

Exporting the “Norwegian Model”: The effect of administrative design on oil sector performance

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ABSTRACT

Norway has administered its petroleum resources using three distinct government bodies: a national oil company engaged in commercial hydrocarbon operations; a government ministry to direct policy; and a regulatory body to provide oversight and technical expertise. Norway's relative success in managing its hydrocarbons has prompted development institutions to consider whether this “Norwegian Model” of separated government functions should be recommended to other oil-producing countries. By studying ten countries that have used widely different approaches in administering their hydrocarbon sectors, we conclude that separation of functions is not a prerequisite to successful oil sector development. Countries where separation of functions has worked are characterized by the combination of high institutional capacity and robust political competition. Unchallenged leaders often appear able to adequately discharge commercial and policy/regulatory functions using the same entity, although this approach may not be robust against political changes. Where institutional capacity is lacking, better outcomes may result from consolidating commercial, policy, and regulatory functions until such capacity has further developed. Countries with vibrant political competition but limited institutional capacity pose the most significant challenge for oil sector reform: Unitary control over the sector is impossible but separation of functions is often difficult to implement.

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1. Introduction

Since 1972, Norway has separated policy, regulatory, and commercial functions in the government's administration of petroleum development. This approach, particularly its requirement that the national oil company (NOC) only carry out commercial activities, has inspired admiration and imitation as the canonical model of good bureaucratic design for the hydrocarbons sector. Development institutions have explored whether oil-exporting countries should adopt this so-called “Norwegian Model” of administrative design as a route to both better performance and enhanced transparency in their hydrocarbon activities (Collins, 2003; Al-Kasim, 2006b; Nore, 2009). (The “Norwegian Model” of revenue management through a savings and stabilization fund has been examined by other researchers¹ and is not a subject of this study; hereafter, we use the term Norwegian Model to refer specifically to an administrative design that separates commercial from policy and regulatory functions in hydrocarbons.)

Among the countries in which the Norwegian template has been promoted are several whose political and institutional

dynamics vary significantly from those prevailing in Norway. In Nigeria, where the oil industry has been beset for decades by inefficiency and corruption, legislation is being considered that would create a separation of institutional roles strikingly parallel to that of Norway, with a National Petroleum Directorate setting policy (in the manner of Norway's Ministry of Petroleum and Energy), an independent commercial NOC analogous to Norway's Statoil, and an autonomous regulator in the mold of the Norwegian Petroleum Directorate (NPD). In new petroleum frontiers across Asia and Africa, governments are examining the Norwegian Model as a means of promoting dynamism and good governance amidst heavy exploration and nascent production. In Latin American countries such as Brazil and Colombia, policy makers have parceled out regulatory functions to autonomous agencies after decades of operation in which NOCs largely filled those roles. And in research and technical assistance projects throughout the world, advisors from international institutions and donor governments – including Norway itself – treat a strict separation of functions as something of a *sine qua non* of effective oil sector governance.²

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¹ See, for example, Velculescu (2008) and Skancke (2003).

² One of the strongest explicit endorsements of separating commercial and regulatory responsibilities was found in the 2009 version of the Natural Resource

At the same time, a noteworthy strand of the development literature cautions in a general sense that governance strategies that work well in countries with mature institutions may be ill-suited to countries lacking certain institutional endowments (Grindle, 2004, 2007; Moore and Putzel, 1999; Rodrik, 2008). To the extent that this is true, reformers would be well-advised to carefully consider the attributes of a specific oil sector context before encouraging the use of a particular “best practice” like the Norwegian Model.

Our current work is motivated by this very practical question of where and when policymakers and reformers should promote the administrative design of separated functions. To derive recommendations in this area that are supported by real-world data across a variety of oil sector contexts, we ask two specific research questions. First, is implementation of the Norwegian Model a universal prerequisite for good oil sector performance? Second, what are the conditions under which the separated functions approach is likely to offer the most benefit? Our ultimate goal is a heuristic that can help policymakers and development agencies assess what kind of oil sector administrative strategy is likely to prove most effective in improving oil sector performance in a particular country at a particular stage of its development.

To answer these research questions, we draw substantial case study data from a new study from Stanford University that examines a number of the most important national oil companies around the world (Victor et al., forthcoming). The Stanford project’s focus on government-NOC relations facilitates detailed comparison of how commercial, policy, and regulatory responsibilities have been allocated in different countries and the role of these administrative choices in shaping outcomes. We selected a sample of 10 countries from the larger study that offers substantial variation in institutional capability, political system, and whether the Norwegian Model has been tried. Our sample consists of the following countries: Algeria, Angola, Brazil, Malaysia, Mexico, Nigeria, Norway, Russia, Saudi Arabia, and Venezuela.

In the remainder of this study we proceed as follows. First, we consult relevant literature to articulate the theory that animates both research questions: theory on how application of the Norwegian Model might be expected to benefit oil sector performance, and how institutional and political variables might mediate the functioning of the Norwegian Model. Second, we explain our research method, laying out the specific hypotheses we will test, the important characteristics of our sample of countries, and our approach for testing the hypotheses with case study data. Third, we summarize our data in the form of capsule case descriptions that touch on the relevant aspects of administrative design, oil sector performance, and how institutional and political factors may have conditioned the relationship between the two historically. Fourth, we present our results for both research questions. Fifth, we discuss these results and speculate about what they may suggest about the broader relationships between administrative design, institutions, politics, and oil sector performance. Sixth, we conclude by offering practical guidance for policymakers and reformers based on this research.

(footnote continued)

Charter (2009), a collective effort by a respected group of academics and practitioners to help countries wisely manage their natural resource endowments. Precept 5 of the 2009 version of the *Natural Resource Charter* stated that “National resource companies should be competitive and commercial operations. They should avoid conducting regulatory functions or other activities.” (Natural Resource Charter, 2009, p12) Interestingly, the more recent version of the charter (Natural Resource Charter, 2010) appears to have eliminated this language, perhaps in part reflecting the results of studies such as the current one that show a more ambiguous relationship between a particular administrative model and oil sector outcomes.

2. Background and theory

Norway is well known for an administrative system in which it assigns oil sector functions to three state-controlled institutions, each with its own distinct role. First, there is the commercial entity, NOC Statoil, which today carries out extensive oil operations both in Norway and abroad. Second, there is the policy-making body, the Ministry of Petroleum and Energy. The Ministry works with (and has at various points guided) the country’s political leadership in setting goals for the sector, makes plans to achieve these goals, and oversees the crucial licensing process. Third, there is the regulatory and technical advisory agency, the Norwegian Petroleum Directorate (NPD), which compiles data on all hydrocarbon activities on the Norwegian Continental Shelf (NCS),³ collects fees from oil operators, advises the Ministry on technical matters, and sets hydrocarbon regulations related to resource management. This separation of roles and responsibilities between commercial, policy, and regulatory bodies became known as the “Norwegian Model” of oil sector governance (Al-Kasim, 2006a). For the purposes of this paper, the most salient separation is between distinct bodies performing commercial and policy/regulatory functions.⁴ (The question of how best to divide policy and regulatory roles among different government agencies is important but beyond the scope of this paper.⁵) We focus principally on policy and regulatory functions related to licensing and revenue collection, as these most directly affect the commercial prospects of oil operators including NOCs.

2.1. Theory of how the Norwegian Model works

Several authors have considered the possible benefits of separation of functions and related approaches to oil sector governance. Al-Kasim (2006a, 2006b) drew on his own deep involvement in Norway’s oil sector to describe the detailed elements that contributed to that country’s positive experience and assess their applicability in a developing country context. Espinasa (2008) studied six Latin American countries with NOCs, three of which put in place government bodies to administer hydrocarbon resources and three of which did not. He observed in his sample that the creation of government agencies with regulatory and policy authority generally had a positive effect on a country’s hydrocarbon performance. Without prescribing which functions should or should not belong to an NOC, Lahn et al. (2007) define general principles of good governance in the petroleum sector, which include “clarity of goals, roles and

³ The Norwegian Continental Shelf (NCS) constitutes the entire offshore region over which Norway has resource sovereignty. It includes parts of the North Sea, Norwegian Sea, and Barents Sea.

⁴ The reality is that even in Norway itself, the formal separation between policy and regulatory functions has actually been somewhat fluid. For example, the technical/regulatory body, the Norwegian Petroleum Directorate (NPD), reports directly to the Ministry of Petroleum and Energy; originally the NPD had a separate board but this was deemed unnecessary and abolished in 1991.

⁵ Norway’s allocation of specific policy and regulatory responsibilities among different government bodies has shifted over the years. The Norwegian Petroleum Directorate was responsible for regulation of resource management as well as health, safety, and environmental issues until the Petroleum Safety Authority was established in 2003–2004 to oversee the latter areas. The issue of whether revenue collection and licensing responsibilities should be combined with safety and environmental ones has received significant attention in the United States in the wake of the 2010 *Deepwater Horizon* oil spill in the Gulf of Mexico. After the incident, the U.S. Minerals Management Service, which had been responsible for regulating safety and environmental protection in addition to licensing and revenue collection, was reorganized. Multiple divisions were created in its place with separate jurisdiction over safety and environmental regulation on the one hand and licensing and revenue collection on the other. See the official report on the incident (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011) for discussion.

responsibilities” among government bodies. *Boscheck (2007)* notes that lack of clarity around regulatory responsibilities indeed has contributed to the problems in Nigeria’s oil sector. At the same time, *Boscheck* dissents from the view that the checks and balances associated with formal separation of functions represent the only feasible way to regulate an NOC. He uses a framework derived from institutional economics to suggest that modes of control ranging from regulation by an independent agency to direct supervision of the NOC by its political masters could be appropriate depending on the particular context.

The theory of how the separation of functions model might improve oil sector performance is built on several claims, which are supported in part by observations of how the model has worked in Norway. First, the NOC may be able to, and perhaps be forced to, focus more exclusively on its commercial activities, enhancing its operational performance and increasing the short- or long-term financial return to the state (*Espinasa, 2008; Al-Kasim, 2006a*). Second, the creation of autonomous policy and regulatory bodies may improve the ability of the government to monitor and benchmark both the NOC and other players in the sector, thereby improving performance (*Thurber and Istad, 2010*). Third, conflicts of interest – in which, for example, the NOC could use its regulatory or policy powers to privilege itself against competitors, or to privilege its (or its partners’) commercial interests over the revenue-generation goals of the state – are potentially reduced (*Al-Kasim, 2006a; Thurber and Istad, 2010*).⁶ Fourth, the state’s assertion of independent control over hydrocarbon policy and regulations may put it in a stronger position to prevent an NOC from capturing other state institutions (including political ones) and thus keep it from becoming a distorting and destabilizing “state within a state” (*Noreng, 1980*).

2.2. Theory of how bureaucratic and political institutions might play an intervening role

Given that much of the theory of Section 2.1 is derived from observations of Norway’s experience, we ask how well it will extrapolate to countries with substantially different bureaucratic and political institutions. The general idea that “best practices” applicable under certain institutional conditions can be ineffective or harmful when institutional prerequisites are absent is well-summarized by *Rodrik (2008)*. In an effort to understand how anti-poverty policies might need to be tailored to country-specific conditions, *Moore and Putzel (1999)* offer a typology of states, which is further elaborated by *Grindle (2007)*. Notably, their typology suggests that institutionalization (“rule through stable and legitimate organizations and procedures”⁷) and degree of political competition are two important variables affecting which states are susceptible of particular types of reform. Though the particular policy context is different, this previous work can offer a starting point for the current investigation of how the Norwegian Model transfers to other countries. There is also significant research specific to the oil sector on the way that institutions can drive or mediate outcomes. While the original “resource curse” theory posited a direct linkage between resource dependence and stunted economic growth, recent contributions have pointed to institutions as a crucial intervening variable (*Atkinson and Hamilton, 2003; Jones Luong et al., 2010; Stevens, 2003*) or even the principal causal variable (*Brunnschweiler and Bulte, 2008*) behind apparent instances of the “resource curse” or its absence.

⁶ In addition to helping ensure that the state’s interests are faithfully pursued, the elimination of such conflicts of interest can help maintain the attractiveness of the sector to private players.

⁷ Compare this definition of institutionalization from *Moore and Putzel (1999)* to the degree of rule of law within a country (*Hults, forthcoming a*).

There are several plausible mechanisms through which institutional quality could interact with administrative design to shape oil sector outcomes. As was the case throughout the development of Norway’s oil sector, a capable bureaucracy can offer the kind of regulatory and policy check on the activities of the NOC that is fundamental to how the Norwegian Model is intended to work—making sure, for example, that government revenue goals are pursued appropriately. Where such civil service institutions are strong and capable, they can continue to play this role even in the face of changes in political leadership. The presence of ample human capital and experience in public administration can allow countries to spread talent across various government bodies to create multiple checks and balances. In countries that lack such institutional endowments, a formal regulator or policymaker may be powerless in practice and vulnerable to NOC political lobbying and other forms of agency capture. In such cases, the country may be better served by concentrating its limited pool of technocrats and capable administrators in one body.

Political competition can be expected to factor in because the mediating role of institutions matters most where competition for power is strong. In politically vibrant states, the existence of a separate policymaking institution may enhance oil sector performance by shielding an NOC from the competing demands of different political actors and by synthesizing those demands into a coherent policy for the NOC to follow. When a leader faces few political constraints, by contrast, decision-making becomes more unitary, and the introduction of multiple institutional players into oil sector management may be futile, wasteful, or even counter-productive.⁸ Moreover, entrenched leaders may have longer time horizons and therefore share the long-term profit maximization goals of an NOC (though exceptions exist), reducing the need for separate policymaking and regulatory agencies to bend the NOC’s actions to the will of the government. Also, in environments of low political competition it is more likely that government leaders and NOC senior managers will come from the same group of elites and thus perceive their fortunes as rising or falling together. In countries where there is frequent movement between NOC and government top posts, these senior officials may even be the same people.

3. Research method

3.1. Hypotheses and methods for testing them

Based on the theory discussed above, we seek to test two hypotheses about the Norwegian Model, starting with the following:

Hypothesis #1. Where a country has an NOC, implementation of the Norwegian Model – defined as the separation of commercial from policy and regulatory functions of government – is strongly correlated with the performance of the oil sector.

To test this hypothesis, we need to characterize for each country whether separation of functions has been tried, whether the implementation was durable, and how the oil sector performs.

⁸ See *Whitford (2005)* and *Hults (forthcoming a)* for further discussion. We acknowledge that this discussion may have an element of circularity in implying that countries cannot develop institutional checks and balances unless they already exist. Generating the momentum necessary for dramatic institutional change is difficult in any context, but we would argue that in attempting to constitute a system or culture of internal institutional checks where none currently exists, the oil sector – usually characterized by massive revenue flows inexorably linked to the levers of state power – represents a particularly challenging place to start.

Because the case studies for each country consider the evolution of the oil sector over time, we are able to examine not only current day relationships but also the possible correlation between separation of functions and performance at particular times in the past. We are also able to evaluate whether there seems to be a causal link between implementation of separation of functions and improved performance.

Based on the capsule case study data in the following section, we perform a binary, yes–no characterization of whether a country has at any point in its history credibly separated commercial and policy/regulatory functions in the oil sector or whether it has always adopted a more integrated approach. This binary characterization maps to government policy choices in a relatively straightforward way. The only challenge in several cases is to distinguish serious efforts to reform oil sector performance through the creation of autonomous policy or regulatory bodies from strictly formal delineations of policy or regulatory agencies that do not provide genuine oversight. One indicator of which category a reform effort falls into is whether a policy-making or regulatory entity is ever able to produce an outcome to which the NOC is averse.

To measure performance, we consider the effectiveness of the upstream oil sector⁹ as a tool for reliably generating revenue to satisfy the short- and long-term objectives of the government.¹⁰ Oil sector performance could also be judged on various non-revenue dimensions, including the degree to which positive linkages are established to the broader economy, oil revenues contribute to broad-based development or poverty reduction, and desired safety and environmental metrics are met.¹¹ However, we focus narrowly on revenue optimization in the interests of parsimony and ease of comparison between countries, and because this is typically a fundamental sectoral goal that supports the non-revenue objectives of oil-exporting governments. We recognize that even this narrow notion of oil sector performance is somewhat subjective and difficult to quantify. We therefore rely again on a broad two-category approach rather than a finer-grained, but possibly misleading, assessment: Oil sector performance is characterized as either good, on the one hand, or fair/poor, on the other.

The theory laid out in Section 2.2 suggests that characteristics of institutions, both bureaucratic and political, can be a critical factor mediating any possible relationship between implementation of separation of functions and oil sector performance. Specifically, we hypothesize effects of *institutional quality* and *political competition* as follows:

Hypothesis #2. Higher levels of institutional quality and political competition increase the likelihood that the separation of functions model will be effective in boosting oil sector performance.

If Hypothesis #2 holds, we may find that sequencing of reforms is important, because separation of functions may not be effective in improving oil sector performance in a country until after a certain amount of institutional or political development has occurred.

⁹ We focus on upstream oil operations (i.e., exploration and production) because the upstream is the main driver of government oil revenue in most exporting countries.

¹⁰ We anticipate that a government usually has the objective of collecting as high a government take as possible without unduly deterring investment, except, perhaps, where the government has the desire to contain the impact of oil revenues on the country's broader economy and industrial structure, to cartelize the oil industry, or to preserve oil supply as part of a "depletion strategy" to optimize the country's revenues over the longer term.

¹¹ We expect, but do not test here, that revenue streams over time are linked to some, but not all, of these other performance dimensions.

In accordance with the theory discussed previously, we define *institutional quality* as a country's endowment of bureaucratic capability¹² to deliver effective policies and services in a durable way, providing continuity even in the face of changes in political leadership. To characterize institutional quality, we use the World Bank's Government Effectiveness index¹³ (World Bank, 2010; Kaufmann et al., 2009), which conforms closely to this definition and is also employed by Brunnschweiler and Bulte (2008) in evaluating the effect of institutional factors on oil sector outcomes. (Some indices of institutional capacity from the "resource curse" literature have lumped together characterizations along a number of distinct dimensions,¹⁴ but we believe this narrower definition of institutional quality as a measure of bureaucratic capability is more parsimonious and instructive for the purposes of the current investigation.)

We define *political competition* as the possibility that an executive and his or her political faction will lose power. It was more difficult to find a suitable representation of political competition than it was for institutional quality. The Polity IV dataset offers a composite measure of political competition (POLCOMP¹⁵); however, this index provides a typology of how political leaders are selected rather than the simpler assessment we seek of how vulnerable the political leaders in a country are to being replaced. In this spirit, we use a much simpler measure of political competition: the time since the last transition in the faction/party in power, with a breakpoint of 15 years ago¹⁶ to denote "low" versus "high" political competition.¹⁷ This is clearly a crude measure – among other shortcomings, its value will shift suddenly when transitions occur – but we find it captures threats to power better than more complicated codings with which we are familiar.¹⁸

Clearly a number of factors in addition to administrative design and its interaction with institutional quality and political

¹² Stevens (2003) notes the existence of effective bureaucracies in several oil-producing countries that appear to have avoided the "resource curse."

¹³ The Government Effectiveness index measures "perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies" (Kaufmann et al., 2009). This represents the overall quality of public government effectiveness, which in some countries may not reflect islands of competence built within the public bodies specifically responsible for oil. In countries like Brazil and Angola, the level of competence in the oil sector significantly exceeds the average government capacity.

¹⁴ The institutional quality index used by Sachs and Warner (1997) and in modified form by Atkinson and Hamilton (2003) groups together measures of rule of law, bureaucratic quality, corruption in government, risk of expropriation, and government repudiation of contracts. Eifert et al. (2003) create a stylized classification of political economies – mature democracy, factional democracy, paternalistic autocracy, reformist autocracy, and predatory autocracy – that describes characteristic political, legal, and bureaucratic institutions for each type.

¹⁵ Political Competition (POLCOMP) is a composite of variables in Polity IV measuring "regulation of participation" and "competitiveness of participation" in the political arena (Marshall et al., 2010).

¹⁶ We choose 15 years to partially account for multi-term leadership, political dynasties, and other phenomena that occur even in politically competitive states.

¹⁷ Even this simple measure is not always as straightforward as it seems. For example, the succession of King Fahd by Crown Prince Abdullah in Saudi Arabia was orderly and clearly represented continuity of the Al Saud ruling family—hence our classification of Saudi Arabia as having low political competition by the metric described. At the same time, the elevation of Abdullah, a half-brother to Fahd, was strongly resisted by the Sudairi faction of full brothers to Fahd (Henderson, 2009).

¹⁸ As noted, we acknowledge that this measure of political competition is fairly narrow. Some countries may be politically competitive even though no change in leadership occurs at the executive level. Political competition may threaten the leader's hold on power (even if the leader staves off those threats) or result in changes in the legislative and/or subnational levels. In most such cases, however, we would argue that the degree of political competition is relatively muted. We therefore adopt the broad, but indicative, measure of a faction/party's time in office as our proxy for political competition.

competition affect the success of hydrocarbons development in different countries. One of the most obvious *omitted* variables in our analysis is the nature of a country's hydrocarbon resources: how much total potential exists, how easy it is to exploit the country's geological endowments, and how significant the associated revenue would be in comparison with the size of the economy. However, this variable is extremely difficult to quantify,¹⁹ and we judged on balance that any attempt to do so would add significant complexity with little payoff in enhanced insight. Our goal in this work, after all, is not to develop a definitive theory of oil sector performance but rather to provide insight to policy-makers about whether a particular country is likely to be well-suited to separation of functions reforms.

3.2. Sample selection

Drawing from a larger research project at Stanford University that includes case studies of important global NOCs (Victor et al., *forthcoming*), we selected a sample of ten countries to examine: Algeria, Angola, Brazil, Malaysia, Mexico, Nigeria, Norway, Russia, Saudi Arabia, and Venezuela. Sample selection was based on several criteria. First, we sought an even split as to whether the Norwegian Model has been tried. Five of the ten countries (Algeria, Brazil, Mexico, Nigeria, and Norway) have at some point attempted to empower an autonomous body or bodies within government with responsibility for policy and regulation; the other five (Angola, Malaysia, Russia, Saudi Arabia, and Venezuela) have either made no such attempt or have vested would-be policy or regulatory bodies with so little actual power that the NOC retains practical control over all important decisions.²⁰ Nigeria and Algeria have tried but been unable thus far to create durable and effective separation of functions; as previously mentioned, Nigeria's current reform push represents another attempt to achieve this goal.

Second, we sought variation in geography and importance to the global oil market. We limited ourselves to countries that currently are or have prospects for becoming net hydrocarbon exporters, on the theory that these are the countries for which administrative design in the upstream hydrocarbons sector is most consequential. We explicitly chose to include the most significant players in oil (Saudi Arabia) and natural gas (Russia).

Third, to facilitate robust testing of Hypothesis #2, we included countries that vary widely in institutional quality and extent of political competition. Fig. 1 illustrates where the countries in our sample fall on our simple measures of institutional quality and political competition, delineating four quadrants with particular combinations of these attributes. Quadrant IV, of which Norway is the strongest example, features countries with high institutional quality and entrenched political competition. Quadrant III contains countries with high institutional quality but low political competition, with Malaysia as an archetype. Quadrant II indicates high political competition but limited institutional capacity – Nigeria is characteristic – and Quadrant I denotes low levels of both institutional capacity and political competition, with Angola being typical. Where not otherwise indicated, we represent each country's levels of institutional capacity and political competition with data from 2008. For the cases of Mexico, Venezuela, and Brazil, we also

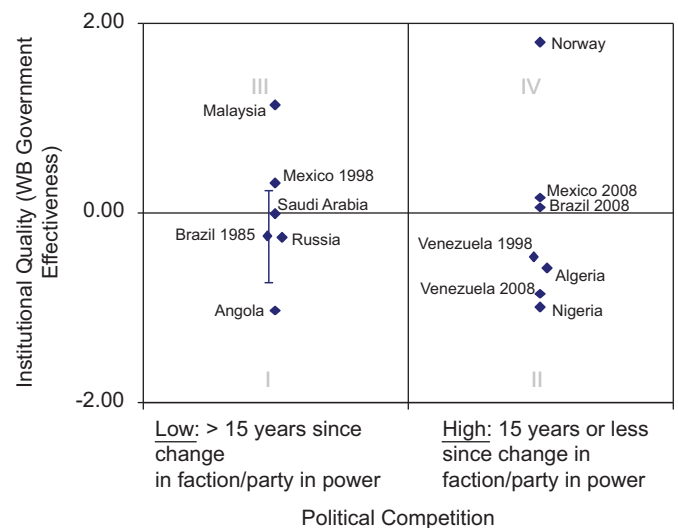


Fig. 1. Classification of countries in our sample on axes of institutional quality ("Government Effectiveness" from the World Bank's Worldwide Governance Indicators) and political competition (time since last transition in power). Data is for 2008 except where noted. There is no data for Government Effectiveness before 1996, so we crudely estimate Brazil's 1985 value as its 1996 value plus or minus an error bar equal to double the change in the index for Brazil between 1996 and 2008. Source: World Bank (2010) for Government Effectiveness; various sources for date of last transition in power.

consider contrasts with earlier time periods. While Fig. 1 will prove useful in structuring our discussion about the applicability of the separation of functions model, it clearly has limited ability to resolve finer details of institutional quality and, especially, political competition. Notably, Venezuela, Malaysia, and Russia have all experienced recent shifts in the political environment that are not reflected in the crude proxy of faction/party changes of power in the last 15 years. For example, while political competition arguably remains salient in Venezuela, President Hugo Chávez has taken significant steps to consolidate power since his original election in 1998, and the quality of government services has declined over the same period. Malaysia has been governed by the same political party since independence in 1957, but power has become appreciably more contested since the departure of long-serving Prime Minister Mahathir bin Mohamad in 2003.

4. Data

The data used to test both of our hypotheses consists of qualitative observations: of hydrocarbon sector performance, of how different countries have chosen to administer their sectors at different points in time, and of the role of institutional quality and political competition in mediating the effect of administrative design on performance. We begin with a tabular assessment of performance (Section 4.1) and then present our observations about how administrative design has affected the hydrocarbon development of different countries (Section 4.2). We use a comparative, discussion-based approach in the interests of readability and efficiency.

4.1. Characterization of performance

As described in Section 3.1, we qualitatively group oil sector performance into two categories according to how effectively a country has been able to develop its upstream oil sector to serve the revenue needs of its government. Factors affecting short- and long-term revenue generation capacity, and thus the overall

¹⁹ See Nolan and Thurber (2010) for one attempt to develop variables expressing geological risk. While their methods were useful for testing a theory about how risk affects state hydrocarbon choices, there were clear limits to how well they were able to characterize geological endowments.

²⁰ Venezuela presents a special case. Until the early 1990s, the holding company for Venezuela's NOC, PDVSA, discharged policy and regulatory roles whereas the NOC operating companies fulfilled commercial roles (Hults, *forthcoming b*). This division of responsibilities in some ways resembles the separation of functions approach, though both functions occurred within the NOC. We discuss the Venezuelan experience more fully below.

Table 1
Summary of oil sector performance for countries in our sample.

Country	Oil sector performance	Justification
Algeria	Fair/Poor	<ul style="list-style-type: none"> • NOC-led sector tends to perform well enough to meet government needs in high price periods but poorly in low-price ones, leading to cycles of opening and closing to international companies • Little positive change over time
Angola	Good	<ul style="list-style-type: none"> • Smooth functioning of internationally-operated projects • High government take from oil
Brazil	Good	<ul style="list-style-type: none"> • Major recent oil and gas discoveries and increasing production that have transformed Brazil from net importer to exporter • NOC is technological leader in deepwater activities
Malaysia	Good	<ul style="list-style-type: none"> • Successful development of domestic resources • High-functioning NOC built on indigenous talent, with some successful international operations
Mexico	Fair/Poor	<ul style="list-style-type: none"> • Declining production streams, putting government budgets at serious risk • Historical underinvestment in exploration • Paucity of domestic technical capability
Nigeria	Fair/Poor	<ul style="list-style-type: none"> • Frequent disruptions to production • Limited development of domestic companies with operational capacities • Red tape imposes additional costs, with significant negative impact on total revenue • Failure to develop natural gas resources to potential
Norway	Good	<ul style="list-style-type: none"> • Successful development of oil and gas as a driver of Norwegian economic growth and savings for future • Development of technology-leading NOC and Norwegian oil services industry
Russia	Fair/Poor	<ul style="list-style-type: none"> • Declines in major gas fields; oil production stable for now • Though currently the world's largest gas producer, future revenues are uncertain because capital and technology constraints are impeding development of new fields • Gas transport infrastructure is deteriorating • Government focused on reconsolidating control over oil
Saudi Arabia	Good	<ul style="list-style-type: none"> • Has maintained status as world's most important oil exporter for decades • Ensures future revenue streams by having an NOC that reliably meets project targets
Venezuela	Fair/Poor	<ul style="list-style-type: none"> • Major declines in production since 2003 strike and evisceration of NOC by President Chávez in response • Domestic technical capacity will be challenged by heavy oil

ranking of sector performance, include the ability of a government to find, develop, and produce oil and gas in a timely manner (whether through the NOC or another agent); to minimize disruptions to hydrocarbon operations; to maximize government take without deterring investment; to exert control over its hydrocarbons sector to ensure that revenue is produced in accordance with government objectives; and where possible to enhance indigenous technological capacity over time to increase the positive impact of oil activities on the local economy and thereby government revenue. We assess these factors based on the case studies in the Stanford project as well as the work of other researchers. The hydrocarbon sector performance rankings that result are provided in Table 1, along with capsule explanations of the rationales for our rankings.

4.2. Country experiences with separation of functions model or integrated approach to oil sector administration

Norway separated policy, regulatory, and commercial functions from the time of NOC Statoil's formation in 1972.²¹ Though it lacked expertise on the oil industry at the outset of hydrocarbon

activities in the mid-1960s, Norway had a high overall level of bureaucratic capacity and a long tradition of democratic competition and intra-governmental checks and balances. Through the Ministry of Industry (which later became the Ministry of Petroleum and Energy), Norway's strong and competent bureaucracy asserted control over hydrocarbon policy and licensing on the Norwegian Continental Shelf (NCS) as soon as the possibility of substantial oil resources became evident in the mid-1960s.²² Majority private firms, mostly foreign, controlled all exploration and production activities until Statoil was formed in 1972 as the government's commercial arm in petroleum. The Norwegian Petroleum Directorate (NPD) was created concurrently with Statoil to concentrate government competence in technical and regulatory matters, thus forming the third leg of the "Norwegian Model." Partly as a result of these administrative arrangements, Statoil was able to focus on developing its commercial capabilities to a greater extent than many NOCs. The Ministry was careful to involve international oil companies as well as Statoil's domestic competitors like Norsk Hydro in license groups to facilitate benchmarking of and leverage over Statoil's performance.²³ And when Statoil inevitably did try to leverage its growing political

²¹ It should be noted that Norway's particular sensitivity to separating the government's commercial ventures from its policy and regulatory functions stemmed in part from a 1962 mining accident on the Arctic island of Spitsbergen that killed 21 employees of a state-owned mining company.

²² This paragraph follows Thurber and Istad (2010).

²³ Involvement of carefully selected IOCs was also intended to facilitate efficient resource development as well as opportunities for Norwegian players to learn from the strongest international operators.

clout for commercial advantage, the Ministry and NPD were able to play at least a partial counterbalancing role.

On the whole, Norway's story of petroleum development has been a positive one: the country developed its oil successfully and at a pace that was set at least somewhat deliberately by government; Statoil developed technological capabilities that helped kick start a broader domestic oil services industry; the government mostly kept Statoil's power in check; and the state collected and continues to collect significant revenues which were prudently deposited in a fund for both savings and stabilization purposes. Norway's success stemmed from many factors, but the separation of functions approach was certainly one element of the country's positive experience.

Latin America offers several examples of oil sectors in which government agencies were created as stewards of the nation's petroleum resources after NOCs had already been in place for some time. As described in detail by Espinasa (2008), Brazil, Colombia, and Peru all created government policy and/or regulatory agencies in recent years. While acknowledging the many factors in play and the various differences between these countries, Espinasa suggests that the creation of such agencies generally had a salutary effect by creating a more level playing field and allowing or forcing each NOC to become more commercial in its approach. Brazil saw production, wells, and reserves all increase appreciably following the creation of the *Agência Nacional do Petróleo, Gás Natural e Biocombustíveis* (ANP) in 1997 (Espinasa, 2008); already strong NOC Petrobras was partially privatized in 2000 and has become an even more efficient player since, with major recent exploration successes (de Oliveira, forthcoming). Petrobras has continued to develop and prosper under the more formalized checks and balances put in place with the creation of the ANP, but it is difficult to conclusively link the development of the company to the separation of powers. Petrobras first came into its own as a competitive and technologically advanced player between 1965 and 1985, when Brazil's overall administrative competence was relatively low and political competition was stifled by military rule (de Oliveira, forthcoming). During this period, Petrobras occupied a privileged position within the Brazilian oil industry and played a strong quasi-regulatory role with few formalized checks and balances in oil governance. The successful move to a separation-of-powers model was made only after institutional competence – in the oil sector particularly, but also more generally – had improved and more checks and balances had been incorporated into the political system.

The other two Latin American countries in our sample, Mexico and Venezuela, rely on monopolistic NOCs that directly execute petroleum policy on behalf of the state (Espinasa, 2008; Stojanovski, 2008; Hults, forthcoming b). Both Mexico and Venezuela have struggled in recent years with falling production and underutilization of available resources due to insufficient NOC technical capability and effort in exploration and development; however, Mexico's Pemex was capable through at least the 1970s and Venezuela's PDVSA in the 1990s was considered to be among the highest-performing NOCs in the world (Stojanovski, 2008; Hults, forthcoming b). The causes of their declines are complex. In Mexico, despite a generally competitive political system, Pemex retains a legal monopoly on all oil projects, and the company has been unable to invest successfully in the maintenance and development of the country's fields. (Mexico's energy reform in late 2008 did attempt to increase regulatory oversight, including through the creation of a technical regulator, the National Hydrocarbons Commission, but it is still too early to fully assess the results.) In the case of PDVSA, President Hugo Chávez sacked 30–40% of its workforce after the company launched strikes against him in 2002 and 2003, amidst a broader effort to tighten executive control of the economy and society. The strikes against

Chávez reflected PDVSA's status as a “state within a state” of sorts, a situation which has reversed itself as the weakened company now acquiesces to direction from the president (Hults, forthcoming b).

Russia's recent experience in oil and, especially, natural gas in some ways parallels Venezuela's. In both countries, leaders have consolidated power politically – Chávez in Venezuela, Vladimir Putin in Russia – and taken command over previously independent NOCs. Both countries also suffer from relatively weak institutions. Illustrating this weakness, Russia's Federal Tariff Service is a de jure regulator of the country's most important NOC, Gazprom, but in practice is a clear example of agency capture by the NOC (Victor and Sayfer, forthcoming).²⁴ And in both countries, overall hydrocarbons performance has lagged in part as a result of poor NOC performance in recent years. Despite being the world's largest natural gas producer by far, Gazprom has struggled to update its aging infrastructure and remains saddled by expensive political obligations, including below-market-price sales to the domestic market and significant involvement in poor-performing non-core activities (Victor and Sayfer, forthcoming). The similarities between Gazprom and PDVSA should not be overstated, however. Unlike PDVSA, Gazprom competes for minority equity investors on the stock exchange. It also competes, at least on paper, for exploration projects with private companies operating in the Russia oil sector (Victor and Sayfer, forthcoming). But competition has brought only limited benefits. Indeed, Russia's performance in oil and gas is vulnerable in part because, as in Venezuela, the political leadership has exploited short-term gains from the hydrocarbons sector at the cost of its long-term health.²⁵

In contrast to Russia or Venezuela, several other countries we consider tried to separate regulatory and commercial functions in oil but were unable to robustly establish such a separation in anything other than a strictly formal sense. Nigeria, for example, started its oil industry with formal organizational relationships surprisingly similar to, and in fact pre-dating, those of Norway. Prior to Nigerian government direct participation in oil, the Ministry of Mines and Power had the task of managing the concessions given to foreign operators to extract the country's oil. In 1970, those working on hydrocarbons within the Ministry were split off as the Department of Petroleum Resources (DPR) to handle the growing regulatory demands (Nwokeji, 2007). With the creation in 1971 of Nigeria's original NOC, the Nigerian National Oil Company (NNOC), the Ministry, DPR, and NNOC formed a triumvirate quite similar in formal relationship to what Norway would create a year later with the Ministry of Industry, NPD, and Statoil.

Whereas in the Norwegian case all three government bodies were able to hold their own and balance the others (although the NPD took some time to establish its niche), Nigeria's triad rapidly deteriorated in the face of a domineering permanent secretary at the Ministry who was able to subdue and eviscerate both NNOC and the civil servants at DPR (Nwokeji, 2007). In response to the disastrous management of Nigeria's oil sector under this tripartite arrangement in the 1970s, and with the logic that it would be better to consolidate Nigeria's limited human talent in petroleum, NNOC and DPR were combined to form the Nigerian National Petroleum Corporation (NNPC) in 1977. Formal regulatory independence was

²⁴ The Federal Tariff Service sets domestic gas prices but only after consulting with Gazprom (Victor and Sayfer forthcoming).

²⁵ In accord with our conception of the dependent variable, we acknowledge that governments may make different choices about their short-term and long-term needs from the oil sector. Our argument is that Russia and Venezuela have prioritized short-term political needs to such an extent that the oil sector cannot meet the revenue goals of the state in the future.

re-established in the 1980s, eliminated in 1998, and re-established again in 1999.²⁶ However, even in periods of formal regulatory oversight (including the present one), the regulator has been unable to procure sufficient resources to effectively oversee and control the oil industry. The principal reason is that Nigeria's political system is built on a patronage network fueled by oil revenue, and those in power have been disinclined to support the development of a truly autonomous regulator that could constrain their ability to distribute spoils to kin and associates (Thurber et al., 2010). The reform bill that is currently facing an uncertain fate in the Nigerian legislature once again attempts to construct a strong regulatory agency; it also seeks to turn NNPC into a more commercial company by removing its regulatory functions and giving it control over its own cash flow.

Algeria, another country with little traditional separation between the government's commercial and policy functions in oil (Marcel, 2005), attempted a similar reform. Algeria's 2005 Hydrocarbons Law aimed to transfer regulatory responsibility from NOC Sonatrach to new government regulatory agencies, with the idea that this would create a level playing field for competition and in the process help the NOC to sharpen its commercial capabilities (Entelis, forthcoming). The 2005 law did lead to the creation of two new formal agencies with policy and regulatory functions: the *Agence Nationale pour la Valorisation des Ressources en Hydrocarbures* (ALNAFT), charged with collecting taxes and royalties, granting exploration contracts, and approving development plans; and the *Autorité de Régulation des Hydrocarbures* (ARH), designated as the regulator of midstream and downstream activities (Entelis, forthcoming). However, as in the Nigerian case, political actors benefiting from oil patronage (including, as in Nigeria, a formerly supportive president²⁷) have acted forcefully to head off real change. Amendments to the hydrocarbons law in 2006 restored Sonatrach's highly preferential position in licensing, with continued closeness among the heads of government agencies and Sonatrach executives casting further doubt on the genuineness of regulatory and commercial separation (Entelis, forthcoming).

The same patronage dynamic that has undermined efforts to create true regulatory and policy bodies in Nigeria and Algeria also causes oil sector performance more generally to fall short of potential in both of these countries. Inefficiencies in revenue collection arise as officials channel resources to associates. Short time horizons of competing elites lead to policies geared more toward creating niches for middlemen than establishing a favorable long-term investment climate. (In both countries, incentives for foreign investment tend to be put in place on an ad hoc basis in response to crises in revenue generation, due for example to declines in oil price.) This generally short-term outlook is also not compatible with the sustained focus on institutional and human capacity development that would support development of either regulatory and monitoring capacity within government or domestic technological capability.

²⁶ See Nwokeji (2007) for detailed discussion of the Nigerian regulatory experience.

²⁷ The trajectories of Algeria's 2005 reform effort and Nigeria's current one have been astonishingly similar in many ways, including in the following respects: (1) thrusts of the attempted reform effort include giving the NOC control over its revenues and creating an independent regulator; (2) the NOC's central function as a tool of patronage causes entrenched interests to block reform; and (3) reform was led by a highly-competent, former high-level OPEC official (Rilwanu Lukman for Nigeria, Chakib Khelil for Algeria) who was at least partially betrayed in the effort by a President (Obasanjo in Nigeria, Bouteflika in Algeria) who seemed interested in reform in theory but did not want it to negatively affect his own ability to deliver spoils and stay in power. In the Nigerian case, the Oil and Gas Reform Implementation Committee (OGIC) recommendations that were ignored by President Obasanjo did go on to become the core of the Petroleum Industry Bill (PIB) under his successor Umaru Yar'Adua, although as mentioned Yar'Adua's regime did not push the Bill into law, and the fate of the PIB under President Goodluck Jonathan remains highly uncertain at the time of this writing.

Another group of countries is composed of those which have never seriously attempted to separate commercial from regulatory and policy functions and yet whose oil sectors run reasonably well. In Angola, there is no independent regulatory institution, and while the law does formally vest certain oversight powers in the Ministry of Petroleum, in practice the national oil company Sonangol is sector manager, regulator, and operator all rolled into one.²⁸ Flying in the face of the canonical Norwegian Model, the country has managed to build a highly productive petroleum sector by means of this single multipurpose agent, achieving steady growth in production and reserves over the last several decades. Although corruption is rife in larger society, bureaucratic capacity is extremely low, and much of the population remains in severe poverty, the oil sector itself runs reasonably efficiently and provides reliable revenue to the government. The government managed to maintain a stable environment for foreign investment in the oil sector even in the face of a civil war that ran from 1975 through 2002. Foreign oil companies still perform almost all of the work of oil extraction, but the government in recent years has been able to build up Angolan know-how, both in regulation of foreign companies and in oil operations and related activities. Sonangol and its subsidiaries are playing an ever-growing role in the operations of the sector and the Angolan economy generally.

Angola's historical lack of political competition helps to explain the fundamentally different dynamics of its oil sector compared with Nigeria or Algeria. (Obviously, there was direct military competition between different groups during the civil war, but the Popular Movement for the Liberation of Angola, or MPLA, maintained control over the machinery of government and the oil industry throughout.) In contrast to fractious Nigeria or Algeria, members of the ruling MPLA in Angola all came from a small and homogeneous elite group, which was made even more tight-knit and pragmatic by the need to fund a protracted civil war. The government became a unitary entity, or "principal,"²⁹ ensconced in power for decades. Partly because of this dynamic, the Angolan government gave coherent, long-run direction to a single agent, Sonangol, whose leaders were closely tied to those of the country (Heller, forthcoming). Angola thus succeeded in the absence of the checks and balances that would be provided by distinct commercial, regulatory, and policy institutions. It will be interesting to observe how the Angolan model evolves as the civil war fades further into the past—in particular whether it proves robust against either a significant drop in oil price or the advent of more political contestation. The Angolan government has made recent public statements that it is considering ceding some of Sonangol's regulatory responsibilities back to a government agency, perhaps the Ministry of Petroleum (Heller, forthcoming).

Saudi Arabia is perhaps the most iconic example of a unitary-style government managing its NOC. Saudi Arabia's royal family, Al Saud, has ruled since the modern state's founding and wielded political influence in the region for centuries. Partly as a consequence, the country has adopted an oil policy almost unique in its degree of stability.³⁰ Unlike nearly all of its counterparts, the

²⁸ This paragraph's discussion of Angola draws from a more extensive analysis in Heller (forthcoming).

²⁹ A *principal* refers to an entity that directs another entity, an *agent*, to do its bidding. Principal-agent relationships arise in politics, employment, and a wide range of other contexts. Some states have multiple principals exercising independent control over government generally but few such principals in the oil sector specifically because of institutional agreements delegating autonomy to that sector. For more of principal-agent theory in the NOC context, see Hults (forthcoming a) and Stevens (2008). For general discussion of the principal-agent relationship, see Spence and Zeckhauser (1971), Ross (1973), and Jensen (1983).

³⁰ Other factors help explain the durability of Saudi policy: Saudi Arabia has a long history of oil production and has been the world's most important oil producer and holder of oil reserves over a sustained period.

government nationalized operations with little acrimony, maintained close ties with international oil interests previously operating in the country, and allowed the private-sector orientation to carry over to its NOC, Saudi Aramco (Stevens, forthcoming). Today, the government and Saudi Aramco's goals of steady, long-run oil development are deeply intertwined. The government sets the company's broad strategic goals and approves its five-year operating and investment plans but leaves most operational decisions to the company. In this environment, Saudi Aramco has flourished. Though little financial data is publicly disclosed,³¹ Saudi Aramco has for years been the world's largest oil producer and managed the largest proven reserves of conventional oil. The company also carries out significant research and development (particularly through its upstream-focused Exploration and Petroleum Engineering Center) and reliably completes major new oil development projects (Stevens, forthcoming). As a consequence, Saudi Aramco has provided, and will continue to provide, massive revenues to the Saudi state for the foreseeable future.

Note that Saudi Aramco has thrived despite minimal institutional oversight. Saudi Arabia's primary institution regulating the oil sector – the Supreme Council on Petroleum and Mineral Affairs (SCPMA) – is relatively capable. But SCPMA typically exerts only a light supervisory role, perhaps because the ruling family and NOC leadership share much the same goals (Stevens, forthcoming).³² Another government entity, the Ministry of Petroleum and Natural Resources, is so tightly linked to Saudi Aramco through shared goals and constant exchanges of personnel that it cannot meaningfully be considered to be an independent policymaking or regulatory body (Stevens, forthcoming).

Malaysia presents the clearest case in our sample of capable institutions coupled with minimal political competition, at least until recently. Malaysia established a multipurpose NOC, Petronas, with very close links to the country's leader, especially during the 1981–2003 government of Prime Minister Mahathir bin Mohamad. Mahathir consolidated power and brooked little opposition; as in the cases of Angola since 1975 or Brazil under military rule from 1965–1985, the country's leadership was centralized, and the NOC was effective even as it played commercial, policy, and regulatory roles. Petronas has leveraged its regulatory role in particular both to increase the government's take of oil revenues and to gain commercial advantage for itself, for example by mandating a high participation share for itself in production sharing contracts with IOCs (Lopez, forthcoming). These partnerships have given it expanded cash flow (unlike many NOCs, Petronas retains its earnings, paying royalties and taxes like international companies) and enhanced opportunities for technology learning. The robustness of Malaysia's multifunctional NOC model in the face of a less unitary government is being put to the test now. Mahathir's successor, Abdullah Admah Badawi (2003–09), largely left the company alone, but fissures have emerged between new Prime Minister Najib Razak and company management (Lopez, forthcoming), possibly contributing to the recent departure of Petronas CEO Hassan Marican, who had been at the helm of the company since 1995.

5. Results and discussion

The above case studies present a complex picture of the relationship between separation of functions and successful oil administration. We address in turn the hypotheses of a direct

effect (Hypothesis #1) and of a relationship mediated by institutions and politics (Hypothesis #2).

As emphasized by the summary in Table 2, we find only limited correlation between attempts to implement the Norwegian Model of separation of functions and overall results in the oil sector. The two countries in our sample that have robustly implemented separation of functions, Norway and Brazil, are indeed strong performers. There is reasonable qualitative support for the contention that implementation of separation of functions had a salutary effect on performance in both cases, although it was but one of a constellation of factors that contributed to good results. At the same time, some countries have performed well in the absence of separated functions (Malaysia, Saudi Arabia, and Angola). Other countries have tried separation of functions as a reform strategy but found it not to be implementable so far (Nigeria and Algeria). Mexico is in the midst of a serious attempt to follow the Norwegian lead, with ultimate results that have yet to be determined. An important message from our ensemble of cases is that reformers should focus at least as much on whether separation of functions can realistically be implemented as on what positive effects it could hypothetically bring to a given oil sector.

Our case study data broadly supports Hypothesis #2, although the ways in which political competition and institutional capacity mediate the functioning of the Norwegian Model appear to be complex and nuanced. Our sample of ten countries suggests the following insights about how political competition and institutional quality affect both the potential value of the separation of functions approach and the chances that it will be successfully implemented.

First, serious efforts to create separation of functions rarely seem to be undertaken where political competition is low. Although two countries in our sample with low political competition, Saudi Arabia and Russia, do have regulatory bodies with formal responsibility for overseeing their respective NOCs, neither regulator has been genuinely independent of the NOC (Stevens, forthcoming; Victor and Sayfer, forthcoming). Several explanations might be possible for the correlation in our sample between political competition and attempts to implement separation of functions. Where political control is contested, there may be more risk of a damaging political schism between government and NOC in the absence of institutional checks and balances in the sector. In an environment without competing power bases, by contrast, there may be no perceived need to create institutional checks and balances to mediate power. NOC management may naturally align with a country's leadership out of mutual interest, as in Saudi Arabia, Angola, and Malaysia in the Mahathir era. An alternative explanation could be that uncontested regimes simply have little inclination to allow a government agency to develop independent regulatory authority.

Looking beyond our sample, however, we can observe countries with limited political competition at the executive level that have nonetheless sought to create institutional checks and balances within their oil sectors. China (which as a large petroleum importer did not meet our sample selection criteria) is a notable example. China's oil sector has employed various administrative designs throughout its evolution, sometimes with policymaking, regulatory, and commercial functions mostly consolidated and at other times with them distributed among multiple government entities (Lewis, 2007; Xu, 2007; Jiang, forthcoming).³³ China's oil sector at present is built around three large, vertically integrated, and relatively corporatized NOCs that are subject to management

³¹ Saudi Aramco's performance is a close proxy for Saudi oil sector performance because no other oil companies operate independently in the country.

³² One prominent exception was during SCPMA's aborted attempt to spur domestic competition in the gas sector (Stevens, forthcoming).

³³ We thank an anonymous reviewer for making this point.

Table 2

Summary table for our sample of countries. Assessments are for 2008 unless noted otherwise. Using the values for the World Bank's Government Effectiveness ("GE") index as shown in Fig. 1, institutional quality is grouped into "High" ($GE > 0.3$), "Middle" ($-0.3 \leq GE \leq 0.3$), and "Low" ($GE < -0.3$) categories. As discussed in the text, the binary grouping into "High" and "Low" political competition ignores nuances of the political environments in these countries, notably in the cases of Malaysia, Venezuela, and Russia. The ordering of countries in the table is designed to highlight the principal results discussed in Section 5.

Country	Tried separating commercial from policy/regulatory functions?	Effective separation of functions currently in place?	Good performance currently? (see Table 1)	Institutional quality (see Fig. 1)	Political competition (see Fig. 1)
Norway	✓	✓	✓	High	High
Brazil	✓	✓	✓	<i>Middle</i>	High (Low as of early 1980s)
Mexico	✓	^a	✓	<i>Middle</i>	High (Low as of late 1990s)
Nigeria	✓			Low	High
Algeria	✓			Low	High
Malaysia			✓	High	Low
Saudi Arabia			✓	<i>Middle</i>	Low
Angola			✓	Low	Low
Russia				<i>Middle</i>	Low (Power being consolidated)
Venezuela				Low	High (Power being consolidated)

^a As discussed in the text, Mexico's energy reform in late 2008 attempted to establish regulatory separation. It is too early to definitively assess the effectiveness of this effort, although initial indications suggest that the reforms have been hindered by Pemex's monopoly position.

and regulatory oversight from several government bodies (Xu, 2007; Jiang, forthcoming). It would be worth further exploring why cases like this diverge from the prevailing pattern in our sample that attempts to separate administrative functions are seen primarily where political competition exists. One possible explanation is that our crude measure of institutionalized political competition does not capture the non-electoral, but nonetheless very robust and multi-tiered, political competition that occurs in a large and complex country like China.

Second, a country's ability to implement separation of functions in a meaningful way is heavily dependent on its level of institutional development at a particular juncture. Norway and Nigeria both created tripartite divisions of commercial, policy, and regulatory functions in the formal sense at the time they established NOCs. Norway's more competent and established bureaucracy, however, enabled its policy and regulatory bodies to grow into informed, moderating forces in the sector where Nigeria's equivalents did not. Norway's bureaucracy was quite well developed by the time oil was discovered in the North Sea in the late 1960s; it had experience regulating other resource sectors like mining and water, and it embarked on a highly focused training program for its employees to learn about petroleum (Thurber and Istad, 2010). Nigeria's indigenous civil service, by contrast, had only come into existence a decade earlier when the country gained its independence. Oil was not discovered in Nigeria until 1956, and its bureaucracy never had the advantage of sufficient institutional stability and training to develop capability amid the political turmoil of the newly independent republic in the 1960s (Thurber et al., 2010). Perhaps partly as a result, Nigerian oil sector regulators acted as either pernicious micromanagers (as with the Nigerian Ministry of Mines and Power in the early 1970s) or mostly passive rubber stamps (as with the Nigerian Department of Petroleum Resources in recent years) or both.³⁴

The case of Brazil illustrates how the sequencing of institutional reforms can be important. Unlike Norway or Nigeria, Brazil did not separate functions at the time it established its NOC. Instead, Brazil built human and institutional capacity in oil first and then successfully implemented a separation-of-functions model once these prerequisites were in place. By the time the

ANP was established as the government's steward of petroleum resources in 1997, the NOC was already a strong performer, and the country's governing institutions had matured to the point where competent independent bureaucratic oversight was both possible and salutary for the company's performance.³⁵

Third, countries lacking deep institutional capacity (both in oil institutions and in government more generally) early in the development of their oil sectors may benefit from *not* establishing the separation of functions model initially. Like Nigeria, Angola lacked an established civil service at the outset of oil development (and in fact its bureaucracy may have been in an even worse position because of the debilitating effects of civil war). Unlike Nigeria, however, Angola chose to consolidate domestic talent in the oil sector, consciously vesting commercial, policymaking, and regulatory powers in Sonangol and then devoting substantial training resources to its development. This approach enabled Angola's unitary government to act with one voice in its management of the sector and minimize the number of bureaucratic points of engagement (and potential corruption) that foreign operators had to face. This facilitated government efforts both to ensure fluid functioning of oil operations and to capture a strong share of revenues. Over time, as the company has developed a class of skilled technocrats and managers, its ability to manage both its regulatory and commercial functions has grown. Over the past three decades, Sonangol has developed as an expanding island of competence in the midst of massive shortcomings in the rest of the Angolan bureaucracy and private sector. The solitary focus on the development of Sonangol as the steward of Angola's most valuable resource may have negatively impacted other aspects of the country's institutional development. But it has certainly helped the government achieve its goals in the oil sector, and it may provide a stable launching pad for broader commercial and administrative development.

Brazil and Malaysia also seemed to benefit from not separating functions of oil administration early in the development of their

³⁴ A characteristic feature of Nigerian oil administration today is that bureaucratic procedures and micromanagement are rife, and yet government bodies exert no truly effective authority over the activities of the international companies that extract the country's oil (Thurber et al., 2010).

³⁵ Our limited sample provides no clear cases of bureaucratic improvements following development of a large oil export industry, though Angola may ultimately turn out to be such a case. Though we do not test for this relationship here, one possible implication – and subject for further research – is that it might actually be more difficult to develop robust institutions after substantial oil rents are flowing to the government. Djankov et al. (2008), for example, analyze the effect of oil rents on political institutions. Ross (2001) also considers the effect of oil sector performance on political competition. Such studies implicitly raise the question of endogeneity in our research design, although we believe that any feedback from our dependent variable to our independent ones is relatively insignificant in the cases we consider.

national oil sectors. In Brazil, the monopolistic position of Petróbras and its insulation from public oversight or regulatory intervention during the long period of military rule from 1965 to 1985 allowed it to make decisions that were politically unpopular but ultimately successful—for example to gain operational experience overseas, and, most importantly, to explore offshore in Brazil (de Oliveira, forthcoming). The relative insulation from politics of Malaysia's NOC Petronas under Mahathir also seemed conducive to its development and to that of the country's oil sector (Lopez, forthcoming).

Fourth, the existence of a robust system of checks and balances may provide crucial stability and resilience against political or economic shocks even if separation of functions does not appear to be needed while political competition remains low. Our conclusions in this respect are highly provisional, but to the extent that this conclusion is borne out by further study, it suggests that countries with the requisite institutional capacity would be wise to preemptively build up the checks and balances that separation of functions provides. Though a cause-and-effect relationship is difficult to establish, changes in political alignment in several countries lacking such institutional checks and balances have had particularly damaging effects on oil sector governance. For all the talent of Venezuela's PDVSA in the 1990s, its political confrontation with Chávez proved disastrous for the company and for the Venezuelan oil sector. The difficulties in government–NOC relations in post-Mahathir Malaysia and the fractures that emerged in Abu Dhabi after visionary Sheik Zayed died and left the leadership of the emirate to his feuding sons (see Rai and Victor, forthcoming) also illustrate this risk. Angola may ultimately prove to be particularly susceptible if the political status quo that has dominated the country's leadership for decades should shift, combining a deterioration of the informal control that has driven Sonangol for decades with the continuing absence of formal institutional oversight.

Fifth, attempts to implement separation of functions in countries where institutional prerequisites are absent can be highly counterproductive. Nigeria has repeatedly seen efforts to create an independent regulator fall short on substance, and Algeria's 2005 reform drive ran aground in the face of similar pushback from entrenched interests. Such reforms can be worse than useless and actually do harm, for example in the following ways. First, overly sweeping and unworkable reform initiatives may crowd out more incremental reform efforts that could actually be substantive and sustainable, implicitly serving the interests of those who benefit from the status quo. Second, reform efforts focused on creating new government bodies can further diffuse limited financial and human resources, as Nigeria's early experience demonstrates. Third, such approaches can increase corruption opportunities by multiplying the points of engagement with government officials. (Sonangol provides a good example of how concentration of government functions can help sidestep or at least centralize corruption problems in a country rife with them.) Fourth, repeated failed efforts to reshuffle the deck chairs via a proliferation of institutions create cynicism and built-in excuses for people not to believe in the possibility of reform, which can actively impede positive developments.

6. Conclusions: different models for different institutional and political environments

The foregoing discussion illustrates the dangers of trying to apply the separation of functions model without regard for institutional and political context. Although the model is, as suggested by the Natural Resource Charter (2009), a 'best practice' of sorts, it is not the right prescription for every ailing oil sector

around the world. As Rodrik (2008) argues in a more general sense about institution building, countries lacking conditions supportive of best practices are better off pursuing "second-best institutions." Reformers in oil need context-specific guidance as to when the Norwegian Model is or is not a good idea.³⁶

Fig. 2 revisits the quadrants introduced in Fig. 1, and provides a framework for thinking about which strategies for administering the oil sector may be effective in states with different degrees of political competition and institutional capacity. We do not claim that institutional quality and political competition are the only relevant variables affecting the success of reforms in oil sector administration. Moreover, as we indicated in the previous section, further research is needed to refine the definitions and best indicators for both of these variables. Our measure of political competition is particularly primitive and can be misleading when applied to certain countries. Nonetheless, the results of this study clearly suggest that institutional quality and political competition matter, and that even relatively crude assessments of these variables for different countries can provide useful guidance for planning oil sector reform strategy. In the remainder of this section, we map out how the findings of this study might translate into concrete policy guidance.

The countries of Quadrant IV, with strong institutional capacity and competitive political systems, present the best environment for formally separating policy and regulatory functions from commercial ones. Norway and Brazil are the outstanding cases in which this approach has been used successfully. As another country with political competition and relatively well-developed institutions, Mexico is also a plausible candidate for separation-of-functions reform; indeed, the country's reform law at the end of 2008 created a new technical regulator, the National Hydrocarbons Commission, and also attempted to strengthen the existing Energy Regulatory Commission.³⁷ (However, resistance in Mexico to foreign participation in the oil sector may limit the effectiveness of such separation-of-functions reform by preventing the emergence of any real competitors to, and thus leverage over, Pemex.) Countries with well-developed institutional capacity that are in transition from unitary to more pluralistic government might also benefit from moves to separate functions in the oil sector.

In Quadrant I, where power is not meaningfully contested and human and institutional capacity are limited, there is a strong case for the consolidation of functions. Because political competition is low, executive time horizons are long and one institution can successfully fulfill many functions on behalf of a country's leadership. Because institutional capacity is low, it may be more effective to create one all-purpose administrative tool rather than to invite the infighting that can result from creating multiple bodies.³⁸ Reformers faced with conditions of low human capacity

³⁶ We note that changes in operator and policymaker responsibilities are not the only avenue for oil sector reform. Other potential options include establishing multiple NOCs (as China has done), opening the sector to private sector competition (as was done in Norway, Brazil, and several other countries), or privatizing NOCs (as Argentina did in the 1990s). Evaluation of the effectiveness of these measures is beyond the scope of this paper.

³⁷ The National Hydrocarbons Commission has arguably shown some initial value by offering a much-needed second opinion on Pemex's controversial plan to invest heavily in the Chicontepec field (Olsen, 2010).

³⁸ The decision to consolidate regulatory and commercial powers when forming NNPC in Nigeria in 1977 followed at least in part from this logic. Although an NOC was the administrative tool of choice for the countries in our sample, it may be that creating a strong regulator/policymaker can be a better choice in some cases, with commercial elements incorporated later or not at all. (In a sense this was the administrative path Norway followed between the first realization among the civil service of oil's potential in the early 1960s and the establishment of Statoil in 1972.) We also note the importance of distinguishing *infighting* among institutions for regulatory responsibilities – which is often harmful in states with

	Low Political Competition	High Political Competition
High Institutional Capacity	<p>Quadrant III</p> <p><u>Suggest:</u></p> <ul style="list-style-type: none"> - Consolidate functions initially - Consider separating functions upon signs that politics is becoming more pluralistic <p><u>Examples:</u></p> <p>MALAYSIA (under Mahathir)</p>	<p>Quadrant IV</p> <p><u>Suggest:</u></p> <ul style="list-style-type: none"> - Separate functions <p><u>Examples:</u></p> <p>NORWAY, BRAZIL, MEXICO</p>
Low Institutional Capacity	<p>Quadrant I</p> <p><u>Suggest:</u></p> <ul style="list-style-type: none"> - Consolidate functions <p><u>Examples:</u></p> <p>ANGOLA</p>	<p>Quadrant II</p> <p><u>Suggest:</u></p> <ul style="list-style-type: none"> - Develop technical and institutional capacity <p><u>Examples:</u></p> <p>NIGERIA</p>

Fig. 2. Suggested approaches for oil administration in different types of oil-exporting states.

should be very wary of proposing a separation of functions model until institutions and talent appear to be in place to support it. A positive outcome will still depend on farsighted decisions by a country's leaders, in particular in appointing skillful managers of their NOCs and then leaving them alone; Angola and Brazil under military rule both did this to a large extent.

It is more difficult to present generalizable recommendations for the countries of Quadrants II and III. In Quadrant III, where institutional capacity is relatively advanced but there is no political competition or entrenched practice of intra-governmental checks and balances, formally separating functions may reduce efficiency without meaningfully impacting the behavior of government or company officials. But as Malaysia has experienced in the aftermath of Mahathir's resignation, a unitary system of oil-sector management can fall quickly out of step with a society that is becoming more pluralistic. Thus our tentative advice for countries in this quadrant is to keep functions consolidated (embedding strong rules for public disclosure of information) while political power remains strongly unitary, but to mirror the evolution of the political system as a whole and promote specialization and separation of functions as the state begins to become more pluralistic.

The minimally institutionalized states of Quadrant II – both politically contested and lacking in durable and effective institutions to provide continuity and a moderating influence – present the most nettlesome challenges to reformers. Suggesting that a leader consolidate personal power as a route to better performance in oil is usually unrealistic, not to mention anathema to supporters of democracy and human rights. For example, Nigeria's extreme diversity and free-wheeling political system will probably prevent the country from ever becoming an Angola.

At the same time, the pursuit of the Norwegian Model is also likely to be fruitless in a country of low institutional capability and vigorous competition for the spoils of oil. Any policy or regulatory bodies that are created will promptly be either neutered or captured by powerful interests who do not want to

see their own control over oil revenues challenged. The unsatisfying conclusion (as previously remarked upon by Moore and Putzel (1999), Grindle (2007), Rodrik (2008), and others) is that ambitious institutional reforms are more likely to work in settings in which basic institutional capacity already exists. Where it does not, more narrow and targeted reforms focusing on technical and institutional capability may offer the best chance of yielding concrete, though more limited, results.

There exists a larger debate on the merits of such a gradual approach to improvement relative to a "grand bargain" strategy that re-configures many institutional interactions at once. The latter approach, for example, might allow better coordination of reforms and associated political horse-trading, and might also provide more rapid payoffs to provide credibility and sustain the momentum of reform (see, for example, Feltenstein and Nsouli, 1998). However, this kind of grand bargain is complicated in the absence of durable institutions that can credibly negotiate and commit to political tradeoffs. In countries like Nigeria and Algeria, such credible institutions simply do not exist, irrespective of any organizational definitions on paper.

It is discouraging that even the best-conceived institutional blueprint cannot turn Nigeria's oil sector into Norway's, or even Angola's, in one fell swoop. However, recognizing the context dependence of oil reform will help countries make reform choices that are realistic and that yield measurable and sustainable progress rather than a dispiriting trail of dashed hopes.

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(footnote continued)

limited institutional capacity – from competition among institutions for commercial gains. China, among other countries, implemented the latter approach by establishing three major NOCs: CNPC, Sinopec, and CNOOC (Lewis, 2007, Andrews-Speed, 2004). We do not assess the effectiveness of internal competition among NOCs here.

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