

National Oil Companies:
Strategy, Performance and Implications for Global Energy Markets

Prospectus

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While the role of the state is declining in nearly every sector of world economic activity, in hydrocarbons the pattern is quite different. State-controlled oil companies—so-called national oil companies (NOCs)—remain firmly in control over the vast majority of the world’s hydrocarbon resources. In some countries where state companies had been waning in influence as governments adopted rules to encourage investment by private firms—including the international oil companies (IOCs)—recent years have seen a resurgence in the roles for state-controlled companies. High energy prices have encouraged governments and NOC managers, alike, to concentrate authority in the hands of state firms—especially in Russia and Venezuela—while many countries have shelved plans to open their hydrocarbon sectors. The central role for NOCs seems more secure than ever. Governments are struggling to find the right policies toward their NOCs. The IOCs are struggling to find their role in this setting.

This study will explore the factors that explain the organization and performance of the world’s largest NOCs. It will involve in-depth case studies of about 15 NOCs that include the enterprises that control the world’s largest oil reserves as well as several NOCs that have large refining and marketing operations. This prospectus summarizes the goals and methods of the study; a sample outline for a typical case study is included in an appendix.

NOCs are hardly monolithic. Some of these enterprises are singular in their control over their home market while others are exposed to competition in some or all the segments of the value chain from exploration & production of hydrocarbons to refining and marketing. Some engage in joint ventures while others create their needed capabilities in-house. Some operate internationally while others stay at home. Some operate projects while others engage passively. These enterprises differ markedly in the ways they are governed and the tightness of their relationship with government. NOCs also vary in their geological gifts, as some are endowed with prodigious quantities of “easy” oil while others must work harder and apply highly advanced technologies. Some have sought natural gas, which requires different skills and market orientation than oil, while others stay focused on liquids. This study will explore how such factors affect the performance of NOCs.

Our aim in this work is partly social science, partly a study of business strategy, and partly normative. As social scientists we note that NOCs are organized and behave in ways that

are strikingly different from private (non-state) firms that are the basis of most theories of industrial organization. NOCs are often, in effect, states within a state. As large suppliers of state revenues they have a special role in state budgets; usually they are among the most attractive employers in the country; typically they exert influence on a wide range of energy services (e.g., electric power supply) in addition to hydrocarbons. These special roles confer enormous political power that NOCs have used in highly varied ways. Our goal is to improve the theory that explains how such special enterprises interact with their host governments.

Concerning business strategy, we are interested in how NOCs might engage most productively with other enterprises—including, notably, the IOCs. Many IOCs have made bold claims about their special role as suppliers of technology, capital and access to markets that are difficult to square with reality, especially in the present high price environment where many governments have not allowed IOCs access to hydrocarbon resources. NOCs have often found it difficult to craft viable partnerships with outside firms; most NOCs have found it especially difficult to operate outside their home market. We will explore which business strategies have been attempted and which prove viable.

Concerning policy, we want to understand how governments can influence the behavior of NOCs. There is a long history of governments reorganizing their hydrocarbon sectors with the goal of improving governance. Western oil companies were originally invited into oil-rich parts of the world in part because host governments thought it would be easier to control development of the sector by working with outsiders that had expertise and capital. The shift to NOCs, which occurred mainly from the 1970s through the early 1980s, was pursued partly on the same logic. Yet both modes of organization have their own troubles. Governments have incomplete information about the real cost and opportunity for developing hydrocarbon resources and they have incomplete leverage over inside and outside firms alike. Governments are taking a fresh look at best practices, and many are encouraging a hybrid of NOCs and private firms. Our study will document the varied outcomes from these different policy efforts and suggest which approaches have the best prospects for governments in the future. Indeed, some countries have imposed reforms on their NOCs that have been extremely successful in boosting output and improvement the effectiveness with which these firms employ capital, technology and labor. Effective policies are important because NOCs control about three-fourths of the world's proven oil reserves and there is little indication that NOCs will be on the wane.

What we want to explain

We aim to explain the varied experiences of NOCs along two dimensions. First, and most important, we want to explain “performance,” by which we mean the economic efficiency with which NOCs find, develop and deliver hydrocarbon resources. We will use conventional measures of hydrocarbon performance such as cost and employment per barrel found, produced and refined. We will focus on measures of economic performance and will report (or estimate) orthodox financial measures of performance (e.g., return on capital employed) and will also adjust those measures for the varied social obligations and differences in taxation that vary across firms—so that we can examine and compare the NOCs on equivalent basis. We are mindful that most NOCs are tight-lipped about the underlying data that would be needed to

assess performance. Thus our studies will combine standard indicators (where available) such as cost per barrel found and produced as well as employment per output. We will augment those data with subjective assessments from a wide range of expert observers obtained through structured interviews.

Second, we aim to explain NOC strategy at home and, where relevant, in markets abroad. What kinds of partnerships have the NOCs entertained and embraced? We will focus, especially, on equity partnerships, operational partnerships, and field service partnerships. To obtain information on these partnerships we will rely heavily on field interviews and work done in the NOC countries and companies. In evaluating these partnerships we will imagine how an efficient firm would deploy partnerships as part of a broader strategy to manage risk and to concentrate in areas of comparative advantage. Such a firm would—through investments, acquisitions and divestitures—develop a portfolio of projects to extract and process hydrocarbon resources, with partnerships to complement core capabilities. Such a portfolio would help it manage market, political and technological risks. We will compare the actual pattern of the NOCs partnerships with such a hypothetical efficient benchmark.

Main Factors

In each case we expect that a wide range of factors will affect performance and partnership strategies in complex ways. At the outset of this study we did not know which factors would be most important, so we identified four categories of factors that probably explain NOC performance and partnerships. These factors are often cited in the literature on NOCs (and on state firms less specifically), and thus our study offers an opportunity to test them with systematic data from a large number of cases. Each of the case studies will document the first three of these categories of factors, along with a history of the NOC and an analysis of the fuller range of factors at work. In addition, the project team will gather information about the fourth factor, which concerns the structure of the state, and use it at the end of the study to examine systematically how such factors may influence outcomes.

1. State goals, capabilities and relationship with the oil sector.

Governments created NOCs, mainly from the 1950s, with particular goals in mind. Some initially sought to create a benchmark that could be used to augment their efforts to regulate and tax foreign and private firms operating in the country. Others went directly to the full endpoint—a national firm with exclusive control—because they thought the state could obtain maximum revenue and leverage only if it monopolized all aspects of production. Such decisions arose in the context of a shift toward greater state control in most economies, with the lucrative oil sector considered of paramount importance.

We seek information on three major aspects of the relationship between the state and the sector. First, what are the goals of the state for the sector and what strategies has government followed to pursue those goals? Each study will examine this question over time, with attention

to factors—such as the price of oil (and thus level of rents)—that may explain how those goals have changed.

Second, we examine the particular instruments that government has deployed to affect behavior in the sector, with attention to regulation and competition policy in particular. Regulation includes price controls as well as health, safety and environmental (HSE) rules. Competition policies affect the number (if any) of competing firms able to enter the sector and the terms of competition. Together, these factors affect the industrial structure and, plausibly, will have a large impact on performance and strategy. We focus on the capabilities of government to develop and apply regulatory and competition policy as performing these functions requires obtaining extensive information needed to monitor the behavior of the enterprise and to make decisions. Where the firms are formally part of government, performing such functions can be especially difficult because government has a conflict of interest and information may be especially concentrated inside the NOC itself. Yet, to allow the firm to behave efficiently—and for a market to function in the countries that have sought to encourage market competition—these capabilities must be developed and applied in firm, predictable and often subtle ways.

Third, we examine the fiscal relationships between the state and the NOC. Each study will summarize the main taxes (and other fees) paid by the NOC and subsidies. Each will also examine the fiscal controls, if any, applied by the state to capital spending by the NOC. Such factors will help to explain the importance of the NOC to the financial health of the state (and the magnitude of resources at stake, which is likely to influence efforts to control the NOC). Taxation, as well as controls on capital spending, will help to explain the investment patterns of the NOC and thus its performance and strategy.

2. Management

Next, we examine a series of factors related to the governance and control of the NOC itself. We examine aspects of management.

First, we examine the formal procedures for governance, with particular attention to several points of control:

- Formal ownership and protections for minority shareholders (if any);
- Control over executive and other senior appointments;
- Formal and de facto decision-making, with particular attention to control over the process for proposing and approving new investments.
- Disclosures and transparency, such as standards for financial accounting (e.g., SEC rules for listed companies; alternative rules for non-listed enterprises)

We think these factors matter because they ultimately affect the identity of key decision-makers, the masters they serve, the information that the enterprise supplies to government and markets,

and critical decisions such as investments. In turn, that should affect firm performance and choice of partnerships. For example, a strong staff with robust internal procedures can keep the firm focused on commercially viable projects, making the enterprise more immune to external political meddling.

Second, the studies will examine each NOC's sources of investment capital. Is the NOC able to raise capital on world markets (what is its bond rating, can it earmark overseas capital against hydrocarbon revenues, etc.), can it retain earnings, and how (if at all) does it draw its capital budget from the state (and at what cost)? These factors will affect the ability of the NOC to mobilize and control capital for investment.

Third, we examine the organizational structure and culture of the NOC. We examine the formal organization of the firm and actual lines of authority and promotion within the firm. Each case study will describe training and typical career paths of key officials and the esprit de corps within the enterprise (which, in turn, relates to whether/how key staff positions are awarded by merit or patronage). Where possible, the studies will explain whether some parts of the NOC's organization have stronger esprit de corps and lead to better performance than others, and why.

3. Technology and Hydrocarbon Resources.

Each study will also examine the interplay of technology and the cost/availability of the hydrocarbon resources that the NOC is able to tap. Where the NOCs have R&D programs of their own, each case study will examine where those R&D programs have succeeded and failed.

We also ask where the enterprise obtains its hydrocarbon resources and the size of those resources. Does it have exclusive access to hydrocarbon resources within its national territory, does it face competition? Must it pay for its resources within its national territory, or are they provided at little or no cost? In acquiring acreage overseas, does the firm rely on special political deals and access afforded through its connections to the government, or does it compete on an even keel with other firms?¹ We expect that provisions for access to resources will affect the firm's E&P strategy both domestically and overseas; moreover, it should affect firm performance since competition may yield improvements in economic efficiency. Control over resources in the ground may also be an instrument that government can use to exert leverage in the sector—to affect the behavior of the NOC and (where relevant) other competitors.

¹ We should be attentive to situations where the firm faces different resource rules at home and abroad as that, in turn, may yield different levels of efficiency in its domestic and overseas E&P operations. (Or it may yield the need for internal subsidies or some such arrangement if, for example, the firm must compete and pay for acreage overseas but is unable to operate such fields efficiently.)

We are mindful that these studies must be attentive to the differences in geology and the nature and type of resources under the control of state companies. Is the resource easily accessible, or is advanced technology required for extraction? What is the quality of the resource? (To help answer these questions systematically we are developing a database of published information on these countries' production costs and international benchmarks.)

We also examine the differences between oil and gas—at least in cases where the national company has both types of resources. The market for oil is nearly guaranteed for all firms that successfully develop their resources. Gas is quite different as merely having the resource doesn't mean it will get used. The market for gas depends on the vagaries of other competing fuels (by contrast, oil has essentially no competitors) and technologies. Increasingly, gas is being used for electric power; thus, assuring a market for gas requires managing regulatory relationships.

Attention to the issues surrounding management of technology and its interplay with hydrocarbon resources will allow us to address questions such as:

- how do decisions by government affect which resources are developed and at what cost?
- to what degree is the NOC's performance explained by the resources that were tapped—for example, did the NOC develop advanced technology (and an engineering culture) because it was required to tap difficult resources?
- has the NOC followed different strategies—with different roles for and types of partnerships and internal development of technology—in tapping different types of resources?

4. State Structure

Most of this study is focused on the attributes of the NOC, the resources it has available to tap, and the relationships between the NOC and government. These factors, we think, will explain the variation in performance of the NOC. However, we must be attentive to the possibility that the root causes of NOC performance are found elsewhere—perhaps in the structure of the state and its system of government. Thus, in parallel with the development of the 15 case studies, a side project will examine the major factors related to state structure and will test whether they coincide with the performance and strategy of the NOCs.

This part of the study awaits information on performance and strategy from the 15 case studies and will also require a systematic review of the literature, but the factors we are likely to examine include:

- Percent of GDP, budget and exports accounted for as hydrocarbons;
- Legislative control over law-making and budgeting;
- Deficit or surplus of state budget;

- Standard variables of governance, such as transparency and corruption;

We remain skeptical that such factors are powerful explanators, but these hypotheses need to be tested.

Units of Analysis and Case Selection

The empirical research in this study will use NOCs as the unit of analysis. By “NOC” we mean a state-owned enterprise engaged in the production or marketing of oil or gas within a national territory. By “state-owned” we mean an enterprise (firm) for which the government has a controlling interest—100% in some cases, but in a few cases as low as perhaps 20% if other shares are held widely or if the state has concentrated ownership of voting shares. For some firms, the state has a golden share or other arrangement that confers state control and thus qualifies as a “state-owned enterprise” in our definition.

To select our sample we compiled a long list of all significant state-owned oil companies (appendix B).² From that list we then selected a sample of 15 NOCs that span the range of the world’s experience with the four categories of factors identified above. These factors are difficult to measure systematically, and our assessments of the variation were subjective. Thus we have erred on the side of selecting companies that are intrinsically important so that our sample was not only scientifically valid but also obviously relevant for the largest companies and host countries. After compiling the full information about the range of experiences we will recheck and possibly adjust our case selection.³

Table 1 shows our sample of 15 NOCs.

Work Plan

The study will run from spring 2006 and run for 18 months, with the effort in stages. This prospectus is being written in the middle of the first stage where we are testing the research protocol with initial studies on six NOCs that have quite different functions and histories (PdVSA, Pemex, Petrobras, NIOC, CNPC and Gazprom). Based on those results we will revise the protocol late in 2006 and begin work on the full sample of companies. We plan a large review meeting in late April 2007 to discuss all the major factors identified in this prospectus, to engage industry and academic observers, and to present initial drafts of the six trial case studies.

² This list is drawn from *Petroleum Intelligence Weekly* [complete citation].

³ A similar process (without the final readjustment phase) was followed in PESD’s study on independent power producers (Woodhouse, “A Political Economy of International Infrastructure Contracting: Lessons from the IPP Experience,” PESD Working Paper #52, 2005).

The final stages of work will include analysis of the factors related to state structure and will also synthesize the findings and then apply them to some critical questions in the industry, such as the ways to manage joint ventures with NOCs, and possible responses from the NOCs to a decline in oil prices.

Table 1

Enterprise Name	Country	Oil & Gas Reserves (Bboe)	Liquids Output (1000 bpd)	Gas Output (MMcf per day)
Saudi Aramco	Saudi Arabia	300.9	9,045	6,900
NIOC (National Iranian Oil Co)	Iran	295.2	3,852	7,640
KPC (Kuwait Petroleum Co)	Kuwait	109.0	2,170	1,054
PdVSA (Petroleos de Venezuela)	Venezuela	104.4	2,500	4,000
ADNOC (Abu Dhabi National Oil Company)	U.A.E.	79.2	1,200	4,242
NNPC (Nigerian National Petroleum Co)	Nigeria	40.2	2,166	677
Pemex	Mexico	18.7	3,723	3,244
Gazprom	Russia	191.5	221	52,244
Sonatrach	Algeria	37.3	1,729	7,807
CNPC*	China	18.4	2,120	2,407
Petrobras	Brazil	11.1	1,701	2,010
Petronas	Malaysia	24.9	731	4,172
ONGC	India	6.6	557	2,486
Sonangol	Angola	2.2	332	6
Statoil	Norway	4.3	740	1,921

Source: Petroleum Intelligence Weekly, 2003 (table to be updated with new PIW survey)

*CNPC reserves and output reported as PetroChina

Annex A:

Universe of Significant NOCs

Enterprise Name	State Ownership (%)	Country	Oil & Gas Reserves (Bboe)	Liquids Output (1000 bpd)	Gas Output (MMcf per day)
Saudi Aramco	100% state	Saudi Arabia	300.9	9,045	6,900
NIOC (National Iranian Oil Co)	100% state	Iran	295.2	3,852	7,640
INOC (Iraqi National Oil Council)	100% state	Iraq	134.8	1,330	239
KPC (Kuwait Petroleum Co)	100% state	Kuwait	109.0	2,170	1,054
PdVSA (Petroleos de Venezuela)	100% state	Venezuela	104.4	2,500	4,000
ADNOC (Abu Dhabi National Oil Company)	100% state	U.A.E.	79.2	1,200	4242
Libya NOC	100% state	Libya	44.3	896	617
NNPC (Nigerian National Petroleum Co)	100% state	Nigeria	40.2	2166	677
Pemex	100% state	Mexico	18.7	3,723	3,244
Qatar Petroleum (QP)	100% state	Qatar	133.143	660	2,144
Gazprom	38.37% state	Russia	191.5	221	52,244
PetroChina	90% state	China	18.4	2120	2,407
Sonatrach	100% state	Algeria	37.3	1729	7,807
Petrobras	51% state	Brazil	11.1	1701	2010
Petronas	100% state	Malaysia	24.9	731	4,172
Pertamina	100% state	Indonesia	20.96916	1139	2562
Petroecuador	100% state	Ecuador	4.5621	204	10
ONGC	84% state	India	6.64662	557	2486
Sinopec	55% state	China	3.77684	742	514
PDO	60% state	Oman	6.5068	702	1284
Socar	100% state	Azerbaijan	5.535	178	500
Rosneft	100% state	Russia	27.1806	393	678
Kazmunaigas	100% state	Kazakistan	2.514	150	130
Sonangol	100% state	Angola	2.232	332	6
Syrian Petroleum (SPC)	100% state	Syria	2.8958	317	510
EGPC	100% state	Egypt	7.39152	375	1611
Statoil	82% state	Norway	4.28848	740	1921
Ecopetrol	100% state	Colombia	2.2692	292	594
CNOOC	71% state	China	2.18372	306	291
Norsk Hydro	43.8% state	Norway	2.31006	395	753
PetroKazakhstan	private	Kazakistan	0.35368	151	
PTT	100% state	Thailand	1.03666	19	555
Forest Oil	78% state	Finland	0.22644	24	266
INA	100% state	Croatia	0.1995	24	179
CPC	100% state	Taiwan	downstream only		
IOC (IndianOil)	82.03% state	India	downstream only		