

The Ownership Advantage of Resource Hosting

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This study focuses on the sustainable advantage of National Oil Companies (NOCs) in the global oil and gas resource sector. Specifically we examine ownership attributes, demonstrating that NOCs have increased ownership over strategic global reserves by 6%, from 72% (in 2005) to 78% in 2008. This NOC dominance looks set to redefine the sector, 4,078 oilfields across 79 host countries are used to show that NOCs have increased ownership at the expense of all competitor groups. The six giant oil majors ExxonMobil, BP, Total, Chevron, Eni and ConocoPhillips are most affected as they compete for similar assets.

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Introduction

Strategic resource ownership is becoming increasingly relevant as emerging economies use trade surpluses to lay claim to energy resources required to fuel economic growth (Carl et al. 2008). We show that despite the increased competition for reserve ownership there is a lack of global research dealing with ownership of these finite and strategically important asset classes. This study adds new global resource sector insights to the body of literature dealing with ownership and demonstrates the sustainable advantages that host countries enjoy.

Specifically we examine how ownership attributes underpin the emergent role of National Oil Companies (NOCs) in global commodity markets. Importantly we show that NOCs have increased ownership over strategic global reserves by 6%; from 72% in 2005 to 78% in 2008. The growing sector dominance of NOCs now looks set to redefine ownership for corporates involved in the sector, particularly as NOCs have increased ownership at the expense of all competitor groups, including the previously dominant six giant oil majors ExxonMobil, BP, Total, Chevron, Eni and ConocoPhillips. State monopolies now dominate in the natural resource sector, with government institutions retaining the power to nationalize or regain natural resource ownership. See Venezuela's nationalization (Hults 2007; Makhija 1993) and those by Russia and Mexico (Philip 1982).

In his review of the effects of globalization, Stiglitz (2007) discusses the need for state and private oil and gas (O&G) cooperation, suggesting that while the goals of private sector operators run counter to those of the public interests, private operators retain specialized knowledge and skills that are desirable in the extraction of resources. Many host countries therefore face the difficult choice of relying on an unskilled public sector and trying to define relationships with private sector operators while retaining ownership over strategic assets.

The recent skill transfer to NOCs has Soros (2007) suggested eroded the traditional advantage of oil majors. To understand the simple host country natural resource ownership advantage, Stiglitz et al. (2007) suggests that natural resource wealth does not need to be produced, it simply needs extraction. Importantly, natural resource extraction takes place quite independently of other political processes. An extractive government can therefore access natural resource wealth regardless of whether it commands the cooperation of its citizens or effectively controls institutions of state. This ability to

control the asset is an important sustainable advantage not available to competitor groupings.

We use a unique ownership dataset for 4078 oilfields to overcome data limitations facing ownership studies that cover exchange traded assets (Heiss and Koke 2004; Holderness 2007). Data cover 9165 corporate stakes in 2005 and 9088 stakes in 2008, enabling us to analyze the effects of host country advantage on asset ownership. We use empirical insights to build on the body of natural resource literature by Stiglitz (2007); Stiglitz et al. (2007), adding to findings for ownership retention by Bortolotti and Faccio (2008). We isolate factors that underpin the host country advantage and apply these in our analysis of strategic competitive advantage. By separating countries into risk categories using Moody's Sovereign Country rating, we are also able to assess the way that countries with different risk profiles use their unique advantage of resource hosting to retain (and increase) strategic asset ownership.

The effect of host country advantage on O&G resource ownership are used to demonstrate that NOCs increase ownership over domestic reserves at the expense of foreign competitors. To test for host country advantage effects, we examine the changes in reserve ownership experienced by NOCs in relation to all competitor groups. In this study, all NOCs in this study have a potential host country advantage, while FNOCs are NOCs without host country reserves and lack the host country advantage. This approach to measuring sustainable advantage is in line with Bain (1956), Stigler (1968), Ferguson (1974) and McAfee et al. (2004), who suggest that established firms' ownership of raw materials and patents allows them a competitive advantage over new entrants.

Even IG countries actually experience an increase in NOC asset participation for the period 2005 to 2008, findings that support recent work on state ownership retention by Bortolotti and Faccio (2008). Gaps in our global resource ownership knowledge are also potentially at odds with the broadly held belief that developed countries' oil and gas assets (such as United States, United Kingdom and Norway) are widely held.

In summary, we find that state ownership actually increased in the O&G sector for the period 2005 to 2008. Interestingly, we observe that in 2005 state controls the majority of O&G reserves in NIG countries compared to a minority holding in IG countries. For the period 2005-2008 NIG countries saw a decline in state control, by contrast, state increased its control over reserves in IG countries making the proportion of the

reserves controlled by the state equal to 53% in both country groupings, the majority of countries' O&G reserves.

An additional finding shows a surprising trend in reserve ownership in IG countries towards higher state participation; NOCs control 45% of reserves in IG countries in 2005, they increase control to 53% by 2008, a 16% increase over a very short time frame. Increased state participation in oil rich IG countries such as Russia, Norway and Kazakhstan underpin this global increase in NOC reserve ownership. We also find that NIG countries have a decreasing state participation trend and that state ownership is barely higher than that in IG countries in 2008. NOCs own 66% of NIG reserves in 2005, decreasing to 53% in 2008 a 20% fall in state ownership (a figure comparable to IG NOCs which own 52.57% in 2008).

Data and Methodology

Dataset construction

[Insert table 1 about here]

An empirical analysis is aided by country data for all commercial oilfield assets across 79 host countries, including both OPEC and non-OPEC host country assets. Oilfield ownership data comprise 4,078 O&G fields, covering the population of commercial O&G fields in 2005 *and* 2008 (see table I). Detailed oilfield data includes the size of the remaining reserves of the fields and their ownership structures as at June 1, 2005 and January 1, 2008. Fields covered in this study are those considered either commercial or technical, where commercial fields are in production, under development or will be under development within the five years from 2008. Technical fields, on the other hand, are fields that have no immediate commercial interest or are not considered to be developable within the five years from 2008. Field data therefore represent both proven and probable (2P) fields, as generally defined in the O&G industry. We analyze all fields with remaining reserves above 5 million barrels of oil equivalent (mmboc), effectively limiting ownership idiosyncracies (Kretzschmar and Moles 2006).

Each field's oil and gas reserves are converted into mmboc, reflecting the amount of remaining reserves. Remaining reserves, stakes, owners and ownership structures can be extracted from the data set, as in the following example. Data for the field Tyrihans indicate that it is located in Norway, has 2,688 mmboc remaining reserves in 2005 and 2,317 mmboc remaining reserves in 2008. The following companies had stakes in Tyrihans in 2005: Eni (7.9%), ExxonMobil (11.75%), Norsk Hydro (12%), Statoil (46.84%) and Total (21.51%). In 2008 Statoil and Norsk Hydro merged, which is reflected in the 2008 stake set for Tyrihans: Eni (7.9%), ExxonMobil (11.75%), StatoilHydro (58.84%) and Total (21.51%). We know that ExxonMobil, Total and Eni are integrated oil companies, Norsk Hydro is classified as an other company while Statoil and StatoilHydro are classified as NOCs. Statoil's acquisition of Norsk Hydro in 2007 results in the Norwegian state's increased ownership of Tyrihans from 46.84% to 58.84% (a 17% increase) between 2005 and 2008.

Countries in this study are categorized into the following three risk groups based on Moody's Government Bond Rating as of May 1, 2005 and June 6, 2008 respectively: investment grade (IG) countries, rated from Baa3 to Aaa, non-investment grade (NIG)

countries, rated from C to Ba1, and unrated countries. This classification is consistent with earlier ownership research by La Porta et al. (1999) who suggest to isolate the effect of country risk on asset ownership. Prior works have suggested that low risk countries have a higher attraction to minority stakeholders than countries with high risk and that ownership diffusion is more common in USA and countries with higher legal protection of minority stakeholders (Berle and Means 1932; La Porta et al. 1998); we examine both these premises in this study.

Companies in the analysis are grouped into four categories based on the following oil and gas sector definitions. A *National Oil Company (NOC)* is defined as a company, joint venture or organization controlled or owned by a government and operating in the same country as the government is located (Hartley and Medlock 2008). In addition to NOCs, this paper also examines asset ownership for the following groupings of companies. A *Foreign National Oil Companies (FNOC)* is a company, joint venture or organization controlled or owned by a government and operating in another country than the government is located.¹ An *Integrated global company* is engaged in the upstream O&G sector, as well as at least one other significant activity in the downstream sector (Victor 2007). Any companies that are not in the above categories are defined as *others*. Table I shows the number of fields, stakes, countries and companies associated with each company grouping, as well as the proportion of global reserves they hold.

Notations and variables

Our definitions of ownership rely on oilfield cash-flow entitlement rather than voting rights (as these do not exist in host oilfield structures). In the oil sector, ownership of reserves entitles the company to cash flows commensurate to the company's percentage holding in the field. This approach is consistent with the ownership attributable to cash flow rights previously emphasized in studies by Faccio and Lang (2002) and Holderness (2007). In this study *Ownership* therefore is measured as the percentage of reserves remaining in the field attributable to company's holding. We examine the ownership of each company in the dataset. For example, if a company X owns 60% of company Y, which in turn owns 30% of field Z, then we assume that company X owns 18% of field Z. Using an example from the dataset, Repsol-YPF owns 66% of company Pluspetrol, which owns 55% of Block 1-AB field in Peru, we posit that Repsol-YPF owns 36.3% of field Block 1-AB.

Summary of notations and variables used in the methodology are presented in table IX. A set of sets is represented by a capital letter using a special font (eg. \mathbb{C}), a set is represented by a bold letter (eg. \mathbf{C}) and single values are represented by small, italic letters (eg. c).

Changes in reserve ownership in a company occur as a result of the changes in the *size* of each oilfield stake the company holds and the *number* of fields held by the company. For example, an increase in average field stake size will, *ceteris paribus*, lead to an increase in the total reserves held. Table II shows both variables, referred to as "stake size" and "proportion of field count" respectively. Stake size is defined as the average size of all stakes owned by the company grouping in the given country grouping and is derived by averaging the stake size (in percentage) of all companies belonging to the given company group in the given countries:

$$\text{stake size}_{\mathbf{E},\mathbf{C},t} = \frac{1}{|\mathbf{S}_{\mathbf{E},\mathbf{C},t}|} \sum_s^{|\mathbf{S}_{\mathbf{E},\mathbf{C},t}|} \text{percentage size}_s, \quad (1)$$

where $\mathbf{S}_{\mathbf{E},\mathbf{C},t}$ is a set of all stakes owned by companies \mathbf{E} in countries \mathbf{C} at time t .

Proportion of field count is the percentage of the country grouping's total stakes that are owned by the specific company type, calculated by taking the number of stakes owned by the company grouping and dividing by total stakes in the country grouping:

$$\text{proportion of field count}_{\mathbf{E},\mathbf{C},t} = \frac{1}{|\mathbf{S}_{\mathbf{C},t}|} \sum_s^{|\mathbf{S}_{\mathbf{E},\mathbf{C},t}|} 1. \quad (2)$$

Figures 1 and 2 derive movements using the logic of equations (1) and (2). Note that figure 2 separates fields into large and small, where large fields are defined as fields that exceed 60 mmbob in remaining reserves. Fields below the 60 mmbob threshold are included as small fields. The Δ -sign, used in table II denotes the change from 2005 to 2008.

Descriptive data analysis

[Insert figure 1 about here]

[Insert figure 2 about here]

[Insert table 2 about here]

Our first finding suggests that state ownership of reserves is pervasive has increased over past period from 2005 to 2008 to the detriment of all other competitors. Second, we show that IG countries have increasing state participation from 2005 to 2008 while NIG countries have decreasing state participation within the same timeframe ending with a state participation barely higher than in IG countries in 2008.

Host country advantage – National Oil Companies

Global natural resource ownership shifts for the period 2005 to 2008 highlight the expanding dominance of NOCs over competitors, as illustrated in the positive reserve ownership bar of Figure 1. Table II, summarizing the shifts in reserve ownership for each company grouping between 2005 and 2008 demonstrates the same trend of increased reserve ownership for NOCs. Large fields are differentiated from small fields. As previously highlighted, changes in reserve ownership in a company are explained by changes in two specific factors, (1) change in the *size* of each oilfield stake the company holds and (2) change in the *number* of fields held by the company. For example, an increase in the number of fields, while the average stake size stays the same, leads to an increase in the total reserves held (e.g. see changes for NOCs in figure 1). This study treats reserve size in relation to global assets owned by other company types; on this basis a decrease in reserve ownership does not necessarily mean an absolute decrease, rather a decrease in the percentage of overall global reserves held by the company group. This can be observed for FNOCs in figure 2a, where both stake size and number of fields increase, but the total reserves decrease.

NOCs own 74% of global reserves in 2005 and 78% in 2008, a 6% increase, illustrated in figure 1 and panel A of table II. Increase in NOC reserve ownership is shown to occur as a result of increased reserve holdings in both large and small fields (see figure 2). A further analysis of attributes underpinning the global reserve ownership change is performed to investigate how the average field size changes and how the number of ownership stakes change. Findings demonstrate that in 2005, NOCs have an average field stake size of 66%, declining to 65% in 2008, a fall of 0.44%, for both small and large fields. Further, NOCs hold ownership stakes in 26% of the world's fields in 2005

and 28% in 2008, an increase of 8%, demonstrating that while NOCs own a lower proportion in each field in 2008 relative to 2005, the acquisition of new fields has driven the increase in NOC total reserve ownership. This increase in NOC ownership can be explained by the advantage NOCs have through state support and the sustainable advantage the host countries have over immobile assets like O&G (Stiglitz et al. 2007).

In Panels B through D of the Table II findings are grouped into countries by risk category, allowing us to isolate the effect of country risk on changes in NOC ownership. A finding, discussed in detail later in this study, is that NOCs own 45% of the reserves in non-OPEC IG countries in 2005 and only 53% in 2008, showing an increase of 16%. We see a similar trend if we investigate the shift in reserve ownership on a country level in tables VI and VII, where each IG country has an average NOC ownership of 29% in 2005 and 31% in 2008. Other countries, like USA and UK only have an insignificant or no change in NOC ownership over the same period. IG countries like India and Mexico have high state participation (92%), resulting in an increase in the average NOC ownership in IG countries (see table VII). We attribute high state ownership of reserves in Mexico to the O&G sector nationalization experienced in the 1930s as discussed by Philip (1982). Countries driving the *changes* are primarily comprised of the resource rich countries like Russia, Norway and Kazakhstan, where NOCs increases their ownership by 27% from 2005 to 2008 (see table VIII).

By contrast, in NIG countries NOCs reduce ownership by 20% from 66% to 53%. At the country level, demonstrated in tables VI and VII, we observe that each NIG country has an average NOC ownership of 40% in 2005 and 34% in 2008. Countries driving the changes are resource rich countries like Egypt and Turkmenistan which have a decrease of NOC ownership of 32% and 30% respectively. While NOCs own 53.13% of reserves in NIG countries in 2008, NOCs own 52.57% of reserves in IG countries, a difference of only 0.56 percentage points. The shift in reserve ownership is explained by the introduction of countries with low NOC reserve ownership into the NIG country risk grouping in 2008. Albania, Azerbaijan, Cambodia and Colombia are all unrated in 2005, but change to NIG in 2008. The NIG countries had an average of 66% in 2005, while newly introduced countries have an NOC ownership average of 21%. The introduction of a set of resource rich countries with a lower average NOC ownership decreases the average of NOC ownership for the whole NIG country grouping in 2008.

Global FNOC ownership of reserves is 1.06% in 2005 and 0.89% in 2008, a decrease of 17%, shown in Figure 1 and in Table II Panel A. FNOC reserves decrease occurs

as a result of decreased reserve holdings in both large and small fields (see Figure 2). When analyzing the underlying attributes, findings suggest that in 2005, FNOCs have an average field stake size of 28.64% and 28.56% in 2008, a fall of 0.27%. While we observe a decrease in stake size of about 3% in small fields, there is an increase in large fields of about 15%. FNOCs have ownership in 8% of the fields globally in 2005, increasing to 9% in 2008, a rise of 10%. Total reserves held by FNOCs declines from 2005 to 2008.

Reserve ownership by integrated companies declines by 12% from 13% in 2005 to 11% in 2008, shown in figure 1 and panel A table II. This decline is primarily driven by the reduced ownership stakes in large fields; however, loss of ownership is also apparent in small fields (see figure 2). In 2005, integrated companies have an average field stake size of 34%, reducing by 1.64% to 33% in 2008. Further, they have ownership in 34% of the world's fields in 2005 and 33% in 2008, a fall of 2%. This shows that integrated oil majors have lost ownership of global oil reserves by decreasing both stake sizes and the proportion of the world's fields they own reserves in, an ownership loss which is consistent with the lack of host country state backing mentioned by [Stiglitz et al. \(2007\)](#) and [Stiglitz \(2007\)](#).

When examining integrated company ownership at a country level, we find that while they hold 24% of reserves in the non-OPEC IG countries in 2005, they own 22% in 2008, a decrease of 10%. Reserve ownership by integrated companies in IG countries like UK, Kazakhstan, Norway and USA decreases by 10%, 8%, 4% and 1%, respectively (see table VIII). Surprisingly, integrated companies have increased their ownership in Russian O&G fields by 2%.

A contrary ownership trend is seen in NIG countries, where integrated companies have increased their ownership by 100% from 10% to 20%. NIG countries like Egypt and Peru have an increase of integrated company ownership of 27% and 125% respectively. Another factor explaining this trend is the introduction of countries with high integrated company reserve ownership into the NIG country risk set in 2008. Azerbaijan and Cambodia are both unrated in 2005, but these shift to NIG in 2008. While the newly introduced countries have an NOC ownership average of 40% and 55% each, the NIG countries have an average of 13% in 2005.

Other companies hold 13% of global reserves in 2005 and 10% in 2008, a decrease of 21%, occurring as a result of decreased reserve holdings mainly in large fields and, to a lesser extent, in small fields (see figure 2). The underlying factors show that in

2005, other companies have an average field stake size of 42.46%, increasing by 2% to 43.12% in 2008. We see an increase in stake size of about 3% in large fields, and an increase in small field stake size of about 1%. Over the same period other companies have an overall decrease in the number of fields; with 32% of the world's fields in 2005, decreasing by 7% to 30% in 2008. This finding demonstrates that even though other companies have increased their average stake size from 2005 to 2008, the decrease in the proportion of the world's fields they participate in leads to an overall fall in total reserve holdings.

Regression models

We use three sets of regression models to isolate the attributes underpinning ownership. The first regression, formulated as (3) shows which company groupings experience significant change in reserve ownership globally (positive or negative). The second regression of the form (4) examines the variables that explain the changes in NOC ownership from 2005 to 2008. The final regression (5) investigates the factors that explain NOC reserve ownership structure as at 2008.

First, we regress the positive change in NOC reserve holdings (increase in reserve ownership) to establish the link between the host country advantage, proxied by NOCs, and reserve ownership. The dependent variable COO in Model 1 isolates positive change in a company's global reserve ownership by taking the value of 1 if there has been change greater than 0% of proportional ownership in the company from 2005 to 2008 and 0 if not. For robustness, we test whether our model holds for changes greater than 25%. This allows our study to analyze the factors that relate to increase in company reserve ownership. The regression is applied to the intersection of the companies active in at least one field in 2005 and 2008 (561 companies). As has been emphasized previously, we differentiate between domestic and foreign reserve for NOCs by subdividing state-owned companies into NOCs and FNOCs, reflecting domestic and foreign reserve holdings, respectively and providing for a total of 704 observations. We construct the following regressions using a widely accepted logit model (e.g. [Grinblatt and Keloharju \(2001\)](#) and [Helwege and Liang \(1996\)](#)). The first set of regressions

isolates company groupings that experience significant positive (or negative) loadings for shifts in ownership:

$$COO = \frac{1}{1 + \exp^{-(\alpha + \beta'_i X_i + \epsilon)}} \quad \text{with} \quad \beta_i(\beta_1, \dots, \beta_5), \quad X_i(X_1, \dots, X_5), \quad (3)$$

where X_1 , X_2 and X_3 represent the type of company grouping (NOC, integrated, other) and the variable is set to 1 if a company is in the respective company group, else set to 0. Note that FNOC is not a variable, as it would lead to collinearity. FNOCs relationship to positive ownership change will be reflected in the intercept. Variables X_4 and X_5 represent the risk group of the company's host country, where X_4 is set to 1 if the company is hosted in an IG country and 0 if not and X_5 is set to 1 if the company is hosted in an unrated country. The NIG variable is removed due to collinearity.

The following two regression models use identical independent variables to test the change in NOC ownership (NOCOO) between 2005 and 2008 and NOC ownership (NOCO) at a point in time in 2008. Specifically, we use the following regression to identify the attributes which enable NOCs to be the only company grouping to increase their relative reserve holdings. Changes in NOC ownership (NOCOO) are used as dependent variable, which allows us to isolate positive change of NOC ownership within fields by taking the value of 1 if there has been a change greater than 0% of NOC ownership in the field over the period 2005 to 2008.

For robustness we also test for changes in reserve ownership exceeding 25% of the field's reserves. The following regression is applied for the field level data:

$$NOCOO = \frac{1}{1 + \exp^{-(\alpha + \beta'_i X_i + \epsilon)}} \quad \text{with} \quad \beta_i(\beta_1, \dots, \beta_4), \quad X_i(X_1, \dots, X_4). \quad (4)$$

Regression 3 is designed to test NOC ownership (NOCO) in 2008 as dependent variable. The variable isolates blockholdings by taking the value of 1 for NOC ownerships greater than 25% of the field's reserves, 0 otherwise. This classification is based on general practice in the oil and gas sector, where a 25% field ownership stake enables the stakeholder operational insights into the oilfield. For robustness we also test for NOC ownership greater than 50%, since it guarantees majority control of the field.

This regression is conducted for the field level data as of 2008 using a logit regression of the following form:

$$NOCO = \frac{1}{1 + \exp^{-(\alpha + \beta'_i X_i + \epsilon)}} \quad \text{with} \quad \beta_i(\beta_1, \dots, \beta_4), \quad X_i(X_1, \dots, X_4). \quad (5)$$

Four independent binary variables are used in Models 2 and 3 in regressions (4) and (5). X_1 and X_2 reflect whether or not a field is located in an IG country or a NIG country and are set to either 1 or 0 dependent on membership or not of the country set. Note that if the country is neither IG or NIG, it is unrated.

Variable X_3 controls for the field size by setting variable X_3 to 1 if the field has 60 mmbob or more in remaining reserves, consistent with work by [Kretzschmar and Moles \(2006\)](#). Further, we investigate the effect of OPEC membership on NOC ownership where X_4 takes the value of 1 if the field is located in an OPEC member state, 0 otherwise.

Analysis of the regression results

Ownership change - all companies

[Insert table 4 about here]

Model 1 of the regression on positive change in the company ownership (Table III), shows that both NOC and other companies are positively related with a positive change in global reserve ownership. The positive loading on the NOC factor supports our descriptive data analysis that NOCs are increasing their ownership of global resources, underpinned by the advantage of being backed by the host country. The positive loading on the Other factor does not contradict with our earlier findings, but rather highlights a specific property of the regression. All the companies are given a dependent variable value of 1 if there is a positive reserve ownership change and 0 if there is no or negative reserve ownership change. By using binary dependent variables we disregard the *size* of the reserves affected by the change, while this reserve attribute is not neglected in our descriptive analysis of ownership change. The positive relation between other companies and positive global reserve ownership change tells us that most other companies actually increase their reserve ownership globally, but when we account for the size of the reserves, other companies cannot compete with NOCs and decrease global reserve ownership.

Integrated companies and FNOCs both have negative loadings, yet only FNOC factor coefficient is significant. An insignificant coefficient for the Integrated factor can perhaps be explained by the insufficient number of observations as the grouping is only comprised of 21 companies (i.e. 21 observations).

Model 2 adds factors isolating the impact of company host country on changes in global proportional reserve ownership. These factors are insignificant and hence we cannot say that the risk profile of the host country of the company is related to a negative or positive change in global reserve ownership.

The robustness tests, where we chose the cut off of 25% change in ownership or more setting the binary response variable to 1, result in the same significance levels and only slightly different factor loadings for both models, demonstrating the robust results in our original regressions.

Change in NOC ownership

[Insert table 3 about here]

In the restricted Model 1 of the second regression on NOC ownership change (table IV), all coefficients are significant at the 1% level. IG countries are shown to be positively related to NOC ownership change, while the opposite effect in the form of a significant negative factor loading is observable for NIG countries. This is consistent with what was indicated in our earlier findings and supports [Bortolotti and Faccio \(2008\)](#) notion of higher concentration (in our case through increasing state participation) in IG countries. Adding factors for field size and OPEC membership in model 2 and 3 does not change the significance of the country set factors (IG and NIG), but the new factors do not turn out significant either. Even though figure 2a shows a greater increase in NOC stakes in large fields than in small fields, our regression finds that this is in fact insignificant ($p = 0.136$ for model 2). Table II shows an NOC ownership increase in OPEC countries of 0.77%, a finding that turns out to be insignificant ($p = 0.634$). These results are robust when we use the 25% or more positive ownership change.

NOC control as at 2008

[Insert table 5 about here]

The regression for NOC blockholding in fields for 2008 (table V) shows that high NOC ownership in a field is negatively related to the field being located in an IG country and is positively related to the field being in a NIG country. These findings indicate that even though there has been a shift towards higher NOC participation in IG countries, NOCs still dominate in NIG countries. Findings are significant for Models 1 and 2, where OPEC membership is not included as an additional factor. Model 3 adds the large field dummy, which is significantly positively related to NOC ownership, showing that NOCs own stakes in large fields while disregarding smaller fields. When the OPEC membership dummy is introduced in model 3, the NIG factor becomes insignificant, while the IG factor decreases its significance from the 1% level to the 5% level. This shows that the countries belonging to OPEC have a significant NOC ownership, a factor not caught in Models 1 and 2. Findings show that OPEC membership is strongly related

with high NOC ownership, which is confirmed in panel E in Table II, demonstrating an NOC ownership within OPEC countries of 93% in 2008.

The robustness test, using a NOC blockholding cutoff of 50%, gives similar results to using 25%, only difference being that both the IG and NIG factors are insignificant in model 3.

Conclusion

This study adds resource sector insights to the body of literature dealing with the sustainable advantage of state ownership retention. Global ownership data suggest that no competitor grouping is able to replicate or access the same reserve ownership advantage as host countries (Stiglitz 2007). Specifically we identify the emergent role of National Oil Companies (NOCs) among corporate groupings in the energy sector. NOCs are shown to play a key role in extending global ownership of oil and gas resources (Victor 2007).

Emergent power of state owned NOCs has enabled them to increase their reserve holdings by 6% from 74% of global O&G reserves in 2005 to 78% in 2008. By contrast NOC competitors decrease their proportional global reserve ownership: FNOCs by 17%, integrated companies by 12% and other companies by 21%.

We show that the broad ownership trend in IG countries is towards higher state ownership concentration and participation. NOCs own 45% of reserves in IG countries in 2005 and increase ownership to 53% by 2008, a 16% increase over a very short timeframe. Increased state participation in oil rich IG countries such as Russia, Norway and Kazakhstan underpin the global increase in NOC reserve ownership. By contrast, NIG countries have a decreasing state participation trend and state ownership is barely higher than that for IG countries in 2008. NOCs own 66% of NIG reserves in 2005, decreasing to 53% in 2008 a 20% fall in state ownership, a figure comparable to IG NOCs which hold 52.57% in 2008.

In global energy markets the emerging economies of China and India are beginning to use trade surpluses to lay claim to energy resources, increasing the need to understand the geopolitics of global reserve ownership. We show that it is increasingly difficult for FNOCs, integrated and other company groupings to compete with NOCs holding host country advantage. Ownership consolidation by host countries will have fundamental consequences for future sector strategic reserve replacement and earnings trends – and National Oil Companies have the sustainable advantage.

Appendix

[Insert table 6 about here]

[Insert table 7 about here]

[Insert table 8 about here]

[Insert table 9 about here]

Notes

¹Note that a state owned company is an NOC when it operates in its host country, while it is an FNOC when it operates outside its host country. As an example, when StatoilHydro operates in Norway, it is classified as an NOC, while when it operates in Angola, it is classified as an FNOC.

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Tables and Figures

Table I Overview of data

The table below gives an overview of the data for 2005 and 2008, separating NOCs (National Oil Companies), FNOCs (Foreign NOCs), integrated and other companies. The countries row shows the number of different countries covered by the company groupings. Similarly the fields row shows the number of different fields that each company owns stakes in. The stakes row shows the number of stakes owned by each company group. The companies row shows the number of companies in each group. The reserves row shows the proportion of global reserves owned by each company grouping.

	Total		NOC		FNOC		Integrated		Other	
	2005	2008	2005	2008	2005	2008	2005	2008	2005	2008
Countries	79	79	60	60	36	40	49	50	70	71
Fields	4078	4078	2290	2417	496	561	1727	1715	1902	1787
Stakes	9156	9088	2421	2585	753	822	3077	2994	2917	2699
Companies	698	692	136	137	48	56	25	22	511	501
Reserves (%)	100	100	74	78	1	1	13	11	13	10

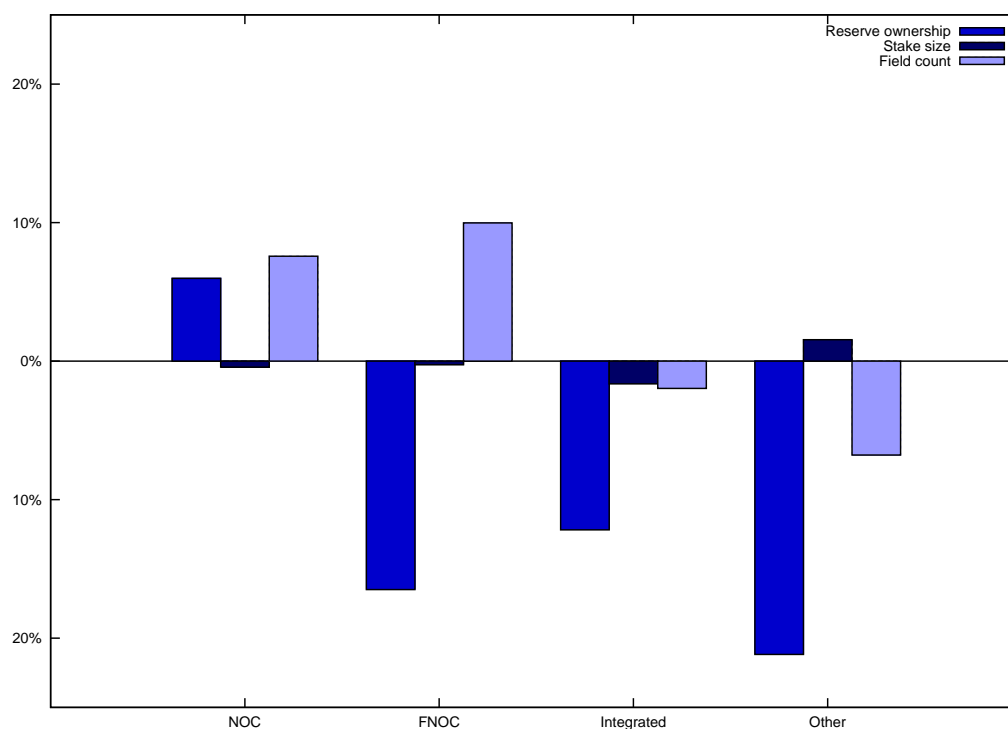
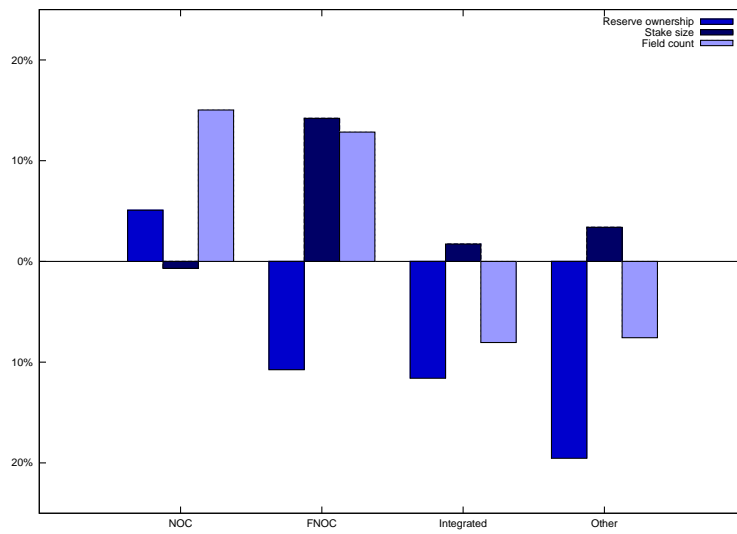
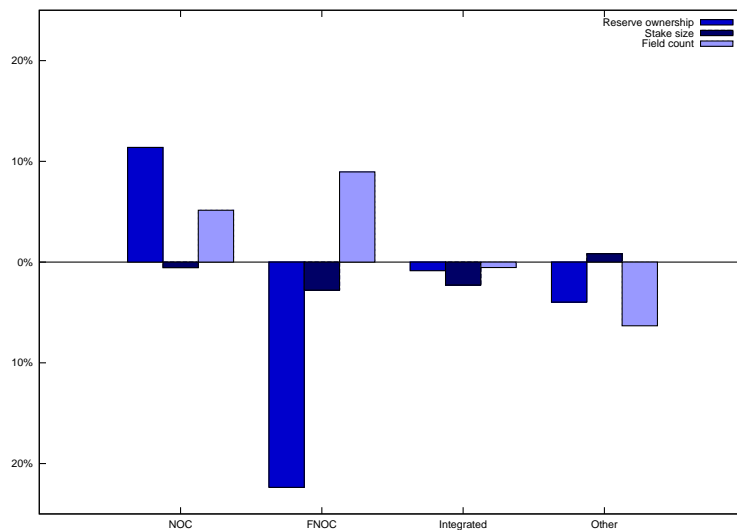


Figure 1. Global changes in average reserve ownership, average stake size and average number of stakes for companies from 2005 to 2008

The figures above describe the global changes in reserve ownership, average stake size and stake count. Reserve ownership represents the proportion of the world’s O&G reserves owned by the company grouping. Stake size is the average size of the stakes held by the company grouping. Stake count is the proportion of the worlds stakes held by the company grouping. The figure shows the changes of these values from 2005 to 2008 for National Oil Companies (NOCs), Foreign NOCs (FNOCs), integrated and other companies. Note that NOCs are the only group to increase their global proportion of reserve ownership.



(a) Large



(b) Small

Figure 2. Global changes in average reserve ownership, average stake size and average number of stakes for companies from 2005 to 2008, separating large and small fields

The figures above describe the global changes in reserve ownership, average stake size and stake count in large and small fields. Reserve ownership represents the proportion of the world’s O&G reserves in large/small fields owned by the company grouping. Stake size is the average size of the stakes in large/small fields held by the company grouping. Stake count is the proportion of the worlds stakes in large/small fields held by the company grouping. The figures show the changes of these values from 2005 to 2008 for National Oil Companies (NOCs), Foreign NOCs (FNOCs), integrated and other companies. Large fields have total remaining reserves ≥ 60 mmboe, while small fields have total remaining reserves < 60 mmboe.

Table II Company ownership of world oil reserves within country sets

This table shows ownership structures of the world's oil resources, separating NOCs (National Oil Companies), FNOCs (Foreign NOCs), integrated and other companies. The "reserve ownership" columns show the ownership structure of the country grouping's reserves and is found by taking the size of the company grouping's reserves within the country grouping and divide by the country grouping's total reserves. The "stake size" columns show the average size of the ownerships as a percentage per field of the company grouping within the given country grouping. The "field count" columns show the percentage of the total country grouping stakes held by each company grouping. Note also that a decrease in stake size and stake count may still lead to an increase in reserve (as seen for OPEC NOCs), as the other companies may have lost even more reserves. Countries are separated into investment grade, non-investment grade and unrated countries as defined by Moody's.

	NOC			FNOC			Integrated			Other		
	Reserve ownership (%)	Stake size (%)	Field count (%)	Reserve ownership (%)	Stake size (%)	Field count (%)	Reserve ownership (%)	Stake size (%)	Field count (%)	Reserve ownership (%)	Stake size (%)	Field count (%)
Panel A: Global												
2005	73.54	65.57	26.41	1.06	28.64	8.21	12.87	33.67	33.56	12.53	42.46	31.82
2008	77.94	65.29	28.41	0.89	28.56	9.03	11.30	33.12	32.90	9.87	43.12	29.66
Δ	5.98	-0.44	7.57	-16.50	-0.27	9.98	-12.18	-1.64	-1.97	-21.17	1.55	-6.78
Panel B: Non-OPEC Investment Grade												
2005	45.30	66.39	20.62	0.70	28.51	3.92	23.87	39.44	30.77	30.13	44.99	44.69
2008	52.57	65.50	23.97	0.96	25.51	5.34	21.53	38.30	30.23	24.95	46.47	40.45
Δ	16.03	-1.33	16.27	37.24	-10.53	36.26	-9.78	-2.89	-1.75	-17.21	3.31	-9.48
Panel C: Non-OPEC Non-Investment Grade												
2005	66.37	79.92	32.32	3.31	30.17	17.25	9.71	55.09	14.49	20.62	50.31	35.94
2008	53.13	75.16	38.84	4.12	34.94	9.26	19.32	59.77	13.88	23.43	48.96	38.02
Δ	-19.95	-5.96	20.19	24.30	15.79	-46.33	99.07	8.50	-4.20	13.67	-2.69	5.77
Panel D: Non-OPEC Unrated												
2005	28.16	36.64	25.03	14.77	29.42	19.18	44.65	32.60	35.97	12.42	33.01	19.81
2008	35.86	32.75	26.94	20.27	35.87	25.87	29.93	48.26	22.38	13.94	36.53	24.81
Δ	27.34	-10.62	7.61	37.24	21.92	34.89	-32.97	48.05	-37.80	12.26	10.66	25.25
Panel E: OPEC												
2005	92.40	73.86	35.20	0.45	26.15	6.18	5.05	25.27	41.73	2.10	33.84	16.89
2008	93.11	70.60	32.62	0.38	23.65	8.93	5.23	24.58	42.81	1.28	32.37	15.64
Δ	0.77	-4.42	-7.34	-15.53	-9.54	44.42	3.53	-2.74	2.60	-38.84	-4.34	-7.39

Table VI Reserve ownerships in 2005

This table shows which proportion of a country's reserves that are controlled by National Oil Companies (NOC), Foreign NOC (FNOC), integrated companies and other companies in 2005. The average given at the end of each country set is the non-weighted average of the countries ownership percentages. The countries are divided into investment grade, non-investment grade and unrated as defined by Moody's sovereign rating for 2005 and further into OPEC and non-OPEC.

Country	Rating	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)		
		All	Large†	Small†	All	Large†	Small†	All	Large†	Small†	All	Large†	Small†	All	Large†	Small†
Panel A: Non-OPEC Investment Grade																
Australia	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	2.02	1.57	3.82	28.65	32.95	11.56	69.33	65.48	84.62
Canada	Aaa	0.10	0.11	0.00	99.90	99.89	100.00	0.85	0.87	0.00	33.91	33.71	44.12	65.14	65.32	55.88
Denmark	Aaa	4.31	3.08	16.59	95.69	96.92	83.41	0.00	0.00	0.00	58.72	60.68	39.02	36.97	36.23	44.39
France	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Germany	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.79	0.00	3.89	99.21	100.00	96.11
Ireland	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Netherlands	Aaa	7.75	0.00	30.37	92.25	100.00	69.63	0.00	0.00	0.00	87.93	100.00	52.70	4.32	0.00	16.93
New Zealand	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	39.96	39.73	43.61	15.87	15.38	23.62
Norway	Aaa	43.97	44.87	30.08	56.03	55.13	69.92	0.19	0.03	2.70	56.70	68.40	37.61	41.74	29.62	61.52
Spain	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	1.56	1.98	0.87	81.24	83.02	64.41	18.76	16.98	35.59
UK	Aaa	0.00	0.00	0.45	99.27	99.23	99.55	1.92	1.82	2.65	2.19	2.04	8.05	0.66	0.21	19.20
US	Aaa	0.73	0.77	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.39
Italy	Aa2	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Greece	A1	24.61	0.00	24.61	75.39	0.00	75.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
China	A2	97.13	97.75	71.96	2.87	2.25	28.04	0.02	0.00	0.78	2.19	2.04	8.05	0.66	0.21	19.20
Malaysia	A3	40.17	39.47	48.58	59.83	60.53	51.42	1.98	1.51	7.61	53.35	55.74	24.73	4.49	3.28	19.08
Bahrain	Baa1	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	Baa1	99.84	100.00	15.25	0.16	0.00	84.75	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	84.75
South Africa	Baa1	58.52	58.75	55.00	41.48	41.25	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.25
Thailand	Baa1	24.64	25.33	6.59	75.36	74.67	93.41	0.00	0.00	0.00	50.80	51.74	26.35	24.56	22.93	67.07
Oman	Baa2	50.26	50.32	0.00	49.74	49.68	100.00	4.39	4.27	100.00	43.66	43.71	0.00	1.69	1.69	0.00
Tunisia	Baa2	20.67	0.00	20.67	79.33	0.00	79.33	3.12	0.00	3.12	28.65	0.00	28.65	47.57	0.00	47.57
India	Baa3	92.43	92.97	65.72	7.57	7.03	34.28	0.00	0.00	0.00	0.00	0.00	0.00	7.57	7.03	34.28
Kazakhstan	Baa3	18.28	17.50	40.94	81.72	82.50	59.06	3.25	2.81	16.07	64.18	66.21	5.49	14.28	13.48	37.50
Russia	Baa3	51.58	53.29	19.91	48.42	46.71	80.09	0.17	0.17	0.10	8.97	8.97	9.04	39.28	37.57	70.94
Trinidad & Tobago	Baa3	10.35	8.95	42.92	89.65	91.05	57.08	0.00	0.00	0.00	59.29	61.21	14.41	30.36	29.83	42.67
Average		28.67	26.66	18.83	71.33	50.26	77.32	0.75	0.58	5.30	30.05	30.52	18.15	40.54	19.16	53.88
Panel B: Non-OPEC Non-Investment Grade																
Egypt	Ba1	5.82	6.97	1.98	94.18	93.03	98.02	1.09	0.00	4.71	56.78	65.66	27.20	36.31	27.37	66.10
Colombia	Ba2	43.90	50.00	37.29	56.10	50.00	62.71	6.25	7.33	5.08	18.17	34.94	0.00	31.68	7.73	57.64
Peru	Ba3	0.00	0.00	0.00	100.00	100.00	100.00	12.31	23.29	0.00	6.25	0.00	13.25	81.44	76.71	86.75
Brazil	B1	94.81	95.39	82.25	5.19	4.61	17.75	0.00	0.00	0.00	3.21	3.26	2.07	1.99	1.35	15.68
Papua New Guinea	B1	73.03	0.00	73.03	26.97	0.00	26.97	0.00	0.00	0.00	18.48	0.00	18.48	8.49	0.00	8.49
Philippines	B1	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Turkey	B1	59.33	0.00	59.33	40.67	0.00	40.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.67
Vietnam	B1	51.59	54.31	24.96	48.41	45.69	75.04	15.98	14.78	27.75	12.70	13.99	0.00	19.73	16.92	47.29
Pakistan	B2	60.66	0.00	94.13	39.34	100.00	5.87	0.00	0.00	0.00	35.55	100.00	0.00	3.78	0.00	5.87
Turkmenistan	B2	82.65	82.76	81.15	17.35	17.24	18.85	0.55	0.00	7.76	0.00	0.00	0.00	16.81	17.24	11.09

Table VI – Continued

Country	Rating	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)			
		All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	
Bolivia	B3	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Argentina	Caa1	0.00	0.00	0.00	100.00	100.00	100.00	3.16	2.80	5.59	12.55	12.23	14.72	84.29	84.96	79.69	
Ecuador	Caa1	53.98	57.07	31.67	46.02	42.93	68.33	16.47	15.13	26.13	10.20	10.22	10.08	19.35	17.58	32.12	
Average		40.44	26.65	37.37	59.56	42.58	62.63	4.29	4.87	5.92	13.38	18.48	6.60	41.89	19.22	50.11	
Panel C: Non-OPEC Unrated																	
Albania	Unrated	12.66	0.00	100.00	87.34	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	87.34	100.00	0.00	
Angola	Unrated	18.55	17.82	34.54	81.45	82.18	65.46	7.88	7.93	6.87	69.34	70.57	42.40	4.23	3.68	16.19	
Azerbaijan	Unrated	21.51	19.74	65.05	78.49	80.26	34.95	13.47	14.02	0.00	45.81	47.67	0.00	19.21	18.56	34.95	
Benin	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00	
Brunei	Unrated	48.98	49.06	44.65	51.02	50.94	55.35	0.00	0.00	0.00	51.02	50.94	55.35	0.00	0.00	0.00	
Cambodia	Unrated	0.00	0.00	0.00	100.00	100.00	0.00	0.00	0.00	0.00	55.00	55.00	0.00	45.00	45.00	0.00	
Cameroon	Unrated	76.30	100.00	64.53	23.70	0.00	35.47	2.98	0.00	4.46	5.78	0.00	8.65	14.95	0.00	22.37	
Chad	Unrated	2.97	0.00	50.00	97.03	100.00	50.00	33.97	35.00	17.71	62.75	65.00	27.08	0.31	0.00	5.21	
Congo	Unrated	10.29	9.92	11.34	89.71	90.08	88.66	0.00	0.00	0.00	73.54	72.09	77.54	16.17	18.00	11.12	
Cote d'Ivoire	Unrated	17.33	17.07	20.00	82.67	82.93	80.00	0.00	0.00	0.00	0.00	0.00	0.00	82.67	82.93	80.00	
Dem Rep of Congo	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	12.51	0.00	0.00	87.49	0.00	87.49	
Equatorial Guinea	Unrated	4.93	5.00	4.53	95.07	95.00	95.47	0.00	0.00	0.00	74.40	74.74	72.34	20.66	20.26	23.13	
Faroes	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	28.29	0.00	28.29	71.55	0.00	71.55	0.16	0.00	0.16	
Gabon	Unrated	2.79	0.00	3.33	97.21	100.00	96.67	0.63	0.00	0.75	51.24	100.00	41.84	45.34	0.00	54.08	
Georgia	Unrated	45.36	0.00	69.51	54.64	100.00	30.49	0.00	0.00	0.00	0.00	0.00	0.00	54.64	100.00	30.49	
Ghana	Unrated	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Guinea Bissau	Unrated	6.00	0.00	6.00	94.00	0.00	94.00	0.00	0.00	0.00	24.00	0.00	24.00	70.00	0.00	70.00	
Kirgizstan	Unrated	43.17	0.00	43.17	56.83	0.00	56.83	0.00	0.00	0.00	0.00	0.00	0.00	56.83	0.00	56.83	
Madagascar	Unrated	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mauritania	Unrated	5.55	5.18	12.00	94.45	94.82	88.00	0.00	0.00	0.00	0.00	0.00	0.00	94.45	94.82	88.00	
Mozambique	Unrated	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Myanmar	Unrated	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Senegal	Unrated	15.00	0.00	15.00	85.00	0.00	85.00	0.00	0.00	0.00	0.00	0.00	0.00	85.00	0.00	85.00	
Sudan	Unrated	6.09	6.25	5.59	93.91	93.75	94.41	92.38	91.95	93.71	0.00	0.00	0.00	1.53	1.80	0.70	
Syria	Unrated	65.67	73.53	29.05	34.33	26.47	70.95	8.08	3.59	29.02	16.66	13.71	30.38	9.59	9.17	11.55	
Timor Leste	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	26.46	0.00	26.46	0.00	0.00	73.54	
Uganda	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00	
Uzbekistan	Unrated	93.52	92.73	100.00	6.48	7.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.48	7.27	0.00	
Yemen	Unrated	2.73	2.74	2.50	97.27	97.26	97.50	21.19	17.98	80.00	39.91	42.09	0.00	36.17	37.19	17.50	
Average		31.01	20.66	30.37	68.99	44.86	59.28	7.20	5.88	8.99	23.45	20.41	16.90	38.34	18.58	33.39	
Panel D: OPEC Investment Grade																	
United Arab Emirates	A1	60.76	60.77	60.34	39.24	39.23	39.66	0.63	0.59	1.83	29.96	30.26	19.05	8.65	8.37	18.78	
Kuwait	A2	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Qatar	A3	46.65	47.93	0.00	53.35	52.07	100.00	0.94	0.00	35.05	11.88	12.19	0.60	40.53	39.87	64.35	
Saudi Arabia	Baa2	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Average		76.85	77.18	65.08	23.15	22.82	34.92	0.39	0.15	9.22	10.46	10.61	4.91	12.29	12.06	20.78	

Table VI – Continued

Country	Rating	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)		
		All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡
Panel E: OPEC Non-Investment Grade																
Indonesia	B2	15.04	15.06	14.33	84.96	84.94	85.67	7.87	7.28	23.69	47.76	49.30	5.99	29.33	28.35	55.99
Venezuela	B2	98.70	98.92	0.00	1.30	1.08	100.00	0.08	0.06	8.44	0.79	0.72	33.10	0.43	0.31	58.47
Average		56.87	56.99	7.16	43.13	43.01	92.84	3.97	3.67	16.06	24.27	25.01	19.54	14.88	14.33	57.23
Panel F: OPEC Unrated																
Algeria	Unrated	88.53	90.20	31.13	11.47	9.80	68.87	2.57	2.36	9.83	3.29	2.69	24.20	5.60	4.75	34.83
Iran	Unrated	90.65	90.55	100.00	9.35	9.45	0.00	1.02	1.03	0.00	4.28	4.32	0.00	4.06	4.10	0.00
Iraq	Unrated	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Libya	Unrated	74.14	75.05	53.51	25.86	24.95	46.49	0.50	0.44	1.81	20.10	19.33	37.50	5.26	5.18	7.17
Nigeria	Unrated	50.64	51.04	46.97	49.36	48.96	53.03	1.47	1.24	3.59	45.32	45.83	40.53	2.57	1.88	8.91
Average		80.79	81.37	66.32	19.21	18.63	33.68	1.11	1.01	3.05	14.60	14.43	20.45	3.50	3.18	10.18

† Fields with total remaining reserves ≥ 60 mmboe

‡ Fields with total remaining reserves < 60 mmboe

Table VII Reserve ownerships in 2008

This table shows which proportion of a country's reserves that are controlled by National Oil Companies (NOC), Foreign NOC (FNOC), integrated companies and other companies in 2008. The average given at the end of each country set is the non-weighted average of the countries ownership percentages. The countries are divided into investment grade, non-investment grade and unrated as defined by Moody's sovereign rating for 2005 and further into OPEC and non-OPEC.

Country	Rating	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)		
		All	Large†	Small†	All	Large†	Small†	All	Large†	Small†	All	Large†	Small†	All	Large†	Small†
Panel A: Non-OPEC Investment Grade																
Australia	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.75	0.59	1.98	33.53	36.14	14.22	65.72	63.27	83.80
Canada	Aaa	0.15	0.15	0.00	99.85	99.85	100.00	0.65	0.62	4.16	41.41	41.40	41.99	57.80	57.84	53.85
Denmark	Aaa	5.98	5.27	10.85	94.02	94.73	89.15	1.43	1.34	2.08	57.25	58.81	46.39	35.35	34.58	40.67
France	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Germany	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.49	0.00	2.40	99.51	100.00	97.60
Ireland	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Netherlands	Aaa	23.93	40.00	10.64	76.07	60.00	89.36	0.00	0.00	0.00	69.48	60.00	77.32	6.59	0.00	12.05
New Zealand	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Norway	Aaa	53.94	55.04	42.99	46.06	44.96	57.01	0.75	0.54	2.85	38.62	38.76	37.19	6.69	5.67	16.97
Spain	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
UK	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	3.22	3.95	2.31	51.13	67.37	30.83	45.65	28.69	66.87
US	Aaa	0.00	0.00	0.00	100.00	100.00	100.00	4.53	4.39	5.66	81.58	84.45	59.02	13.88	11.16	35.31
Italy	Aa2	0.00	0.00	0.00	100.00	100.00	100.00	0.00	0.00	0.00	92.59	100.00	55.55	7.41	0.00	44.45
China	A1	97.44	97.94	71.50	2.56	2.06	28.50	0.01	0.00	0.46	1.76	1.58	11.17	0.79	0.48	16.87
Greece	A1	47.39	47.39	0.00	52.61	0.00	52.61	0.00	0.00	0.00	0.00	0.00	0.00	52.61	0.00	52.61
Bahrain	A2	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oman	A2	52.36	52.42	0.00	47.64	47.58	100.00	4.18	4.07	100.00	42.58	42.63	0.00	0.88	0.88	0.00
Malaysia	A3	45.61	44.56	58.81	54.39	55.44	41.19	2.67	2.71	2.23	46.41	48.41	21.35	5.30	4.32	17.62
Mexico	Baa1	99.94	100.00	0.00	0.06	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	100.00
South Africa	Baa1	58.99	58.75	60.00	41.01	41.25	40.00	0.00	0.00	0.00	0.00	0.00	0.00	41.01	41.25	40.00
Thailand	Baa1	22.38	23.07	5.71	77.62	76.93	94.29	0.00	0.00	0.00	52.44	54.05	13.62	25.18	22.88	80.66
Trinidad & Tobago	Baa1	12.54	12.30	30.54	87.46	87.70	69.46	0.65	0.66	0.00	55.44	56.15	2.08	31.37	30.89	67.38
Kazakhstan	Baa2	24.44	23.84	43.82	75.56	76.16	56.18	2.52	2.18	13.35	59.22	61.00	1.28	13.82	12.97	41.55
Russia	Baa2	65.04	66.05	28.27	34.96	33.95	71.73	0.75	0.77	0.00	9.15	9.12	10.18	25.07	24.07	61.55
Tunisia	Baa2	17.56	0.00	29.10	82.44	100.00	70.90	1.32	0.00	2.19	17.84	0.00	29.57	63.28	100.00	39.14
India	Baa3	90.62	91.09	52.63	9.38	8.91	47.37	0.00	0.00	0.00	0.00	0.00	0.00	9.38	8.91	47.37
Average		31.47	29.63	18.93	68.53	51.13	77.22	0.90	0.84	5.28	28.88	29.22	17.47	38.74	21.07	54.47
Panel B: Non-OPEC Non-Investment Grade																
Azerbaijan	Ba1	27.70	25.04	80.22	72.30	74.96	19.78	11.64	12.23	0.00	39.81	41.83	0.00	20.85	20.91	19.78
Brazil	Ba1	95.25	96.15	71.38	4.75	3.85	28.62	0.00	0.00	0.00	2.87	2.59	10.47	1.88	1.26	18.14
Egypt	Ba1	3.95	4.37	0.00	96.05	95.63	100.00	1.34	0.52	9.04	73.04	77.10	34.88	21.67	18.01	56.08
Colombia	Ba2	46.33	41.16	52.16	53.67	58.84	47.84	10.02	5.68	14.92	8.41	15.86	0.00	35.24	37.29	32.93
Peru	Ba2	9.91	10.92	0.00	90.09	89.08	100.00	3.92	4.32	0.00	14.06	14.31	11.65	72.12	70.45	88.35
Turkey	Ba3	65.97	0.00	65.97	34.03	0.00	34.03	0.00	0.00	0.00	0.00	0.00	0.00	34.03	0.00	34.03
Vietnam	Ba3	47.24	48.37	27.43	52.76	51.63	72.57	21.79	21.39	28.78	12.78	13.51	0.00	18.19	16.73	43.79
Albania	B1	8.98	0.00	100.00	91.02	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.02	100.00	0.00
Papua New Guinea	B1	73.77	73.58	76.37	26.23	26.42	23.63	0.00	0.00	0.00	15.16	14.52	23.63	11.07	11.90	0.00
Philippines	B1	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00

Table VII – Continued

Country	Rating	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)		
		All	Large [†]	Small [‡]	All	Large [†]	Small [‡]	All	Large [†]	Small [‡]	All	Large [†]	Small [‡]	All	Large [†]	Small [‡]
Cambodia	B2	0.00	0.00	0.00	100.00	100.00	0.00	0.00	0.00	0.00	55.00	55.00	0.00	45.00	45.00	0.00
Pakistan	B2	69.38	100.00	54.29	30.62	0.00	45.71	0.00	0.00	0.00	25.88	0.00	38.64	4.74	0.00	7.07
Turkmenistan	B2	58.10	55.97	93.63	41.90	44.03	6.37	0.00	0.00	0.00	0.00	0.00	41.90	44.03	6.37	
Argentina	B3	2.59	1.94	9.02	97.41	98.06	90.98	2.14	1.38	9.71	13.22	12.52	20.12	82.05	84.16	61.14
Bolivia	B3	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Average		33.94	30.50	42.03	66.06	49.50	51.30	3.39	3.03	4.16	17.35	16.48	9.29	45.32	29.98	37.85
Panel C: Non-OPEC Unrated																
Benin	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Brunei	Unrated	48.38	48.41	46.10	51.62	51.59	53.90	0.00	0.00	0.00	51.62	51.59	53.90	0.00	0.00	0.00
Cameroon	Unrated	75.19	100.00	42.40	24.81	0.00	57.60	2.60	0.00	6.03	7.29	0.00	16.91	14.93	0.00	34.66
Chad	Unrated	0.00	0.00	0.00	100.00	100.00	100.00	35.46	35.00	44.29	64.54	65.00	55.71	0.00	0.00	0.00
Congo	Unrated	11.44	10.46	20.81	88.56	89.54	79.19	1.51	1.53	1.31	82.72	86.38	47.58	4.33	1.63	30.30
Cote d'Ivoire	Unrated	17.11	17.11	0.00	82.89	82.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	82.89	82.89	0.00
Dem Rep of Congo	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	11.01	0.00	11.01	88.99	0.00	88.99
Equatorial Guinea	Unrated	4.96	5.00	4.57	95.04	95.00	95.43	0.00	0.00	0.00	73.71	73.94	71.41	21.33	21.06	24.02
Faroes	Unrated	0.00	0.00	0.00	100.00	100.00	100.00	28.29	0.00	0.00	71.55	0.00	71.55	0.16	0.00	0.16
Gabon	Unrated	1.37	0.00	2.96	98.63	100.00	97.04	1.48	0.00	3.20	69.72	100.00	34.68	27.42	0.00	59.15
Georgia	Unrated	58.58	73.11	23.46	41.42	26.89	76.54	0.00	0.00	0.00	0.00	0.00	0.00	41.42	26.89	76.54
Ghana	Unrated	10.00	10.00	0.00	90.00	90.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.00	90.00	0.00
Guinea Bissau	Unrated	6.00	0.00	0.00	94.00	0.00	94.00	0.00	0.00	0.00	0.00	0.00	0.00	94.00	0.00	94.00
Kirgizstan	Unrated	46.16	50.00	0.00	53.84	50.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	53.84	50.00	100.00
Madagascar	Unrated	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mauritania	Unrated	7.09	6.91	12.00	92.91	93.09	88.00	60.84	60.95	57.62	0.00	0.00	0.00	32.07	32.13	30.38
Mozambique	Unrated	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Myanmar	Unrated	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Senegal	Unrated	15.00	0.00	15.00	85.00	0.00	85.00	0.00	0.00	0.00	0.00	0.00	0.00	85.00	0.00	85.00
Sudan	Unrated	6.18	6.18	5.00	93.82	93.82	95.00	91.86	91.86	95.00	0.00	0.00	0.00	1.96	1.96	0.00
Syria	Unrated	32.22	32.99	21.35	67.78	67.01	78.65	21.26	19.17	50.57	11.43	10.49	24.64	35.10	37.35	3.44
Timor Leste	Unrated	0.00	0.00	0.00	100.00	0.00	100.00	0.00	0.00	0.00	53.87	0.00	53.87	46.13	0.00	46.13
Uganda	Unrated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uzbekistan	Unrated	93.16	92.48	100.00	6.84	7.52	0.00	0.00	0.00	0.00	0.00	0.00	6.84	7.52	0.00	0.00
Yemen	Unrated	0.37	0.00	1.18	99.63	100.00	98.82	51.66	50.00	55.33	0.00	0.00	0.00	47.98	50.00	43.49
Average		29.33	26.11	16.03	66.67	41.89	63.97	11.80	10.34	13.67	19.90	15.50	17.65	34.98	16.06	32.65
Panel D: OPEC Investment Grade																
Kuwait	Aa2	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
United Arab Emirates	Aa2	61.00	61.06	54.74	39.00	38.94	45.26	0.79	0.80	0.00	29.43	29.51	20.07	8.78	8.63	25.19
Qatar	Aa3	42.59	43.77	0.00	57.41	56.23	100.00	0.93	0.00	34.48	14.99	14.85	20.18	41.49	41.38	45.34
Saudi Arabia	A1	98.97	98.97	100.00	1.03	1.03	0.00	0.00	0.00	0.00	1.03	1.03	0.00	0.00	0.00	0.00
Average		75.64	75.95	63.69	24.36	24.05	36.31	0.43	0.20	8.62	11.36	11.35	10.06	12.57	12.50	17.63
Panel E: OPEC Non-Investment Grade																

Table VII – Continued

Country	Rating	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)		
		All	Large [†]	Small [‡]	All	Large [†]	Small [‡]	All	Large [†]	Small [‡]	All	Large [†]	Small [‡]	All	Large [†]	Small [‡]
Indonesia	Ba3	25.29	25.72	11.95	74.71	74.28	88.05	9.07	8.82	16.76	39.55	40.75	2.37	26.09	24.72	68.92
Venezuela	B2	99.55	99.60	62.04	0.45	0.40	37.96	0.01	0.01	1.60	0.33	0.32	12.72	0.11	0.08	23.64
Ecuador	B3	61.57	64.59	29.82	38.43	35.41	70.18	12.99	10.33	40.94	5.36	4.59	13.47	20.08	20.49	15.78
Average		62.14	63.30	34.60	37.86	36.70	65.40	7.36	6.39	19.77	15.08	15.22	9.52	15.43	15.10	36.11
Panel F: OPEC Unrated																
Algeria	Unrated	87.26	88.92	32.93	12.74	11.08	67.07	2.56	2.30	11.02	3.81	3.27	21.55	6.37	5.50	34.50
Angola	Unrated	22.81	21.67	45.59	77.19	78.33	54.41	6.13	6.04	7.92	68.16	69.98	31.94	2.90	2.32	14.55
Iran	Unrated	97.37	97.36	100.00	2.63	2.64	0.00	0.13	0.13	0.00	2.07	2.08	0.00	0.43	0.43	0.00
Iraq	Unrated	99.70	99.70	100.00	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.00
Libya	Unrated	79.37	80.06	54.00	20.63	19.94	46.00	1.04	1.01	1.90	16.85	16.27	37.96	2.75	2.66	6.14
Nigeria	Unrated	53.45	53.82	46.39	46.55	46.18	53.61	1.02	0.85	4.20	43.35	43.65	37.78	2.18	1.68	11.64
Average		73.33	73.59	63.15	26.67	26.41	36.85	1.81	1.72	4.17	22.37	22.54	21.54	2.49	2.15	11.14

[†] Fields with total remaining reserves ≥ 60 mmboe

[‡] Fields with total remaining reserves < 60 mmboe

Table VIII Change in reserve ownerships from 2005 to 2008

This table shows the change in proportion of a country's reserves that are controlled by National Oil Companies (NOC), Foreign NOC (FNOC), integrated companies and other companies from 2005 to 2008. NA means that the ownership was 0 in 2005 and that it is not possible to calculate a change due to division by 0.

Country	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)		
	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡
Albania	-29.07	NA	0.00	4.21	0.00	NA	NA	NA	NA	NA	NA	NA	4.21	0.00	NA
Algeria	-1.43	-1.42	5.77	11.07	13.04	-2.61	-0.39	-2.45	NA	15.75	21.76	-10.96	13.59	15.80	-0.96
Angola	22.98	21.59	32.00	-5.23	-4.68	-16.88	-22.24	-23.83	15.29	-1.71	-0.84	-31.38	-37.09	-37.09	-10.12
Argentina	NA	NA	NA	-2.59	-1.94	-9.02	-32.22	-50.78	73.64	5.28	2.33	36.74	-2.65	-0.95	-23.28
Australia	NA	NA	NA	NA	0.00	NA	-62.73	-62.55	-48.23	17.02	9.68	22.98	-5.20	-3.37	-0.96
Azerbaijan	28.76	26.84	23.33	-7.88	-6.60	-43.42	-13.62	-12.80	NA	-13.09	-12.26	NA	8.57	12.61	-43.42
Bahrain	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benin	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
Bolivia	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
Brazil	0.47	0.80	-13.21	-8.59	-16.46	61.25	NA	NA	NA	-10.49	-20.73	406.98	0.00	NA	15.70
Brunei	-1.23	-1.31	3.24	1.18	1.27	-2.61	NA	NA	NA	1.18	1.27	-2.61	NA	NA	NA
Cambodia	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	0.00	0.00	NA	0.00	0.00	NA
Cameroon	-1.45	0.00	-34.30	4.68	NA	62.39	-12.72	NA	NA	26.09	NA	95.60	-0.13	NA	54.93
Canada	39.00	37.77	NA	-0.04	-0.04	0.00	-23.38	-28.89	NA	22.12	22.81	-4.84	-11.27	-11.45	-3.63
Chad	-100.00	NA	-100.00	3.06	0.00	100.00	4.38	0.00	150.10	2.86	0.00	105.70	-100.00	NA	-100.00
China	0.31	0.20	-0.65	-10.61	-8.71	1.66	-52.97	NA	-41.48	-19.38	-22.73	38.76	19.46	126.99	-12.13
Colombia	5.53	-17.68	39.87	-4.33	17.68	-23.71	60.38	-22.45	193.79	-53.72	-54.60	NA	11.24	382.26	-42.87
Congo	11.14	5.53	83.50	-1.28	-0.61	-10.68	NA	NA	NA	12.48	19.82	-38.64	-73.21	-90.97	172.50
Cote d'Ivoire	-1.31	0.21	-100.00	0.27	-0.04	-100.00	NA	NA	NA	NA	NA	NA	0.27	-0.04	-100.00
Democratic Republic of Congo	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	-11.99	NA	-11.99	1.71	NA	1.71
Denmark	38.66	71.07	-34.61	-1.74	-2.26	6.89	NA	NA	NA	-2.50	-3.09	18.91	-4.40	-4.56	-8.37
Ecuador	14.06	13.18	-5.86	-16.49	-17.52	2.72	-21.11	-31.71	56.68	-47.46	-55.10	33.66	3.78	16.54	-50.89
Egypt	-32.14	-37.32	-100.00	1.99	2.80	2.02	23.14	NA	91.88	28.63	17.44	28.20	-40.32	-34.21	-15.16
Equatorial Guinea	0.53	0.00	0.73	-0.03	0.00	-0.03	NA	NA	NA	-0.94	-1.07	-1.28	3.24	3.96	3.87
Faroes	NA	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
France	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
Gabon	-50.80	NA	-11.03	1.46	0.00	0.38	135.62	NA	326.07	36.05	0.00	-17.11	-39.51	NA	9.39
Georgia	29.13	NA	-66.25	-24.18	-73.11	151.06	NA	NA	NA	NA	NA	NA	-24.18	-73.11	151.06
Germany	NA	NA	NA	0.00	0.00	0.00	NA	NA	NA	-38.12	NA	-38.29	0.30	0.00	1.55
Ghana	-90.00	NA	-100.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Greece	92.61	NA	92.61	-30.22	NA	-30.22	NA	NA	NA	NA	NA	NA	-30.22	NA	-30.22
Guinea Bissau	0.00	NA	0.00	0.00	NA	0.00	NA	NA	NA	-100.00	NA	-100.00	34.29	NA	34.29
India	-1.95	-2.02	-19.92	23.85	26.77	38.18	NA	NA	NA	NA	NA	NA	23.85	26.77	38.18
Indonesia	68.17	70.72	-16.61	-12.07	-12.54	2.78	15.26	21.11	-29.25	-17.19	-17.35	-60.45	-11.06	-12.82	23.09
Iran	7.41	7.51	0.00	-71.83	-72.02	NA	-86.89	-86.98	NA	-51.55	-51.87	NA	-89.44	-89.51	NA
Iraq	-0.30	-0.30	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ireland	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
Italy	NA	NA	NA	0.00	0.00	0.00	NA	NA	NA	13.97	20.46	-13.74	-60.49	-100.00	24.87
Kazakhstan	33.69	36.25	7.05	-7.54	-7.69	-4.89	-22.55	-22.22	-16.96	-7.74	-7.87	-76.71	-3.21	-3.79	10.80
Kirgizstan	6.92	NA	-100.00	-5.26	NA	75.98	NA	NA	NA	NA	NA	NA	-5.26	NA	75.98
Kuwait	0.00	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Libya	7.05	6.68	0.92	-20.21	-20.08	-1.06	108.20	130.20	4.69	-16.18	-15.85	1.22	-47.75	-48.69	-14.45

Table VIII – Continued

Country	NOC (%)			All Operators (%)			FNOC (%)			Integrated (%)			Other (%)		
	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡	All	Large†	Small‡
Madagascar	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Malaysia	13.54	12.90	21.05	-9.09	-8.41	-19.89	34.99	79.17	-70.74	-13.01	-13.15	-13.69	18.00	31.86	-7.66
Mauritania	27.76	33.45	0.00	-1.63	-1.83	0.00	NA	NA	NA	NA	NA	NA	-66.04	-66.11	-65.48
Mexico	0.10	0.00	-100.00	-62.40	NA	17.99	NA	NA	NA	NA	NA	NA	-62.40	NA	17.99
Mozambique	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Myanmar	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Netherlands	208.72	NA	-64.98	-17.54	-40.00	28.34	NA	NA	NA	-20.98	-40.00	46.72	52.53	NA	-28.85
New Zealand	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
Nigeria	5.55	5.46	-1.23	-5.69	-5.69	1.09	-30.90	-31.70	16.78	-4.33	-4.77	-6.80	-15.25	-11.04	30.68
Norway	22.66	22.67	42.93	-17.79	-18.45	-18.47	295.70	1800.16	5.49	-3.37	-2.45	-14.71	-57.83	-63.15	-28.13
Oman	4.18	4.17	NA	-4.22	-4.22	0.00	-4.73	-4.69	0.00	-2.48	-2.48	NA	-47.96	-47.96	NA
Pakistan	14.37	NA	-42.33	-22.16	-100.00	678.70	NA	NA	NA	-17.99	-100.00	NA	25.16	NA	20.44
Papua New Guinea	1.02	NA	4.57	-2.76	NA	-12.37	NA	NA	NA	-17.99	NA	27.87	30.41	NA	-100.00
Peru	NA	NA	NA	NA	-9.91	0.00	-68.18	-81.46	NA	125.13	NA	-12.06	-11.45	-8.15	1.84
Philippines	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
Qatar	-8.71	-8.68	NA	7.62	8.00	0.00	-0.71	NA	-1.62	26.16	21.78	3278.57	2.37	3.78	-29.55
Russia	26.08	23.93	41.96	-27.79	-27.31	-10.43	342.22	345.07	-100.00	1.96	1.69	12.56	-36.17	-35.94	-13.23
Saudi Arabia	-1.03	-1.03	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Senegal	0.00	NA	0.00	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
South Africa	0.81	0.00	9.09	-1.14	0.00	-11.11	NA	NA	NA	NA	NA	NA	-1.14	0.00	-11.11
Spain	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	0.00
Sudan	1.43	-1.11	-10.62	-0.09	0.07	0.63	-0.56	-0.10	1.38	NA	NA	NA	27.88	9.08	-100.00
Syria	-50.94	-55.13	-26.52	97.44	153.12	10.86	162.91	433.77	74.27	-31.40	-23.52	-18.89	265.98	307.29	-70.22
Thailand	-9.16	-8.93	-13.29	2.99	3.03	0.94	NA	NA	NA	3.23	4.45	-48.29	2.50	-0.18	20.28
Timor Leste	NA	NA	NA	0.00	NA	0.00	NA	NA	NA	103.59	NA	103.59	-37.27	NA	-37.27
Trinidad & Tobago	21.20	37.36	-28.84	-2.45	-3.67	21.68	NA	NA	NA	-6.50	-8.27	-85.57	3.34	3.55	57.90
Tunisia	-15.05	NA	40.78	3.92	NA	-10.62	-57.59	NA	-29.71	-37.72	NA	3.22	33.03	NA	-17.71
Turkey	11.19	NA	11.19	-16.32	NA	-16.32	NA	NA	NA	NA	NA	NA	-16.32	NA	-16.32
Turkmenistan	-29.70	-32.38	15.38	141.45	155.42	-66.22	-100.00	NA	-100.00	NA	NA	NA	149.32	155.42	-42.56
UK	NA	NA	NA	0.00	0.00	0.00	106.51	99.47	164.40	-9.82	-1.51	-18.03	9.36	-3.16	8.70
US	-100.00	-100.00	-100.00	0.74	0.78	0.45	135.83	140.51	113.34	-0.79	-1.14	1.50	-8.12	-6.81	-8.87
Uganda	NA	NA	NA	-100.00	NA	-100.00	NA	NA	NA	NA	NA	NA	-100.00	NA	-100.00
United Arab Emirates	0.40	0.47	-9.28	-0.62	-0.73	14.11	25.61	33.78	-100.00	-1.78	-2.48	5.34	1.50	3.14	34.13
Uzbekistan	-0.39	-0.27	0.00	5.68	3.44	NA	NA	NA	NA	NA	NA	NA	5.68	3.44	NA
Venezuela	0.86	0.69	NA	-65.39	-62.67	-62.04	-87.40	-86.76	-81.02	-57.80	-55.72	-61.57	-75.18	-74.16	-59.57
Vietnam	-8.45	-10.95	9.90	9.00	13.02	-3.29	36.35	44.74	3.71	0.68	-3.44	NA	-7.80	-1.09	-7.40
Yemen	-86.57	-100.00	-52.82	2.43	2.82	1.35	143.83	178.07	-30.83	-100.00	-100.00	NA	32.63	34.44	148.50

† Fields with total remaining reserves ≥ 60mmboc

‡ Fields with total remaining reserves < 60mmboc

Table IX Control analysis notations

This table gives the attributes which underpin reserve ownership changes and the size of the sets. A set of sets is represented by a capital letter using a special font (eg. \mathbb{F}), a set is represented by a bold letter (eg. \mathbf{F}) and single values are represented by small, italic letters (eg. f). Countries are separated into IG (investment grade), NIG (non-investment grade) and unrated countries as defined by Moody's. Companies are separated into NOC (National Oil Company), FNOC (Foreign NOC), integrated and other companies.

Variable	Value	Description	Size	
			2005	2008
\mathbf{C}	$\{\text{IG, NIG, Unrated}\} \times \{\text{Non-OPEC, OPEC}\}$	A set of all countries	79	79
IG		Set of all IG countries	30	30
NIG		Set of all NIG countries	18	18
Unrated		Set of all unrated countries	31	31
Non-OPEC		Set of all Non-OPEC countries	68	66
OPEC		Set of all OPEC countries	11	13
\mathbf{C}	$\subseteq \mathbf{C}$	A set of countries	Variable	Variable
c	$\in \mathbf{C}$	A single country	1	1
\mathbb{F}	$\{\text{Large Fields, Small Fields}\}$	A set of all fields	4074	4074
Large Fields		A set of all fields ≥ 60 mmbob	1078	1078
Small Fields		A set of all fields < 60 mmbob	2996	2996
\mathbf{F}	$\subseteq \mathbb{F}$	A set of fields	Variable	Variable
f	$\in \mathbf{F}$	A single field	1	1
\mathbb{E}	$\{\text{NOC, FNOC, Integrated, Other}\}$	A set of all companies	698	692
NOC		Set of all NOCs	136	137
FNOC		Set of all FNOCs	48	56
Integrated		Set of all integrated companies	25	22
Other		Set of all other companies	511	501
\mathbf{E}	$\in \mathbb{E}$	A set of companies	Variable	Variable
e	$\in \mathbf{E}$	A single company	1	1
\mathbf{S}_f	$\subseteq \mathbf{S}_f$	A set of all stakes in the world	9156	9088
\mathbf{S}_f	$\in \mathbf{S}_f$	A set of stakes in field f	Variable	Variable
s_f	$\in \mathbf{S}_f$	A single stake in field f	1	1
t	$\in \{2005, 2008\}$	Time as a year		