country in which the reserves are located. We utilize a global transactions database of 1,655 mergers and acquisitions in which petroleum reserves were traded during the period 2000-2006. To capture the riskiness of the location, we consider the political risk rating calculated by International Country Risk Guide (ICRG) and the country risk rating published in Institutional Investor.

Controlling for factors that affect reserve value, we demonstrate the value-destruction of political risk, and estimate the asset discount for 37 countries. Furthermore, contrary to the assumption in the scholarly literature, we show that the discount depends on market conditions – the higher the expected future market prices of oil and gas, the larger is the discount, regardless of a country's riskiness. Our findings suggest that treating political risk and market risk separately is likely to yield inaccurate estimates of asset value.

Uncertainty, Climate Change, and Advanced Solar R&D

Erin Baker and Haewon Chon*
University of Maryland
College Park, MD USA

†Leon Clarke
Joint Global Change Research Institute,
College Park, MD USA

‡Jeffrey Keisler
University of Massachusetts,
Boston, MA USA

Abstract

Both climate change and technical change are uncertain. In this paper we combine economics and decision analysis to develop a framework for incorporating the uncertainty of technical change into climate change policy analysis. We present the results of an expert elicitation on the prospects for technological change in advanced solar photovoltaics. That is, we indicate how much a marginal R&D dollar is likely to buy in terms of probability of success for multiple levels of success. We find there is disagreement about how much funding is needed to achieve success in solar technologies; but overall agreement about which technologies have the most "bang for the buck." We then combine the expert elicitations on the technology with MiniCAM, a technologically detailed Integrated Assessment Model, to derive a probability distribution over future greenhouse gas abatement cost curves. We note that (1) there is a non-linear relationship between the reduced cost of solar technology and its impact on the abatement cost curve; and (2) assumptions about how PVs will interact with the grid are a key determinant of their impact on reducing the costs of global climate change.

The Source and Transmission of Volatility in Petroleum Markets

Thomas K. Lee*
Marymount University
Arlington, VA USA

John Zyren
Energy Information Administration, EI-42
US Department of Energy
Washington, DC USA

Abstract

This paper addresses price volatility behavior, the sources of the volatility and the interrelationship of volatility in the petroleum markets, for crude oil and gasoline, during the 1992 – 2007 time period. While estimated volatilities using a GARCH model predict too much volatility persistence, cointegrated error correction models often fail to identify long-run equilibria. We utilize models of conditional heteroscedasticity that contain Markov-switching parameters, which allow discrete shifts and changes in the persistence parameters, to examine both univariate and bivariate volatilities. These models enable us to observe segmented volatility behaviors and co-movements between these markets over the period. We also examine whether periods of high volatility in crude oil market spilled over into the motor gasoline market during the 1992 – 2007 period. Our preliminary empirical results suggest that there are different long-run equilibria in the volatilities. As a result, estimated volatility must be accounted for by segmented states. The results show that there is some weak evidence of volatility co-movements between markets. Thus, the conventional wisdom of volatility spillover from the oil market to motor gasoline market is not always true. We do find some supporting evidence that short-run price volatility in crude oil contributes to price volatility in finished motor gasoline. However, our results are not overly supportive of volatility spillover or contagion from one market to the other.

Do Firms Interact Strategically?
A Structural Model of the Multi-Stage Investment Timing Game in Offshore Petroleum Production

Cynthia Lin
University of California at Davis
Davis, CA USA

Abstract

Abstract: Petroleum production is a multi-stage process involving sequential investment decisions. The first stage is exploration: when a firm acquires a previously unexplored tract of land, it must first decide whether and when to invest in the drilling rigs needed to begin exploratory drilling. The second stage is development: after exploration has taken place, a firm must subsequently decide whether and when to invest in the production platforms needed to develop and extract the reserve. Because the profits from petroleum production depend on market conditions such as the oil price that vary stochastically over time, an individual firm producing in isolation that hopes to make dynamically optimal decisions would need to account for the option value to waiting before making either irreversible investment. The dynamic decision-making problem faced by a petroleum-producing firm is even more complicated when its profits are affected not only by exogenous market conditions, but also by the actions of other firms producing nearby.

When firms own leases to neighboring tracts of land that may be located over a common pool of reserve, there are two types of externalities that add a strategic (or noncooperative) dimension to firms' investment timing decisions and may render these decisions socially inefficient. The first type of externality is an information externality: if tracts are located over a common pool or share common geological features so that their ex post values are correlated, then firms learn information about their own tracts when other firms drill exploratory wells or install production platforms on neighboring tracts. A second type of externality is an extraction externality: when firms have competing rights to a common-pool resource, strategic considerations may lead them to extract at an inefficiently high rate. Thus, when individual petroleum-producing firms make their exploration and development investment timing decisions, positive information externalities and negative extraction externalities may lead them to interact strategically with their neighbors. This paper examines whether these inefficient strategic interactions take place in U.S. federal lands in the Gulf of Mexico. In particular, it analyzes whether a firm's production decisions and profits depend on the decisions of firms owning neighboring tracts of land. The empirical approach is to estimate a structural econometric model of the firms' multistage investment timing game. The results suggest that the federal government best eliminates any inefficiencies in petroleum production that may result from non-cooperative strategic interactions when the tract size is large.