BACKGROUND: The economics of the upstream petroleum business is complex and dynamic. Each year anywhere between 25-50 countries in the world offer license rounds, 20-30 countries introduce new model contracts or fiscal regimes, and nearly all countries revise their tax laws during their annual budgetary process.

The focus of fiscal system analysis depends upon your perspective. From the host government’s point of view, focus is usually maintained on the division of profit (take) between the contractor and government. From the operator’s perspective, economic measures such as the present value and rate of return describing the expected profitability of the project are of primary interest.

OBJECTIVES: The manner in which the fiscal terms and parameters of the contract impact system measures are complicated and not well understood. The purpose of this report is to quantify the influence of private and market uncertainty on the computation
of the economic and system measures of a petroleum producing field governed under
cessionary and contractual fiscal system arrangements.

**DESCRIPTION:** The economic and system measures associated with hydrocarbon
production are subject to various levels of private and market uncertainty. This paper
develops an analytic framework to quantify the influence of private and market
uncertainty under contractual and concessionary fiscal systems.

The impact of changes in system parameters is usually presented as a series of graphs
or tables that depict the present value, rate of return, or take (or whatever measure is
under consideration) as a function of one or more variables under a “high” and “low”
case scenario. While useful, this approach is generally piecemeal and the results are
anchored to the initial conditions employed. A more general and concise approach to
fiscal system sensitivity is developed.

**SIGNIFICANT CONCLUSIONS:** A constructive approach to fiscal system analysis was
developed to isolate variable interaction and determine the manner in which private and
market uncertainty impact take and the economic measures associated with a field.
Functionally relations were developed by computing the component measures for
parameter vectors selected within a given design space. The relative impact of the
parameters and the manner in which the variables are correlated was also established
in a general manner. The methodology was illustrated on hypothetical oil fields and
case studies for the deepwater Na Kika development and the Angolan deepwater
Girassol development were considered. The impact of royalty relief on the field
economics of Na Kika and the impact of fiscal design on the field economics of Girassol
were examined.

**STUDY RESULTS:** The paper develops an analytic framework to quantify the influence
of private and market uncertainty on the economic and system measures associated
with a field. A “meta-modeling” approach is employed to construct regression models of
the system measures in terms of various exogenous, fiscal, and user-defined
parameters. In meta-modeling, a model of the system is first constructed, and then
meta data is generated for variables simulated within a specified design space. Linear
models are then constructed from the meta data. Meta-modeling is not a new construct,
but as applied to fiscal system analysis is new, useful, and novel, being an especially
good way to understand the structure and sensitivity of fiscal systems to various design
parameters.

**STUDY PRODUCTS:** Kaiser, M.J. and A.G. Pulsipher. 2004. Fiscal system analysis:
Concessionary and contractual systems used in offshore petroleum arrangements. U.S.
Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region,