

STUDY TITLE: Profitability of Offshore Petroleum Ventures and Operations: Empirical Evidence from Oil and Gas Lease Sales and Development on the Gulf of Mexico OCS, 1983-1999

REPORT TITLE: Competition and Performance in Oil and Gas Lease Sales and Development in the U.S. Gulf of Mexico OCS Region, 1983-1999

CONTRACT NUMBER: 1435-01-99-30951-18176

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA: Western, Central, Eastern

FISCAL YEARS OF PROJECT FUNDING: 2002, 2003, 2004, 2005, 2006

COMPLETION DATE OF REPORT: June 2007

COSTS: FY 2002: \$16,671.51; FY 2003: \$87,365.39; FY 2004: \$1,141.45; FY 2005: \$19,792.24; FY 2006: \$29.41; **CUMULATIVE PROJECT COST:** \$125,000

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KEY WORDS: Gulf of Mexico; offshore; economics; lease sale; cash flow; profitability; rate of return; Outer Continental Shelf; oil; natural gas

BACKGROUND: In the 1980s, several studies were conducted using federal OCS lease data to facilitate a good understanding of the structure and performance of the OCS oil and gas lease market. These studies were conducted using data on lease sales from 1954 to 1977 under the nomination and tract selection arrangement. The implications of joint ventures, industry structure and market conditions for federal offshore oil and gas lease sales were well documented in these studies.

The structure of the U.S. oil and gas industry, however, has changed significantly over the years. Moreover, leasing policy has changed from nomination to area-wide leasing. The leasing policy governing OCS lease sales now allows firms to bid for any OCS tracts that have not been previously leased. The immediate result of this change in policy was a large increase in the number of leases or tracts awarded at each subsequent lease sale. Furthermore, the type of bids that can be submitted jointly also changed following the Energy Policy and Conservation Act (EPC) of December 1975. The EPC Act forbade some of the major oil and gas companies to bid jointly for leases

on the OCS to reduce the potential for anti-competitive effects on the OCS bidding system.

OBJECTIVES: The objectives in this study are to appraise the prospectivity and productivity of OCS leases and to estimate measures of competition and economic performance in lease sales and development in the U.S. Gulf of Mexico for leases issued from 1983 to 1999.

DESCRIPTION: The emphasis in this study is to estimate physical and economic performance measures to characterize lease sales and development in the U.S. Gulf of Mexico. Subsequently, we estimated lease development index, lease productivity and expeditious index as measures of physical performance in lease sales and development; and lease profitability index and aggregate internal rates of returns for lease categories.

To further address lease development issues, variables considered as central in the determination of the expected value of or realized values from lease development were incorporated in the study. Such variables include water depth, bidding structure and conduct, bonus size, E&P firm type and size as well as the Gulf planning area. The framework adopted in this paper is such that each annual portfolio of leases is treated as a unique but interdependent investment decision by firms at different points in time. Thus, in an aggregate sense, the estimated rates of return earned from investment by leases and also by important lease categories in the Gulf of Mexico OCS region are estimated.

SIGNIFICANT CONCLUSIONS: The changing pattern of lease ownership in the Gulf of Mexico shows a significant influx of new players in the bidding process for OCS leases over time. However, there is enough evidence in our ownership pattern analysis to suggest that the attractiveness of the Gulf of Mexico OCS to the big four E&P firms remained strong. Lease ownership pattern evaluation, within the context of any anti-competitive behavior in the bidding process, shows that the actual company identity does matter in bidding process evaluation.

Regarding prospectivity of OCS in terms of lease development index, we found that of the 13,641 leases issued from 1983 to 1999, 26 percent reported some drilling activity as of 2004. Of those 3,467 leases reporting drilling activity from 1983 to 1994, MMS qualified 43 percent as producible leases. The drilling failure rate in the aggregate was about 57 percent as of 2004.

The overall aggregate lease development index (the product of the proportion of drilled leases and the proportion of successful drilled leases) for leases issued from 1983 to 1999 was 11.4 percent as of 2004. In other words, approximately one out of nine leases produced hydrocarbons in the Gulf of Mexico OCS. Variations in lease prospectivity within group are evident in the report.

STUDY RESULTS: The time interval from lease sale to first drilling activity (spud) and from sales to first production by lease category is called expeditious development index

in this report. Our study shows evidence of declining trends over time in the average lag from sales to production on leases issued from 1983 to 1999. On average, it took about 78.9 months prior to first production on leases sold from 1983 to 1987. In comparison it took approximately 50.9 months on average from sales to production for leases sold from 1995 to 1999.

Regarding productivity as a measure of physical performance of lease development in the Gulf of Mexico, we found evidence that the overall aggregate productivity per drilled lease declined significantly from a high of 4,536 MBOE for leases issued from 1983 to 1987 to 2,864 MBOE for leases issued in the early 1990s. Further, for all categories of leases, the productivity ratios in the early 1980s were significantly higher than productivity ratios in the early 1990s, notwithstanding the fact that more leases were issued and drilled in the 1980s than in the early 1990s.

For comparative purposes, we used two representative discount rates in this report for all categories of leases. Thus, our results do not reflect any cross sectional or time variations in the cost of borrowed capital by firms for projects. The key finding in the profitability index analysis is that the estimated indices were significantly low for all categories of leases. This finding notwithstanding, we found that the impact of bonus payment, which has been suggested to be regressive in nature, is significant on the economic performance of lease development.

In general, the estimated rates of return for all categories are relatively low for all categories of leases when compared to a desirable return value of about 17 percent in the U.S. manufacturing sector during the period. The reported low profitability measures in terms of internal rates of return, notwithstanding, we found that in the aggregate, leases issued in the early 1990s have higher annual rate of return on average than leases issued in the late 1980s.

STUDY PRODUCTS: Iledare, O.O. and M.J. Kaiser. 2007. Competition and Performance in Oil and Gas Lease Sales and Development in the U.S. Gulf of Mexico OCS Region, 1983-1999. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2007-034. 106 pp.