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Doubling down

National oil companies as instruments of risk and reward

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Abstract: National oil companies tend to elicit unequivocal views. To political leaders within petroleum-producing countries, they often represent a *sine qua non* of a strategy capable of delivering long-term benefits to citizens. To many international analysts and donors, they represent vestiges of an outmoded statist perspective that discourages investment, encourages corruption, and delivers fewer benefits to the country than a purely private-sector approach. The reality lies somewhere in between these poles. Many national oil companies have enabled their governments, over the long term, to exert stronger control over their oil sectors and capture a larger share of rewards from the industry. But relying heavily on a national oil company carries certain fundamental risks—both the standard business risks of a volatile sector and particular governance risks inherent to the space they occupy at the intersection of commercial interests and the state's allocation power. This paper argues that decisions about how large a role to give a national oil company in the execution of an oil-sector strategy and the management of public financial resources should be based on a careful assessment of the size of the potential rewards and the state's tolerance for these fundamental risks. It then examines the most important risk mitigation techniques that governments have used to increase the likelihood that their national oil companies will deliver strong economic returns and remain accountable to citizens.

Keywords: state-owned enterprises, national oil companies, oil and gas
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1 Introduction

State-owned oil companies have proven themselves capable of reaching tremendous heights—as generators of public revenues and stewards of core industries—and devastating lows—as squanderers of national resources and agents of corruption. Sometimes, both sides of this dichotomy can be illustrated by the same company. In recent years, no company has provided a more dramatic example than Brazil's Petrobras.

Coming of age during Brazil's period of military rule, Petrobras became an increasingly skilled and effective company throughout the 1960s and 1970s, developing particular expertise in deep-water exploration and production. The Brazilian oil sector was opened to competition in the 1990s, and Petrobras continued to thrive, generating secure petroleum resources and revenues for the state, helping stimulate a thriving Brazilian private sector in oil services, and expanding its operations overseas (de Oliveira 2012). By the 2010s, industry 'experts' were hailing Petrobras as a model of commercial efficiency (Heller et al. 2014).

The company's positive image came crashing down in 2014, with the public revelation that Petrobras had sat at the centre of a multi-billion-dollar bribery and price-fixing scheme. Petrobras directors had conspired with a cabal of Brazil's leading construction companies to rig massive procurement processes and award contracts to participants in the conspiracy at inflated prices. Corrupt officials were rewarded for their efforts with bribes upward of US$2 billion. The impact of this 'Operation Car Wash' scandal on Petrobras was dire. The company had to write down US$17 billion in direct and indirect losses from the scandal, and saw its share price fall by 80 per cent from its 2014 high point to the end of 2015. The scandal devastated Brazil's economy and rocked its political system to its core, resulting in the indictments of hundreds of public officials and industrial titans, undermining confidence in the economy and contributing heavily to the political destabilization that culminated in the impeachment of President Dilma Rousseff (International Monetary Fund 2016; Leahy 2016).[1]

At its best, Petrobras illustrated the reasons that so many countries have invested in national oil companies (NOCs) as centrepieces of their strategies for developing their oil and gas sectors. The world's most successful NOCs, including Norway's Statoil, Saudi Arabia's Saudi Aramco, and Malaysia's Petronas, have maintained vigorous exploration programmes, delivered strong returns on public resources, decreased long-term reliance on costly private partners, and/or helped promote the rise of a technocratic class of private businesses and professionals.

But Petrobras' fall from grace underscores a set of risks common to NOCs, which in many cases have resulted in a net negative contribution to oil-sector management. At the core, these enterprises' positions at the intersection of public policy, commercial ambition, massive economic rents, and networks of elites leave them particularly vulnerable to being used as vehicles for patronage. In many cases, weak incentives or management structures also render them ineffective developers of petroleum reserves, which can mean they waste significant portions of the public resources they are entrusted with overseeing.

NOCs can increase their governments' share of long-term rewards from the oil and gas sector. In virtually all cases they expose their governments to risk, both financial (via the reinvestment of

[1] The formal rationale for Rousseff's impeachment was improper manipulation of the budget, not the 'Car Wash' scandal. But the scandal was one of the major flash points that led to the crisis in confidence in the government.

petroleum revenues back into the unpredictable industry itself) and political (via the kinds of patronage mechanisms to which Petrobras so spectacularly fell prey and via principal–agent problems that sometimes lead the company's goals to diverge from the government's). Rather than examining the question of whether or not a state should create an NOC, this paper takes as a given that almost all non-Organisation for Economic Co-operation and Development (OECD) oil producers already have one. The study focuses instead on constructing a risk–reward lens oriented around an attempt to inform the kinds of practical questions that governments face in managing their NOCs; namely:

- *what* commercial investment strategies are most likely to maximize return on investment;
- *how* public oversight and corporate governance measures can enhance performance incentives and reduce the most serious risks; and
- *how much* public revenue should be entrusted to the NOC to manage in order to balance reinvestment in the sector against other public expenditure needs.

An environment of low global oil prices poses a special set of challenges to which NOCs must respond. Well-managed NOCs have been able to develop projects efficiently even when prices are high and money flows freely. But many companies become bloated during boom times, failing to sufficiently take advantage of opportunities and deliver sufficient benefits to their countries. Many of these companies face crises when volatile oil prices fall, as has happened at the time of the writing of this paper. Lean times force NOCs to cut costs and seek efficiency gains. As such, a moment of crisis can offer an opportunity for some NOCs to implement reforms with long-term benefits, but only if they focus on systemic corporate governance and accountability commitments that are robust even to the pressures of plenty that will return if prices rise again.

After this introduction, Section 2 provides a brief review of the key literature on state-owned enterprises (SOEs), emphasizing a typology of different types of NOCs and some of their fundamental characteristics. Section 3 constructs the central analytical lens of the piece, classifying the most important risks and modes of assessing potential rewards. Section 4 offers a practical response, outlining some of the strategies that have been demonstrated to maximize the chances that rewards will be realized and to mitigate risks. Finally, Section 5 provides concluding thoughts, with a particular emphasis on the specific challenges surrounding NOC governance during times of low petroleum prices.

2 SOEs: context and core characteristics

There is a rich scholarship on the role that SOEs play in the management of modern economies, and about some of the problems associated with entrusting key sectors to SOEs. These enterprises are often given a privileged role in critical sectors of the economy based on the multiple ambitions of enabling the state to meld the management of strategic industries to policy priorities (particularly in highly regulated sectors); generating positive externalities that benefit citizens; building up a targeted class of skilled managers and technocrats; and generating financial returns to the treasury (Megginson and Netter 2001; Victor et al. 2012).

Much of the empirical work around SOEs generally has focused on their commercial performance vis-à-vis that of private companies, with the preponderance of studies showing that private companies tend to be more efficient and to generate stronger financial returns than SOEs (Boardman and Vining 1989; Megginson and Netter 2001; Shirley and Walsh 2000). Several inherent factors contribute to these performance challenges, most of which, following Shirley and Walsh, can be categorized as 'incentive effects' (stemming from the weak incentives for SOE

managers) and/or 'information effects' (stemming from a weak relationship between data on performance and decisions/imperatives for SOE actions). Specific problems include the following:

- *Mixed mandates.* The goal of private-sector firms is clear: profit maximization. SOEs are often called upon to pursue profits while simultaneously promoting other public goods, which can impede clear strategy, hinder rigorous performance monitoring, and create incentives to distort markets (Sappington and Sidak 2003).
- *Politicized and bureaucratized decision-making.* Politicians and bureaucrats—often with limited commercial skills and experience—can play a disproportionate role in SOE management by virtue of shareholding rights and, in many cases, their appointment and remuneration powers.
- *Reduced competition.* Some SOEs enjoy total monopolies in their sectors; others are subject to some competition but benefit from systemic advantages—via access to markets, inputs, or financing. This means that these enterprises can continue to operate (and often to dominate) even in the presence of substantial inefficiencies.
- *Difficulty in accessing replenishment capital.* The fiscal relationships between SOEs and the state are often complex and unpredictable, with SOEs sometimes being used as 'cash cows' by the treasury. This can make it difficult for these enterprises to have the financial predictability to plan effectively and address problems when they arise.

SOE efficiency problems can result in the wasting of public resources invested in them, and poor provision of the public goods they are expected to provide. Beyond these efficiency concerns, many SOEs have been involved in corrupt activities and have further weakened economic governance through self-dealing or abuse of the power they occupy at the intersection of public oversight and market participation (Kane and Christiansen 2015).

Nonetheless, SOEs have played an important role in the management of national petroleum sectors across the world since a wave of nationalizations swept the Middle East and Latin America in the 1970s. Today, more than 90 per cent of the world's top per capita oil and gas producers have an NOC, with the major exceptions being OECD countries such as the United States, Canada, and United Kingdom (Myers 2015). At a global level, NOCs have been estimated to control 90 per cent of global oil reserves and 75 per cent of production (Tordo 2011).

Like SOEs in other sectors, the performance of NOCs has been chequered. Some NOCs have generated strong financial returns and other public goods, including innovation, stimulation of a domestic class of oil-sector technocrats, and effective promotion and oversight of the sector. But on average, research indicates that NOC commercial performance lags significantly behind that of private-sector international oil companies (IOCs) on most industry-standard measures (Eller et al. 2007; Victor 2007; Wolf 2009; see Table 1). Studies that have examined NOC performance in the light of their broader range of objectives have presented mixed conclusions, with strong successes such as Statoil (Norway) and Saudi Aramco balanced against failures such as Venezuela's Petróleos de Venezuela (PDVSA) and the Nigerian National Petroleum Corporation (NNPC) (Heller et al. 2014; Tordo 2011; Victor et al. 2012).

Table 1: NOC average commercial performance vs private oil companies, 2002—04

	Revenue per employee (US$)	Revenue per reserves (US$)
NOCs	1,000	5
Major IOCs	2,865	15
Other IOCs	1,629	11

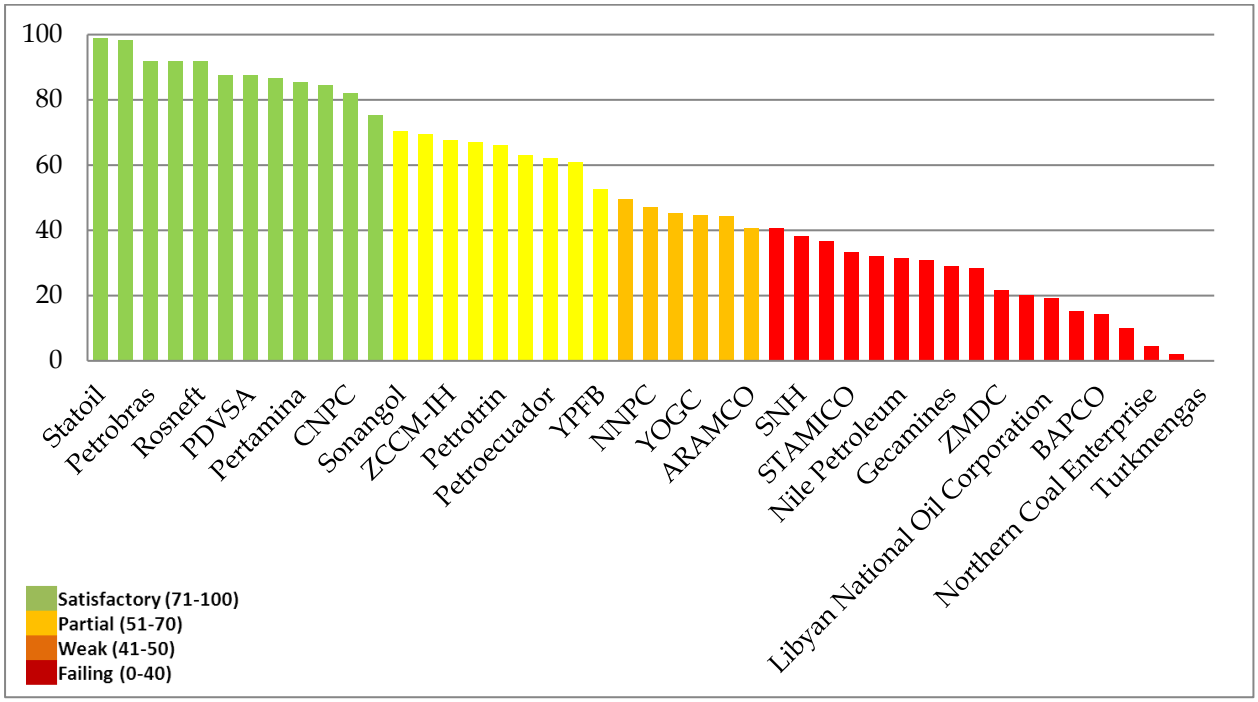
Source: based on Eller et al. 2007.

SOEs in the oil sector are subject in many cases to exacerbated versions of the general challenges facing SOEs in other sectors, particularly vis-à-vis corporate governance. Oil is a classic 'rentier' sector, whereby the state has the power to manage and distribute huge flows of public wealth without facing public pressure to stimulate innovation or maintain the consent of the governed (Karl 1997; Ross 2012). Because of the massive revenues that can be generated by petroleum, and the complexity of the processes necessary to get it out of the ground, NOCs often find themselves managing larger flows of public revenues than SOEs in other sectors. They sit at the intersection of the state's distributional power, the company's own ambitions for growth and a swirling pool of private interests trying to gain access to this lucrative and strategic sector. As such, many NOCs have experienced weak incentives for efficient performance, and strong temptations for patronage. NOCs have been key players in large-scale corruption scandals in countries ranging from Nigeria to Brazil to Russia.

With some exceptions, NOCs have not been subjected to the kinds of strong oversight and reporting requirements that promote strong corporate governance in the private sector. The Resource Governance Index, which measures accountability mechanisms in oil- and mineral-producing countries worldwide, found that only 12 of the 45 SOEs in its sample demonstrated satisfactory governance (Natural Resource Governance Institute 2013; see Figure 1).[2]

[2] The 2013 Resource Governance Index evaluated the governance of the extractive sectors in 58 countries, including 45 with SOEs. Each country's score is assessed via a 173-country survey divided into four core categories: institutional and legal setting, reporting practices, safeguards and legal controls, and enabling environment. For an explanation of the overall methodology of the Index, see www.resourcegovernance.org/resource-governance-index/methodology. The ranking for SOEs displayed in this graphic is based on a subset of questions addressing each SOE's transparency, oversight, and clarity of responsibilities—see www.resourcegovernance.org/resource-governance-index/report/state-owned-companies. A new version of the Index, with an expanded assessment of SOE governance, is to be published in 2017.

Figure 1: Resource Governance Index—SOE scores



Source: Natural Resource Governance Institute (2013).

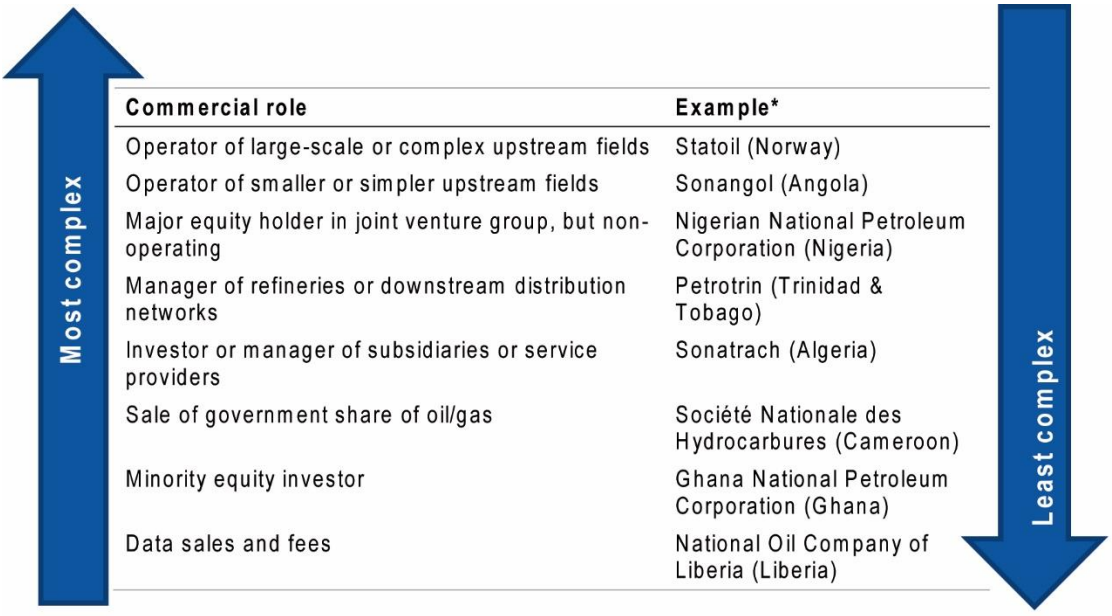
3 Analysing risk and reward

3.1 Key choices and lenses of analysis

The significant ambitions ascribed to NOCs, and their frequent failure to meet these ambitions, point to the need for governments to engage in rigorous analysis as they set up, structure, and manage their NOCs. This need is particularly pertinent in some of the new oil and gas countries that are only now beginning to exploit large reserves (examples include Tanzania and Kenya). The question in most countries is not *whether* to have an NOC—the vast majority of current and prospective oil producers, with limited exceptions, already have one (or several), and few countries are likely to eliminate them. Rather, the question is *what kind* of NOC can best achieve the country's goals, and *how* to create the right incentives for performance.

Three questions are particularly critical. First, the government should decide what kind of *commercial mandate* the NOC will be empowered to pursue. NOC commercial mandates vary dramatically, as is appropriate given the wide divergence in capacities and oil-sector prospects across countries (Heller and Marcel 2011). The aspirations of Saudi Aramco are thus necessarily of a different order of magnitude than those of a company like the National Oil Corporation of Kenya. Figure 2 elaborates.

Figure 2: Spectrum of NOC commercial roles



Commercial role	Example*
Operator of large-scale or complex upstream fields	Statoil (Norway)
Operator of smaller or simpler upstream fields	Sonangol (Angola)
Major equity holder in joint venture group, but non-operating	Nigerian National Petroleum Corporation (Nigeria)
Manager of refineries or downstream distribution networks	Petrotrin (Trinidad & Tobago)
Investor or manager of subsidiaries or service providers	Sonatrach (Algeria)
Sale of government share of oil/gas	Société Nationale des Hydrocarbures (Cameroon)
Minority equity investor	Ghana National Petroleum Corporation (Ghana)
Data sales and fees	National Oil Company of Liberia (Liberia)

Note: many NOCs play several of these roles simultaneously. The inclusion of a company as an example of a particular role on this list does not imply that this is the only role the company plays. Angola's Sonangol, for example, is simultaneously an operator of smaller/simpler upstream fields, a major non-operating shareholder in some fields, the manager of refineries and distribution networks, the owner of subsidiaries, the seller of government oil and gas, and a minority equity investor.

Source: author.

Second, the government should decide what, if any, kinds of *non-commercial* roles to empower NOCs to carry out. While some analysts suggest that an enterprise should refrain altogether from non-commercial activities, the reality is that almost all NOCs engage in some degree of non-commercial work, and in some cases this mixing of responsibilities has been compatible with efforts to build skills and knowledge over time (Thurber et al. 2011). Table 2 illustrates some of the most common tasks. The assignment of some non-commercial responsibilities can enable a new producer to begin to increase capacity by concentrating resources in one public institution, and can thereby support the delivery of important public goods to citizens (Marcel 2016a). But such assignments can damage NOCs' commercial efficiency, by saddling them with costly burdens that divert resources away from the core commercial goals. They can impede effective performance monitoring by muddying fundamental goals and benchmarks. And they can create conflicts of interest by ostensibly requiring NOCs to enforce regulations against themselves or to choose between themselves and other prospective contractors.

Table 2: NOC non-commercial roles*

Role	Purported justification	Potential drawbacks	Example
Regulatory			
Leaders of efforts to draft laws/regulations	NOC can be most knowledgeable/skilled government body	Conflict of interest, over-extension of company, may distort orientation of sector rules	National Oil Company of Liberia (Liberia)
Licensing of rights to private companies	NOC is knowledgeable/skilled, may be well-positioned to choose its partners	Conflict of interest	Petronas (Malaysia)
Approving and monitoring company work programmes, de facto or de jure enforcement of legal rules	NOC has closest access to projects	Conflict of interest, over-extension	Sonangol (Angola)
Quasi-fiscal			
Providing large-scale public employment	NOC may have resources to cushion labour-market stresses, deliver income to population	Cost burden, damage to company efficiency, potential for corruption	China National Petroleum Corporation (China)
Building public infrastructure	NOC may be most competent, financially strong government entity	Cost burden, potential for corruption, distracts from core mission	Saudi Aramco (Saudi Arabia)
Providing social services	NOC may be most competent, financially strong government entity	Can weaken other government institutions, cost burden, potential for corruption, distracts from core mission	PDVSA (Venezuela)
Managing subsidized fuel programme	Nexus between extraction and consumer fuel needs	Cost burden, potential for corruption	NNPC (Nigeria)

Note: many NOCs play several of these roles simultaneously. The inclusion of a company as an example of a particular role on this list does not imply that this is the only role that company plays.

Source: author.

Third, the government should decide how to allow the NOC to finance its mandate. These companies can be stewards of huge portions of public revenues—in countries ranging from Azerbaijan to Angola more than half of all government revenue passes through the hands of the NOC. This creates a dilemma. In order to execute their commercial and non-commercial programmes, some NOCs have to spend extensively, on operating costs and investments. The leadership of these companies often lays claim to hold on to large shares of the revenues that they capture. But if the NOC is allowed to control too great a share of public revenues, it risks becoming a sort of parallel treasury that reinvests the lion's share of public gains from the sector back into oil and gas, or spends on public goods outside of the ordinary institutional procedures of government. This can subvert effective and accountable fiscal management.

In making these decisions, this paper posits that many governments would be well-served to conduct more concentrated risk–reward analyses of available options, and to share the results of these analyses with the public. Such an approach can lead to a better matching of strategy to the state of the country's oil sector, quality of its institutions, level of dependence of oil revenues, and ability to withstand failure.

3.2 Categorization of risks

Government officials sometimes focus on the upside potential of major investments in an NOC—and the national pride that the company can amplify—without systematically assessing how likely the upside is to be realized in practice or how costly failure would be. Following are two basic categories of risks that countries face when investing in NOCs.

Commercial/financial risk

Making an investment in an NOC can mean that the government ends up with fewer economic benefits than it would have had absent such an investment. For purposes of this discussion, it is useful to think in terms of a hypothetical upstream oil project, and presume two stylized options. Under the first option (referred to as the 'British Option') the state does not involve an NOC in the project at all: instead it awards a licence to a private company and extracts financial benefits purely by taxing that company.

Under the second option (the 'Saudi Option'), the NOC has exclusive dominion over the project, exploring and operating the field itself (and hiring any contractors it may need to get the job done). Here, the idea is that the NOC will invest upfront as necessary to execute the project effectively, and that the state will ultimately derive financial benefits via taxes, dividends, or other transfers from the NOC to the treasury, and also from any other non-commercial benefits that may accrue (public employment, ancillary infrastructure, etc.).

Over the long run, if the government chooses the Saudi Option, it may hope for stronger overall returns. By cutting out the middleman (private company), a larger share of rents from the project can stay in the country. But in order to generate this potential, the government needs to pay, today. It will itself have to spend on building up a set of core competencies and staff—hundreds or thousands of skilled technical staff members—in order to become a major operational player (Marcel 2016b). And it will have to invest in project-specific capital and operating costs.[3] In executing a project in this manner, there are several elements of financial risk.

- *Geology*. This is the most significant risk. Exploration is expensive, and usually fails. Research by a global energy research firm showed that only 8 per cent of wells drilled in 'frontier' countries—those without previous discoveries or production—yielded a commercially viable play from 2011 to 2015. Even in mature oil producers, the success rate was only 36 per cent (Myers 2016). In general, the more promising are the oil plays that exist within a country, the better an NOC may be able to spread its geological risk. When a state opts for an NOC to be responsible for exploration—as opposed to assigning that responsibility to a private company—the burden of any exploration failure falls on the public purse.
- *Market fluctuations*. Extractive industries are notoriously volatile, and periods of low prices can devastate the returns on investments.
- *Performance divergence*. For the reasons discussed above, an NOC may be less efficient than private-sector oil companies, which may mean that the government choosing the Saudi Option will be less likely to see the project carried through successfully to production, but

[3] Note that if we deviate from the stylized all-or-nothing hypothetical, an NOC can defer some of these project costs by having its interests in a project 'carried' through the exploration or development stage by private partners. This reduces risk meaningfully, but the government is still responsible for repaying its share of costs out of any revenue stream ultimately generated by the project.

more likely to see it managed so inefficiently that it wipes out most or all of the benefits deriving from the state's exclusive control.

- *Opportunity cost.* Revenues reinvested in the oil sector via NOC projects are not available for immediate public investment, including in growth-promoting sectors such as infrastructure or education. Sometimes a cycle of reinvestment lasts for years or decades, with a strong share of NOC revenues being returned into the company in a continual bet on future returns. Table 3 shows that many oil producers have tied up large sums of national assets in their NOCs (Manley et al. 2016). For comparative purposes, the table shows what NOC asset holdings represented as a percentage of total government spending in that year.[4] A period of low prices or of repeated project failures can mean that years of sector revenues are wasted without an appreciable impact on national development.

Table 3: Public assets held by 100 per cent NOCs, 2014

Country (company)	Total assets (US$ million)	State assets as percentage of annual government expenditure
Angola (Sonagol)	54,496	103
Azerbaijan (SOCAR)	30,684	135
Indonesia (Pertamina)	49,507	30
Malaysia (Petronas)	164,531	181
Mexico (PEMEX)	160,119	44
Qatar (Qatar Petroleum)	110,031	164
Venezuela (PDVSA)	226,760	104

Source: company annual reports, author's calculations.

The British and Saudi options represent the two extreme poles of the spectrum of commercial roles assigned to NOCs, and the choices that a government makes about what kind of role the company can play. The key is that a dollar invested in the NOC is a dollar of public funds put at risk. The more complex a role that the government assigns the NOC (i.e. the further towards the top the company sits among the range of options shown in Figure 2), the greater is the risk that the government is undertaking with public revenues.

Governance risks

In addition to the financial risks associated with putting public revenues into play via a national company with commercial aspirations, poor management of (or by) NOCs can disrupt the governance of the oil and gas sector or even the economy as a whole. These risks are elevated when the NOC is assigned significant regulatory or quasi-fiscal responsibilities. These can take several forms.

First, a country can discourage private investment if would-be participants in an oil market perceive that the playing field is uneven and that NOCs are accorded special privileges. In order to generate the confidence necessary to invest the huge sums associated with exploration and development, oil companies want assurances that commitments will be honoured. Oil executives routinely cite the fear that assets will be 'nationalized' (i.e. handed over to the NOC) or that project decisions will be forced upon them midstream by NOC partners as one of the biggest risks their companies

[4] This is an admittedly crude proxy for the opportunity cost of the allocation of assets to SOEs, as the accumulation of assets takes place over the course of years or decades. But it is listed here to show the relative size of NOC assets in terms of the total public sector. Upcoming research by the author examines the relationship between NOC assets as revealed in financial statements and various measures of public assets and government activity.

face (Ernst & Young 2013). At an extreme, uncertainty about excessive grants of NOC access to the best geological resources or the power of NOCs to force project decisions can cause oil companies to avoid a market altogether. Venezuela has been one of the strongest recent examples of this risk—strong fears of dramatic retrenchments of private oil company contractual rights in favour of PDVSA have made the country too risky for some oil companies. At a minimum, oil companies price these concerns into their assessments of the value of a project and the fiscal terms they will accept.

Second, the enforcement of generally applicable rules can be weakened significantly if the NOC is not subject to strict oversight. In order for its oil sector to be managed effectively and in the interests of the public, a country needs strong legal rules covering issues ranging from fiscal oversight to environmental protection to health and safety. Many countries have enforced these rules weakly or inconsistently vis-à-vis the NOC, either because the NOC enjoys *formal* regulatory power (and is thus in the conflicted position of ostensibly overseeing itself) or because it exercises *informal* political power that protects it from the strictures of the rules. This increases the likelihood that oil projects will fail to deliver promised economic results or, worse, that dangerous incidents may occur without redress. It also damages the prospects for the development of strong public institutions. In countries such as Nigeria, the NOC is widely perceived to play outside of the rules, exercising power through a tapestry of informal levers. This has dramatically hindered the development of strong systems of financial and environmental control, resulting in continually disappointing financial returns from the NOC to the state and a persistent state of conflict and environmental damage.[5]

Third, for the reasons cited above, NOCs have too frequently been at the centre of large corruption scandals, many of which have spread to the broader economy or polity. The Petrobras pay-for-play scandal is the most dramatic recent case, but other examples abound. In Congo-Brazzaville, the government has been accused of selling public oil through an intermediary company controlled by the head of the NOC Société Nationale des Pétroles du Congo (SNPC). A Norwegian company was sanctioned both in Norway and the United States for paying US$5 million into the accounts of the director of the National Iranian Oil Company in order to secure access to a major Iranian gas field.

3.3 Assessment of potential rewards

As is noted above, some NOCs have contributed extensively to their countries' efforts to develop an efficient and profitable oil sector that delivers benefits to their countries, including, but not limited to, extensive revenue flows. But in order to make a country's investment in an NOC a net-positive proposition, the government needs to map the precise benefits that it hopes to derive from its NOC, and the conditions necessary for those benefits to come to pass. This step is sometimes overlooked by governments, as is the need to assess trade-offs between different goals.

Among the benefits that NOCs can deliver to their states and the conditions for their achievement are the following:

- *Larger revenues.* For countries at a relatively early stage of oil-sector development, relying heavily on an NOC as a commercial player rarely generates greater revenues to the state than would relying on private companies and taxing them effectively. Minority equity stakes do not generally produce financial returns beyond those that could otherwise be

[5] For an understanding of the frequency and scope of oil spills in Nigeria, see the *Nigerian Oil Spill Monitor* at https://oilspillmonitor.ng.

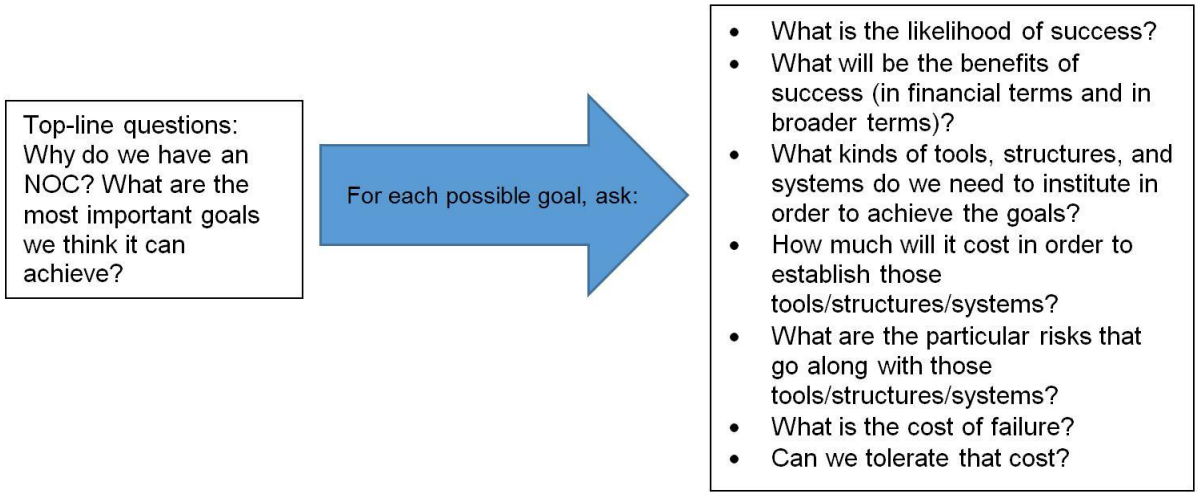
captured via other fiscal mechanisms (Natural Resource Governance Institute 2014). And especially during early years, assigning responsibility to an NOC to manage oil fields itself is likely to result in efficiency losses as the company develops its competence from an initially low base. But over time, if an NOC succeeds in developing itself as a skilled and efficient project manager, the state can successfully extract a greater share of revenues deriving from production, without having to rely heavily on private contractors. Various NOCs in the Middle East, Latin America, and Asia have demonstrated the long-term potential of these enterprises as effective revenue generators. In order for this goal to be realized, a country needs a sufficient supply of oil or gas to provide for a long enough period of production for the NOC to build economies of scale and develop its capabilities (Heller and Marcel 2011).

- *Greater control over the pace of oil-sector development.* Governments often want to manage the development of an oil sector strategically, timing the pace of exploration and extraction according to national macroeconomic goals, a desire to maximize long-term production levels, or the aim of building up national capacities/systems before extracting large quantities of petroleum. Managing this pace of development can be difficult if a government is working overwhelmingly with private contractors, which are driven by their own market-oriented time frames. Planning projects principally through an NOC can enable a government to exercise greater control (see Lahn and Stevens 2017; Stevens et al. 2015).
- *Building a nexus of domestic expertise in the sector.* Countries such as Malaysia and Angola have used the NOC as the place where human and financial resources are concentrated in the early stages of oil-sector development. NOCs are often able to attract the country's best talent, benefiting from more flexible compensation systems than government ministries. Some countries have chosen to 'mass forces' in the NOC as a way to build a body most capable of developing and enforcing a strategy for the sector. This sort of concentration approach carries a greater risk of conflict of interest, but those risks have been deemed acceptable by governments in many new producer countries (Thurber et al. 2011).
- *Promoting local content and positive economic spillovers.* Many governments see their NOCs as the most natural champions of efforts to use the oil and gas sector as an incubator for small and medium enterprises that service the oil sector and that ultimately can develop into dynamic companies in their own right. Such responsibilities can be imposed upon private/foreign oil companies, but embedding them in the core mandate of an NOC is often seen as a clearer route to place local content at the core of the business. Further, the successful development of a local content strategy can be a key to transforming exhaustible petroleum resources into something more sustainable.

3.4 Putting the pieces together

The various different considerations that have been set out above work together to determine the type of NOC structure and systems that will be most suitable in any particular country context. When a government makes decisions about how to structure its NOC, or indeed when the NOC's own leadership sets out its strategy, they need ideally to examine the foregoing elements of risk and potential reward side-by-side. Doing so can provide an opportunity to be more systematic and realistic, and to tailor plans more effectively. Asking a basic sequence of questions such as those set out in Figure 3, and conducting the in-depth analysis necessary to answer those questions, can also aid effective policy-making and execution. Figure 3 illustrates the basic sequence.

Figure 3: Key questions for NOC goal-setting



Source: author.

In practice, some NOCs—ranging from commercially sophisticated giants such as Statoil and Qatar Petroleum to more limited-mandate companies such as tiny Staatsolie of Suriname—have engaged in this kind of strategic and systematic assessment. However, such concerted strategic decision-making remains the exception rather than the rule. Other NOCs have a mixed decision-making record, executing thorough strategic planning on several aspects of their business while occasionally bowing to the idiosyncratic demands of the political system. And still others are more purely reactive to the ebbs and flows of national politics, and have failed to develop coherent strategies.

4 Mitigating risks and making rewards more likely to materialize

The precise contours of the risk–reward analysis discussed above will vary based on the characteristics of the oil endowment of each country, the quality of institutions, and the state of economic development. But there are certain strategies for how to manage an NOC that have been demonstrated to reduce risks and increase the chances of success across a range of countries.

Perhaps most importantly, it is important to define the roles and responsibilities of the NOC as clearly as possible. Major problems arise where the contours of what the NOC is allowed and required to do are unclear, or where the lines of authority between the NOC and other government agencies are blurred. This is particularly problematic in countries where the NOC engages in non-commercial activities. Blurred lines of responsibility and scope can damage the NOC's commercial bottom-line, because they saddle the company with non-core responsibilities that lack clear limits. They also impede good governance, by obscuring channels of accountability and requiring stakeholders to navigate complex systems. Across a range of different types of NOCs, with different sorts of mandates, the countries that have reduced ambiguity and inefficient overlaps in responsibility have tended to see better performance. Colombia's Ecopetrol, for example, has over time been increasingly absolved of what were once a large set of non-commercial activities, and allowed to focus energy and resources on its economic bottom-line. Even some NOCs with mixed mandates—such as Malaysia's Petronas—have been able to develop commercial units with clear mandates and benchmarks that have kept focused on business success.

Given the tensions around revenue flows, with NOCs advocating for larger shares of revenue flows and ministries of finance pushing for these companies to pay more to the treasury, instituting

a clear system governing revenue transfers is particularly important. When payment flows between the company and the state are subjected to the whims of the government or of company executives, the results can seriously impede planning, both within the company and for the national budget. In a worst-case scenario, the company becomes a state within a state that plays an outsized role in public spending. A clear and easy-to-understand system not only enhances public planning, but can also make it easier for the public to track the decisions that the NOC is making on the use of public resources. The easiest systems to comprehend are those that subject NOCs to the same rules that apply to private taxpayers, such as in Norway and Brazil. But these systems may not deliver adequate shares of oil revenue to the state in some countries, so where special rules apply to the NOC, they should be transparent and easy to track.

The most successful countries have developed governance mechanisms to promote strong incentives for effective NOC performance. These mechanisms can broadly be grouped into three categories:

- *Corporate governance* tools within the NOC to promote accountable and effective management, including strong standards for Board membership, merit-based hiring and promotion, internal ethical standards, anti-corruption training, and whistleblower protections for employees who report malfeasance. Additionally, the conduct of rigorous and independent audits by highly skilled, independent auditors is perhaps the most important mechanism to promote sound financial management. Examples of companies that have implemented such tools are Malaysia's Petronas and several Persian Gulf NOCs.
- *Intragovernmental checks and balances*, such that the executive and the legislature can hold NOC company leadership accountable for their performance. Among these measures are the establishment of clear goals and performance targets, and the assessment of company leadership against those targets; consistent reporting by the NOC to its 'shareholder' ministry within government; and the requirement that the company provide detailed reports to the legislature and appear before the legislature when summoned. Norway and Colombia are often considered the countries that have developed the strongest such checks and balances.
- *Public reporting systems* that can give citizens a clear picture of how NOCs are managing national resources. NOCs should publish clear annual reports with detailed financial information—including income statements, balance sheets, and cashflow statements. The public also benefits from detailed information about the NOC's plans, budgets, operational activities, and internal management policies. Several prominent NOCs—including many in Latin America and Asia-Pacific—provide very extensive public reports. Middle Eastern and African NOCs—including giants such as Saudi Aramco and Nigeria's NNPC—have had weak public reporting to date.

5 Conclusion: NOCs in times of plenty, and of scarcity

Much of the recent scholarship on NOCs has been developed with tacit or explicit framing within the context of the high-price era, with a concomitant focus on helping countries maximize the opportunities presented by their oil and gas wealth via NOCs. At the time of writing, the world was ensconced in what appears likely to be a sustained period of lower oil and gas prices. The price fall has hit NOCs particularly hard, and across the world these companies have been forced to shelve projects, cut costs, or take on new debt in order to keep going.

This low period in the decades-long cycle of oil-price volatility has laid bare some of the risks inherent in government choices to invest heavily in NOCs as a core of their sector development

strategy. By doubling down on the country's dependence on the oil sector—i.e. reinvesting revenues in the sector, via the NOC—governments give themselves the opportunity to extract larger shares of the benefits during boom times. But they leave themselves doubly exposed when times are more difficult, with the negative impact being felt in the national budget and with struggling entities needing to be propped up as national 'flagships'.

But in the midst of this period of crisis for many countries may lie the opportunities for reform that can help reduce the risk of similar swings in the future. NOCs from across the world—from major producers such as Azerbaijan and Malaysia to countries that are not yet producing oil, such as Liberia—have announced a range of measures to try to strengthen their balance sheets, including reducing personnel budgets, selling their interests in risky exploration plays, and eliminating investments in non-core or money-losing ventures. The elimination or reduction in fuel subsidies in a range of countries—including such seemingly unlikely places as Saudi Arabia and Venezuela—could also prove a boon to the finances of NOCs that have carried a heavy burden.

These responses to market challenges could have a long-term impact, helping NOCs to become leaner, better managers of public resources in the long-term, if they are sustained. But that is a big 'if', and past efforts to tighten NOC operations during tough times have tended to be pushed aside by patronage and bloat when prices rise again, reducing the benefits that accrue to the companies' public shareholders. The key for the NOCs that have been able to remain focused and efficient in times of plenty—including Colombia's Ecopetrol, Norway's Statoil, and Malaysia's Petronas—has been a strong commitment to corporate governance, transparency, and oversight. If they wish to take advantage of this period of fiscal crisis to implement durable reforms, governments and NOCs in other countries can aim for systemic reforms that commit the companies to stronger technocratic management and internal decision-making, tougher performance incentives and protections for whistleblowers, and better public communication. They would also be well-served to use this moment to reflect carefully on the risk–reward calculus, and adapt strategies to hit an optimal balance for the long term.

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