NOCs and the Global Oil Market: Should We Worry?

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Energy Seminar
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Largest Reserves Holders are NOCs

*Wood Mackenzie commercial + technical reserves as of Oct 2009

(Reserves figures on working interest basis)

**Data Source:** Wood Mackenzie
Largest Producers are NOCs

(Production figures on working interest basis)

Data Source: Wood Mackenzie
Role of NOCs in Oil

Oil Reserves* as of Oct 2009
(top 1460 petroleum companies)

- PESD 15 NOCs: 56%
- Other NOCs: 17%
- Majors: 9%
- Other IOCs: 18%

Total = 1.5 trillion barrels
*Wood Mackenzie commercial + technical reserves

2008 Oil Production
(top 1460 petroleum companies)

- PESD 15 NOCs: 46%
- Other NOCs: 15%
- Majors: 16%
- Other IOCs: 23%

Total = 77 million barrels/day
(94% of world total)

NOCs control 73% of world oil reserves and 61% of world oil production

Data Source: Wood Mackenzie Corporate Analysis Tool
Role of NOCs in Natural Gas

Gas Reserves* as of Oct 2009 (top 1460 petroleum companies)

- PESD 15 NOCs: 46%
- Majors: 12%
- Other NOCs: 22%
- Other IOCs: 20%

Total = 1.2 trillion barrels oil equivalent

*Wood Mackenzie commercial + technical reserves

(All reserves and production figures on working interest basis)

NOCs control 68% of world gas reserves and 52% of world gas production

2008 Gas Production (top 1460 petroleum companies)

- PESD 15 NOCs: 37%
- Majors: 17%
- Other NOCs: 15%
- Other IOCs: 31%

Total = 48 million barrels oil eq/day (93% of world total)

Data Source: Wood Mackenzie Corporate Analysis Tool
Should We Worry?

...about the future of private oil companies?

...about NOCs as geopolitical weapons?

...about the effect of NOCs on price?

...about the environmental impacts of NOCs?
How NOCs are Different and Why It Matters
Our Sample of 15 NOCs
Some are active abroad

Natural gas too (and sometimes a lot else)

A stretch in describing many NOCs

SCEIWH = State-Controlled Entity Involved With Hydrocarbons
NOCs Produce Their Reserves More Slowly

Data Source: Wood Mackenzie Corporate Analysis Tool (2009)
(Working interest production and commercial + technical reserves)

Why?
• Poor performance?
• Inflation of reserves estimates?
• Deliberate strategy?
Oil Company Goals

International Oil Company (IOC) objectives
• Maximize and grow profits
Principal-Agent Theory

- **Principal**
- **Agent**

**Government**
- Oil Company
  - Private
  - State-Owned

**Incentive/monitoring scheme**

- Different objectives from principal (e.g. most pay for least work)
- Knows more about its performance (“information asymmetry”)
Oil Company Goals

International Oil Company (IOC) objectives
• Maximize and grow profits

National Oil Company (NOC) objectives (many are possible)
• Maximize and grow profits
• Provide major portion of government budget (many, including Mexico, Venezuela, India, Nigeria, Algeria)
• Subsidize domestic fuel (e.g. Venezuela, Iran)
• Provide social programs / employment (e.g. Venezuela)
  – Programs can also be used to build political base
• Serve as government implementing agent (e.g. Venezuela)
• Provide for “energy security” of country (e.g. Brazil)
• Pursue foreign policies aims of government (e.g. Russia?)
• Extend lifetime of resources (e.g. Qatar, Saudi Arabia?)
<table>
<thead>
<tr>
<th>Level of Burden</th>
<th>Social Goods</th>
<th>Private Goods</th>
</tr>
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</table>
| High           | **Gazprom** *(subsidized domestic gas)*  
* NIOC *(fuel subsidies; social programs)*  
* NNPC *(fuel subsidies)*  
* PDVSA *(post-strikes)* *(fuel subsidies; social programs)*  
* Pemex *(high taxes, spent by government for broad public purposes)* | **NIOC** *(rents to security and police groups that back ruling elites)*  
* NNPC *(political patronage; contracts and “lifting licenses” to associates; senior posts as political plums)*  
* PDVSA *(post-strikes)* *(political patronage)* |
| Upper middle    | **CNPC** *(employment)*  
* KPC *(employment of Kuwaitis in general)*  
* Sonatrach *(high taxes, which government uses to pursue macroeconomic stability goals)* | **Gazprom** *(investments benefiting elites)*  
* KPC *(elite employment)*  
* ONGC *(nepotism; contract corruption)*  
* Pemex *(patronage through unions)*  
* Sonatrach *(political patronage)* |
| Lower middle    | **ADNOC** *(training/employment)*  
* ONGC *(employment; some CSR)*  
* PDVSA *(pre-strikes)* *(fuel subsidies)*  
* Petrobras *(tool for energy self-sufficiency and to supply domestic markets)*  
* Petronas *(fuel subsidies; high taxes in Malaysia, spent by government for public purposes)*  
* Saudi Aramco *(support diversification of economy and Saudi employment)*  
* Sonangol *(fuel subsidies)* | **CNPC** *(senior posts as political plums)*  
* Petronas *(private banker and political tool for prime minister)*  
* Sonangol *(education and employment for elites)* |
| Low            | **Statoil** | **ADNOC**  
* PDVSA *(pre-strikes)*  
* Petrobras  
* Saudi Aramco  
* Statoil** |
The Impact of State Goals on Performance

<table>
<thead>
<tr>
<th>Performance in hydrocarbon functions</th>
<th>Non-hydrocarbon burden</th>
<th>Upper middle</th>
<th>Lower middle</th>
<th>Low</th>
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<tr>
<td>High</td>
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Large Non-Hydrocarbon Burden → Low Hydrocarbon Performance
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...about the effect of NOCs on price?

...about the environmental impacts of NOCs?
Risk and the Hydrocarbon Industry

Investment: $100M
Payoff: $0

Investment: $100M
Payoff: $0

Investment: $100M
Payoff: $500M

Investment: $100M
Payoff: $0
Risk $\rightarrow$ Uncertainty + Capital at Risk

Source: Nolan and Thurber 2010
“Obsolescing Bargain”

**Frontier**
- Reserves creation
- Major exploration and field development

**Proven/Mature**
- Reserves extraction
- Field surveillance, maintenance & Secondary Recovery

**Frontier**
- Reserves creation
- Tertiary Recovery

**Investment risk**

**Field maturity**
## Managing Risk: IOCs vs. NOCs

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<th>Risk Management Strategy</th>
<th>Context for IOCs</th>
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<td>2) Diversify risk through a global portfolio</td>
<td>Must compete globally for best opportunities</td>
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Going Abroad

NOC moves abroad spurred by perceived resource insufficiency at home

Data Source: Wood Mackenzie Corporate Analysis Tool
## Managing Risk: IOCs vs. NOCs

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<td>3) Use connections to get resources to customers</td>
<td>Global reach</td>
<td>Domestic focus</td>
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<tr>
<td>4) Reduce capital costs through skillful engineering</td>
<td>Cost reduction drives profit and survival</td>
<td>“Soft budget constraint”; govt. appropriates profits</td>
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<td>5) Share risk with other companies</td>
<td>Partnerships with IOCs and NOCs</td>
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=> IOCs tend to be more effective risk managers
Managing Risk:
NOCs, IOCs, and the Deepwater Frontier

Data Source: Wood Mackenzie PathFinder database
There Will Always Be Hydrocarbon Frontiers
=> IOCs Will Always Have a Role

Classification of Partnerships Between NOCs and IOCs, 1990-2011

Source: PESD Database of NOC-IOC Partnerships (2012)
The Unconventional Gas Frontier

Source: PESD Database of NOC-IOC Partnerships (2012)
Should We Worry?

...about the future of private oil companies?  **NO.**

...about NOCs as geopolitical weapons?

...about the effect of NOCs on price?

...about the environmental impacts of NOCs?
Should We Worry?

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Using the NOC as a Geopolitical Tool

Obstacles

1) Issues of Risk and Investment Climate

2) Principal-Agent Relationship
Principal-Agent Theory

Government

Principal

Incentive/monitoring scheme

Agent

• Different objectives from principal (e.g. most pay for least work)
• Knows more about its performance ("information asymmetry")

Oil Company
- Private
- State-Owned

Moves abroad often driven by the NOC, to assert autonomy
Ways NOCs Could Be Geopolitical Tools

1) Cut off energy exports to serve political goals of government (Gazprom?)

2) Use domestic resource access to forge political alliances (PDVSA?)

3) Project political influence through oil and gas activities abroad, while “locking up” scarce resources (CNPC and other Chinese NOCs?)
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Economic factors often at root of cross-border pipeline disputes

- Russia-Ukraine gas disputes were high-stakes price negotiations
- Russia-to-China gas pipeline on hold due to gas price disagreements
Gas Consumers More Likely to “Shut Off the Tap” Than Suppliers

Initiators of Natural Gas Contract Interruptions

- User Country (5)
- Supplier Country (3)
- Transit Country (4)

Source: Victor, Jaffe, and Hayes (2006) case studies of international gas projects
Ways NOCs Could Be Geopolitical Tools

1) Cut off energy exports to serve political goals of government (Gazprom?)

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Developing Venezuela’s Orinoco Belt

“Magna Reserva” reserves certification project

• Create a “multipolar world” through NOC-NOC tie-ups

• None except Lukoil has any heavy oil experience

Actual “heavy lifting” will be done by companies that know heavy oil
Ways NOCs Could Be Geopolitical Tools

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Only an est. 10-20% of oil produced overseas by China’s NOCs makes it back to China (Dirks 2006)

Energy security might have been original govt. motivation for “going out,” but bigger factor today is CNPC’s desire for autonomy
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Ways NOCs Could Influence Price

1) Exercise of market power
2) Deliberate depletion policy
3) Governments pursue “target revenue” through NOCs
OPEC as a Poorly-Enforced Cartel

• Saudi Aramco plays lead role in maintaining excess capacity, which:
  – Allows exercise of market power (especially when demand is high)
  – Discourages investments in alternatives (fossil or non-fossil)

• Poor regulation of cartel creates price volatility, further discouraging potential competitors
NOCs in theory can help states optimize savings (as $ or oil in ground) through deliberate choices in hydrocarbon development. Price will be higher if NOCs produce less than IOCs as a result.

Source: Stevens 2012
Target Revenue Model and “Backward Bending Supply Curves”

**Idea**

1) Governments seek certain revenue to fund budgets ("target revenue")
2) When demand shifts out & price increases => less pressure on governments to maintain/increase quantity supplied
3) Governments rely more on less efficient NOCs rather than IOCs
4) Weak supply response to price increase
5) Higher prices, and volatile with demand

NOC case studies appear to support this mechanism
Should We Worry?

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Ways NOCs Could Affect the Environment

1) Through effects on oil price
   • Keep oil price high
     (boost vehicle alternatives; hurt oil-indexed natural gas)
   • Keep oil price volatile
     (discourage coal-to-liquids, oil sands; discourage non-fossil energy)

2) Through weak environmental standards
   • Gas flaring is still a major problem

3) Through fuel subsidies
   • Environmentally & fiscally disastrous but politically compelling
Fossil Fuel Consumption Subsidies

Source: IEA World Energy Outlook 2010
Benefits from Removing Subsidies

Figure 19.5 - Impact of fossil-fuel consumption subsidy phase-out on global primary energy demand.

Figure 19.8 - Impact of fossil-fuel consumption subsidy phase-out on global energy-related CO₂ emissions compared with the Current Policies and 450 Scenarios.

Source: IEA World Energy Outlook 2010
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Thank You