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Incorporation of offshore shell companies as an indicator of corruption risk in the extractive industries

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Abstract: We show that the incorporation of offshore entities increases when oil and gas exploration licences are awarded. We exploit leaked data on the incorporation of shell companies and detailed information on tax havens and the awarding rounds of oil licences to construct a new data set covering 119 countries over the period 1990–2014. We consider the incorporation of offshore entities as an indicator of corruption risk. We find that the number of new shell companies increases by 11.1 per cent in the period around the award of an exploration licence. We interpret this evidence as a strong indicator that the award of an exploration licence increases the risk of corruption. Consistent with rent-maximising behaviour, this association is stronger when the price of oil increases. Our work informs the fight against corruption, proposing greater monitoring of the ultimate beneficiaries of opaque companies that participate in awarding procedures.

Key words: oil, extractives, natural resources, corruption, tax havens, shell companies

JEL classification: D72, D73, O13, Q32

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1   Introduction

> Headlines from around the world make it clear: trillions of dollars in illicit money are circling the globe, enriching powerful individuals and keeping crooked leaders in power, all at the expense of everyday citizens. But headlines don't provide much insight into how corruption actually works. (Gillies 2019: ch. 3)

Corruption in the extractive industries (oil, gas, and mining) is a widespread phenomenon. Estimates of global foreign bribery suggest that 20 per cent of transnational bribes are related to extractive industries (OECD 2014). Large windfalls and widespread involvement of the state in the sector facilitate bad practice. Corruption in extractive industries has often been linked to the low and unequal growth of resource-rich countries (Addison and Roe 2018; Humphreys et al. 2007) in what the literature has called the 'resource curse'.

The awarding of licences for the exploration of oil blocks is a crucial moment for corruption to occur. Exploration licences are usually awarded by ministries, public authorities, or local governments, and they give the licence holder the exclusive right to explore for oil and gas within the specified block. Corruption may take place when exploration licences are awarded, given that very valuable contracts are at stake and the government enjoys a high degree of discretion in the choice of the awardee. Press reports are rich in anecdotal evidence of malpractice during awards. In 2012, a Romanian businessman named Frank Timis allegedly exploited his relationships with Senegalese politicians to gain control of two offshore oil blocks in Senegal. At the time of the award, Timis's winning company did not even physically exist: it was incorporated in the Cayman Islands later. The company lacked the capital and infrastructure to carry out the exploration. However, it was able to sell the licence to another British Virgin Islands company, and ultimately to resell it to two well-established and better-equipped oil corporations (Sharife and Dieng 2019). Timis allegedly exploited multiple shell companies to carry out the transfer of property: he enriched himself while—crucially—hiding his identity.

Policy reports and news articles highlight how relevant offshore centres are in fostering corruption. In a report published in 2017, the Natural Resource Governance Institute collected case studies of bribery and corruption in the award of licences and contracts (Sayne et al. 2017). The document proposed 12 red flags that should trigger suspicion of corruption during the awarding process. Among the indicators, the authors listed: i) 'a competing or winning company shows signs of having a politically exposed person [PEP] as a hidden beneficial owner'; ii) 'a company provides payments, gifts or favors to a PEP with influence over the selection process'; iii) 'the government allows a seemingly unqualified company to compete for, or win an award' (Sayne et al. 2017: 2).

To provide systematic evidence of how offshore entities enable corruption in the awarding of oil licences is nonetheless a difficult challenge, since one reason individuals choose to set up companies in tax havens is to hide their identities. However, recent developments in investigative journalism have allowed us a peek at the identities of the beneficiaries of thousands of shell companies registered in tax havens. The Panama Papers in 2016 and the Paradise Papers in 2018 revealed the names of the beneficiaries of shell companies incorporated by two major law firms in the Caribbean: Mossack Fonseca and Appleby.

We exploit this leaked information to provide systematic evidence of the association between the timing of the awarding of exploration licences and that of the incorporation of entities in tax havens. We construct a novel data set where we link detailed information about the incorporation of offshore entities with geo-localized information about awards of exploration and production

licences. We check whether countries incorporate more entities in tax havens during the six months around the award of exploration licences. We find that the number of entities incorporated increases by 11.1 per cent in the period around the award of an exploration licence. In contrast, we do not detect any statistically significant effect around the awarding of production licences.

Corruption is more likely to take place during oil booms (Andersen et al. 2017; Gillies 2019). When oil prices surge, oil companies make higher profits, and they are more willing to invest and to raise their bids in licensing rounds. Government officials and/or government ministers take advantage of the companies' increased willingness to pay to extract higher bribes. We test how the relationship between the awarding of exploration licences and the incorporation of offshore entities varies in response to fluctuations in the world price of oil. We find that when oil prices surge, the association between the timing of awards and the incorporation of offshore entities is even stronger. Finally, we show that the relationship between the awarding of exploration licences and the creation of shell companies is more likely to hold in countries where oil revenues play a central role in the whole economy.

This paper contributes to the strand of literature about natural resources and corruption (Andersen et al. 2017; Gillies 2019; Moisé 2020). We use a novel data set to provide statistical evidence of the role of offshore entities as indicators of potential corruption in the oil sector. This work is linked to Andersen et al. (2017), who use data from the Bank for International Settlements on bilateral bank deposits to show that natural resource-reliant countries with weak institutions are more likely to respond to a surge in petroleum prices with an increase in capital deposits in tax havens. Our paper builds on Andersen et al. (2017) and uses a direct measure of potential rent-seeking behaviour during the award of exploration licences: leaked data from the Panama and Paradise Papers. The awarding of licences, besides oil trade (Hsieh and Moretti 2006; Östensson 2020) and the payment of royalties (Baragwanath 2020; Caselli and Michaels 2013), may create opportunities for corruption. We provide systematic evidence of the relationship between the awarding of exploration licences and the incorporation of entities in tax havens. Our work aims to inform policy initiatives that develop indicators to enhance transparency and accountability in the extractive industries (Gillies 2020; Sayne et al. 2017). Lastly, we contribute to the literature on the natural resource curse (Addison and Roe 2018; Cust and Mihalyi 2017; Lahn and Stevens 2018; Ross 2001) by shedding light on how tax havens facilitate malpractice and potentially corruption in extractive industries, specifically the oil and gas sector.

2 Data and descriptive evidence

2.1 Data set

We construct a novel data set with detailed information about the incorporation of offshore shell companies and the award of licences for the exploration and production of oil and natural gas. We combine data from two main sources to i) proxy for corruption and ii) identify the timing of awards of exploration licences. We rely on leaked data from the Offshore Leaks Database to measure offshore entity incorporation as a proxy for corruption. We use information from Enverus, a business intelligence provider specialized in oil and gas, to recover information about exploration licences. We enrich the database with information from the World Bank, the Polity Index, and the Europe Brent Spot Price from the Energy Information Administration. These three data sources are used to measure a country's dependency on the extraction of oil and gas (oil rents as a share of gross domestic product (GDP)), which countries are autocracies (Polity Index), and oil booms (surges in the oil price).

Ideally, we would like to observe any bribes channelled towards awarding authorities around the time of the award of exploration licences. Despite such information being unavailable, investigative accounts (Gillies 2020; Sayne et al. 2017) suggest that shell companies are the vehicle most often used to transfer these kinds of funds. Offshore entities serve the purpose well, as they transfer funds with simplicity while granting secrecy to the payer and the payees. We draw the data from three massive leaks that occurred between 2010 and 2016 and that showed how the use of offshore finance is a global phenomenon.

In 2016, the International Consortium of Investigative Journalists (ICIJ) attracted global media attention by revealing a leak of data from Mossack Fonseca, a law firm based in Panama whose core business was offshore entity incorporation. A secret source (self-identified as John Doe) had passed two *Süddeutsche Zeitung* journalists 2.6 terabytes of data, including documents, emails, and details on entity incorporation from Mossack Fonseca. According to *The Economist* (Economist 2016), the firm covered between five and ten per cent of the global shell company market and, as reported by the ICIJ, had relationships with customers all over the world through its more than 40 worldwide offices. In the spring of 2016, the ICIJ released the Offshore Leaks Database, listing the dates, names, and beneficiaries of more than 200,000 entities incorporated by Mossack Fonseca. The efforts of the ICIJ to uncover the scope of tax havens and offshore finance had already started before the Panama Papers investigation, and continued even after it. In 2013, the ICIJ published the first list of more than 100,000 offshore entities incorporated by Portcullis TrustNet and Commonwealth Trust Ltd, two law firms respectively based in Singapore and the British Virgin Islands. In 2017, the ICIJ extended the Offshore Leaks Database with further data from a new leak that contained information about Appleby, a law firm headquartered in Bermuda and part of the 'magic circle' of offshore law firms. Similarly to Mossack Fonseca, Appleby's 700 employees, located across more than 19 tax havens, allowed the company to target a widely international market. The three leaks from Portcullis, Mossack Fonseca, and Appleby together make up the Offshore Leaks Database.

For each entity listed in the Offshore Leaks Database, we observe the name of the single or multiple beneficiaries (legal or natural persons) and the date on which the entity was incorporated. Crucially for our analysis, for a subset of the entities we observe the country of their beneficiaries, and we can therefore attribute a nationality to the company. In most cases, the country where the entity is incorporated differs from that of the beneficiary. About ten per cent of the 740,000 entities included in the three leaks report a 'bearer' as a beneficiary,[1] therefore limiting our ability to assign a country to the beneficiary. When the beneficiary's country is not reported, we use information from a different variable: the address linked to the office. For 121,000 observations, however, the variable is not evaluated. Following Alstadsæter et al. (2019), we exclude beneficiaries linked to more than ten addresses, as these are likely to work as intermediaries too, and thus their nationality may not reflect that of the ultimate beneficiary. Following this criterion, we disregard about 70,900 observations. We also disregard officers linked to more than ten entities (the median number of entities per officer is two, while the 75th percentile is 130 and the 90th percentile is 245), as they are also likely to work as go-betweens rather than being the actual beneficiaries.

We exclude from the analysis beneficiaries that report a tax haven as their location, as they are more likely to be nominees, and their nationality is not informative of the country of the actual beneficiary. Suppose for example that a corrupt politician from Angola incorporates an entity in Bermuda and nominates an officer from Bermuda as a nominee. It would be incorrect to attribute

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[1] A bearer share is a piece of paper that entitles the person who shows it to dispose of the company reported on it.

the entity to Bermuda, as the person who disposes of the wealth of the company is actually located in Angola. In cases where the beneficiary of an entity is linked to more than one country, we impute the entity to each country separately.

We construct two main outcome variables that are relevant to our analysis: the number of entities incorporated in a given month in a given country, and a dummy that equals one every month a new entity is incorporated.

Awarding of exploration licences

We obtain detailed information about the awards of exploration and production licences for oil and gas from Enverus, a business intelligence provider that collects information on oil and gas awarding procedures through scouting agents located around the world. Enverus sells these services to oil companies interested in receiving the most up-to-date information about upcoming licensing rounds: it provides them with details on the size, location, and type (onshore/offshore) of the block, as well as the awarding date. Crucially for our analysis, Enverus stores and sells historical information on bidding rounds, including details on the country of the block and the award date. Figure 1 shows the average number of licences awarded in a single month across the world. There are wide differences across countries. Large producers of oil (Australia, Brazil, Canada, and the United States) are more active in setting up licensing rounds. When focusing on the developing world, we observe large differences across continents: Latin American countries are more frequently active in licensing rounds than African countries.

In our analysis we focus on licences awarded between 1990 and 2014, as this is the period covered by the Offshore Leaks Database. Enverus reports details on 6,334 awards across 131 countries during this time interval. The incorporation of an offshore entity may occur in the period immediately preceding or following the awarding of an oil licence. For example, a company may be set up just before the incorporation to participate in the bidding round. Alternatively, and similarly to the case reported in section 1 of this paper, the timing of the award may precede that of the company's incorporation: the company exists only on paper until the bidding round. The actual incorporation takes place in the immediate aftermath of the round, once the award is certain. To take this feature into account, we focus our analysis on the six months around the award of a licence.

Figure 1: Distribution of monthly licence awards across the world
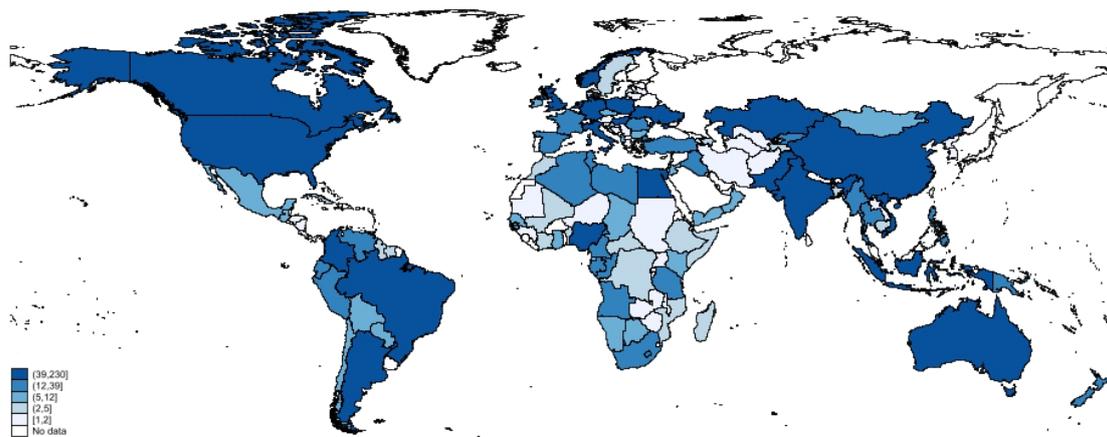
Source: authors' illustration based on data from Enverus database. Map created through the command spmap of the Stata software, with a shapefile from Natural Earth.

2.2 Descriptive evidence and statistics

We start the analysis by providing some descriptive evidence of the relationship between the award of oil licences and the incorporation of offshore entities. In Figure 2 we plot the yearly series for the total number of awards, the total number of incorporations of new entities, and the world oil price. The three measures show an increasing trend over time. The series for the oil price and the number of offshore entities map each other very closely. In Figure 3 we reproduce the same series, distinguishing between the awards of exploration licences (top panel) and production licences (bottom panel). A comparison of the two panels shows that the evolution of the total number of exploration licences closely follows the dynamics of the incorporation of new offshore entities. A similar relationship does not appear in the evolution of awards of production licences. These stylized facts guide the choice of specification in the empirical section of this paper. We test whether these global trends are confirmed when we exploit within-country differences in the timing of awards. We do this by exploiting monthly data on the number of awards and the number of newly incorporated shell companies at the monthly level.

Figure 2: Licences, oil price, and offshore entity incorporations
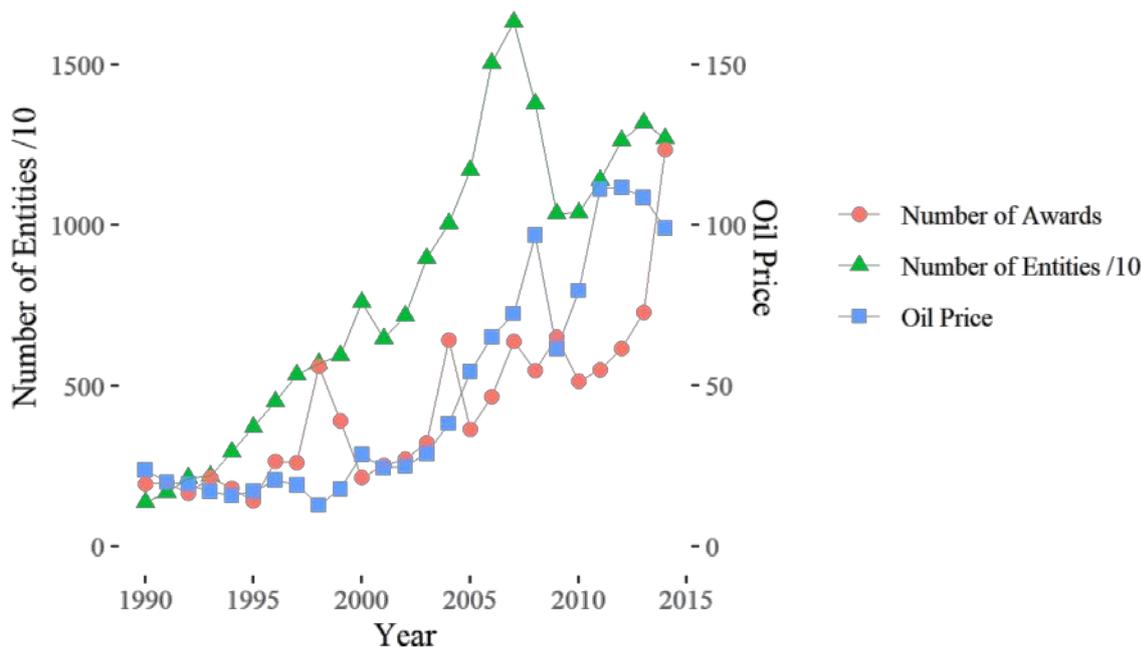
Note: this figure shows the general global trends of our main variables. Green triangles represent the number of offshore entities that open every year and that we can observe in our data (left axis). Red dots represent the number of awards for both exploration and production licences (left axis). Blue squares represent the average price of oil in a given year (right axis).

Source: authors' illustration.

Figure 3: Licences, oil price, and entity incorporations by type of licence

A: Awards of exploration licences, oil price, and offshore entity incorporations
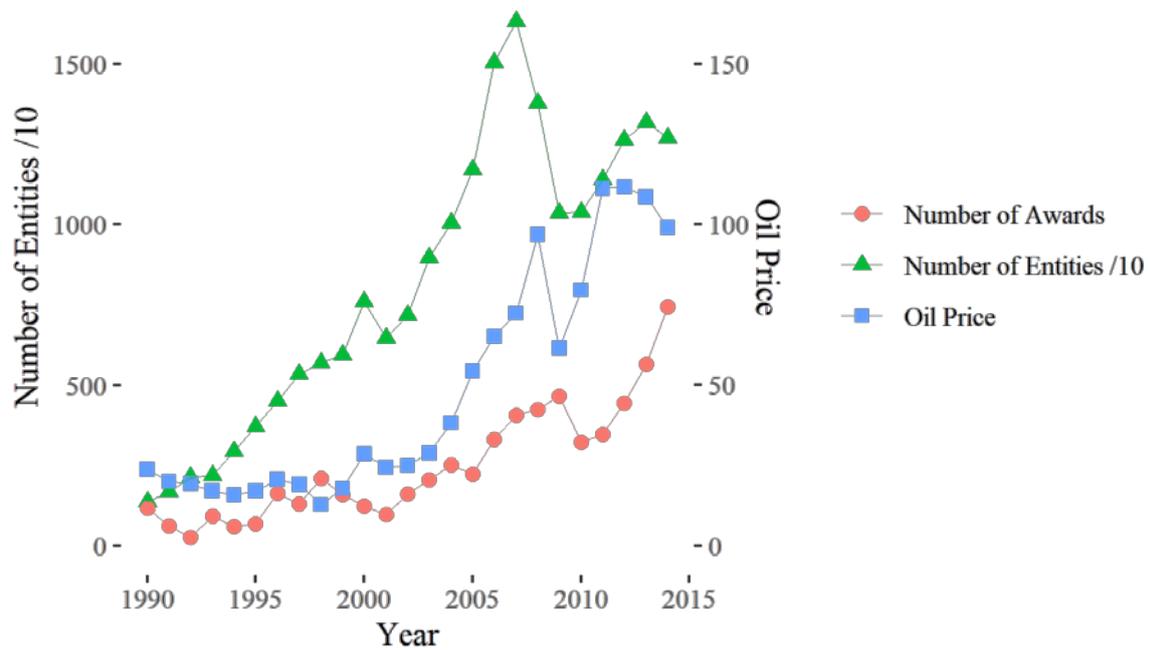
B: Awards of production licences, oil price, and offshore entity incorporations
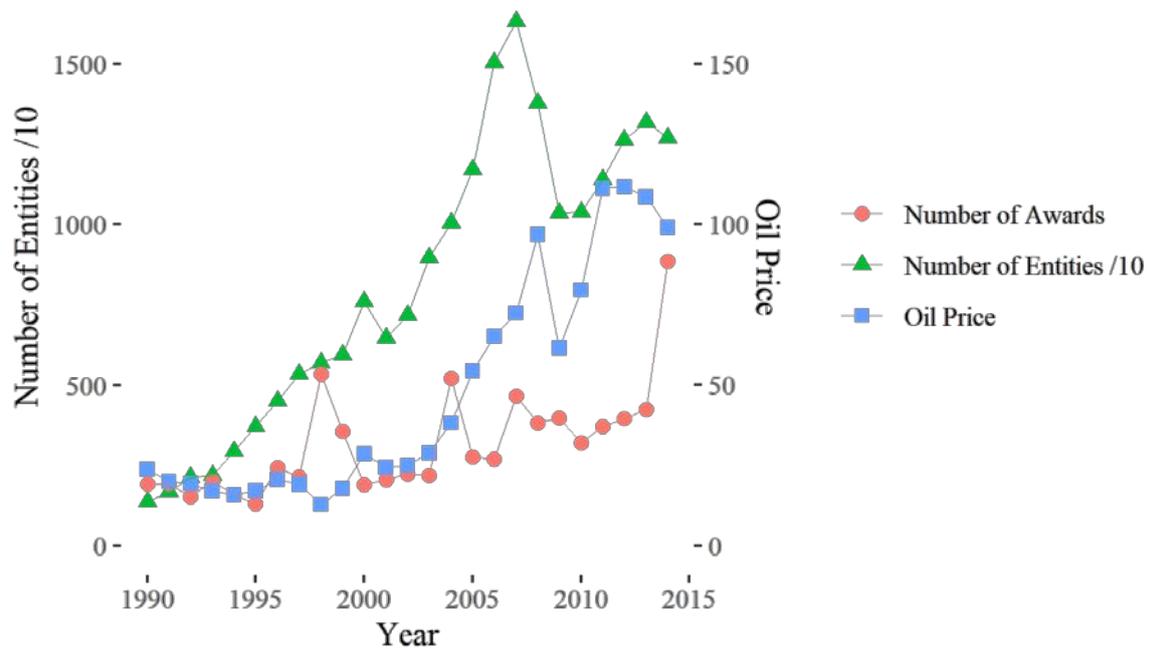
Note: this figure shows global trends in our main variables of interest. Panel A shows global trends when we only consider exploration awards. Panel B shows global trends when we only consider production awards. Green triangles represent the number of offshore entities that open every year and that we can observe in our data (left axis). Red dots represent the number of awards of exploration licences (panel A) and production licences (panel B). Blue squares represent the average price of oil in a given year (right axis).

Source: authors' illustration.

Table 1 reports the descriptive statistics for our sample. The data shows great variation in the number of offshore entities incorporated. To limit the risk that outliers will drive our results, and to take into consideration the large number of observations where no new entities are incorporated, we use the inverse hyperbolic sine (IHS) transformation of the number of monthly incorporations as the dependent variable. We measure the extent to which a country's economy depends on petroleum by using the World Bank measure of oil rents as a share of GDP. The data shows a vast degree of heterogeneity in this respect: Iraq and Libya rank the highest. Finally, countries differ widely with respect to the size of their economy (real GDP) and population. It is important to note, however, that our analysis will check for a relationship between awards and entity incorporations by exploiting data at the monthly frequency. As long as the sizes of the economy and of the population change at a lower frequency compared with the award of oil licences, they are unlikely to affect our results.

Table 1: Descriptive statistics

	Mean	Min.	Median	Max.	SD
No. of monthly incorporations	5.8	0.0	0.0	1088.0	24.92
At least one new incorporation	0.4	0.0	0.0	1.0	0.49
Month in an awarding interval	0.3	0.0	0.0	1.0	0.44
Month in an awarding interval: exploration	0.2	0.0	0.0	1.0	0.38
Month in an awarding interval: production	0.2	0.0	0.0	1.0	0.40
Oil rents as share of GDP	4.9	0.0	0.2	66.7	10.51
Dummy for oil rents above median	0.5	0.0	0.0	1.0	0.50
Real GDP	3447.8	0.0	2599.1	9997.8	2655.77
Population (millions)	48.3	0.4	11.8	1364.3	156.13
Observations					35268

Source: authors' calculations.

3   Estimation strategy

We estimate the association between the timing of the award of licences and the incorporation of offshore shell companies through a battery of two-way fixed effects models. We first estimate the following model by ordinary least squares:

$$ihs(\text{Number of Entities})_{it} = \alpha_i + \mu_t + \beta \text{Around Award}_{it} + \epsilon_{it} \qquad (1)$$

α_i represents country fixed effects, allowing us to capture any systematic time-invariant characteristics of any given country i, such as institutional features. μ_t represents month fixed effects, allowing us to control for any contemporaneous shocks across countries, such as variations in oil prices, as well as any non-linear dynamic in the expansion of Mossack Fonseca that is common across countries. Around Award_{it} is a dummy that takes the value of one in the six months around every award date in any given country i (e.g., if a licence is awarded in April, the dummy takes the value of one from January to June). The variable $ihs(\text{Number of Entities})_{it}$ is the IHS transformation of the number of entities opened in month t whose beneficiary is from country i. ϵ_{it} represents an error term correlated at the country level. The coefficient of interest β can be interpreted as the percentage change in the number of entities opened around the award of licences. We estimate the same model using a dummy variable that takes the value of one if at least one new offshore entity with a beneficiary from country i is incorporated. This approach allows

us to tease out the difference in the impact of awarding licences on the incorporation of offshore entities on the intensive and extensive margins.

We estimate the model described in equation [1] for all licensing awards for oil and gas, and then we estimate it separately for awards of exploration licences and of production licences. This approach allows us to understand at what stage potential corruption is likelier to occur.

3.1 Role of an oil boom

An increase in the oil price spurs profit opportunities in the oil sector, and potentially opportunities for corruption and rent embezzlement. When the price of oil surges, oil companies are more likely to expand their investment opportunities, while the governments of oil-producing countries increase their bargaining power. Licences awarded during the period of an oil boom may be perceived as more valuable, thus leading to more corruption (Andersen et al. 2017; Gillies 2019). To test for this channel in our setting, we enrich the specification with an interaction between the awarding of licences and the monthly log change in the oil price:

$$ihs(\text{Number of Entities})_{it} = \alpha_i + \mu_t + \beta \text{Around Award}_{it} + \gamma \text{Around Award}_{it} \times \text{Oil Price Change}_t + \epsilon_{it} \quad (2)$$

The variable $\text{Oil Price Change}_t$ represents the monthly percentage change in the oil price. The coefficient of interest γ can be interpreted as the average percentage increase in the number of entities incorporated by country i when the price of oil changes by one per cent between two consecutive months.

3.2 Relevance of the oil sector and institutional setting

The scope for corruption may depend on a country's reliance on the oil sector (Andersen et al. 2017). Similarly, the scope for sheltering funds offshore may differ depending on the institutional setting of a country. Tax havens provide secrecy and anonymity. These features make them an appealing destination for politicians whose countries implement strict transparency and accountability policies. Tax havens are a 'safe' place to hide funds. On the other hand, countries with autocratic regimes may be more corrupt per se, and may therefore be more used to exploit opaque structures and to shelter funds abroad. In the end, the direction of the influence of the institutional setting on the embezzlement of funds remains an empirical question. To test these aspects, we enrich the main specification [1] with interactions with two dummies. One dummy captures whether oil rents as a share of GDP are above the median; the other captures whether the country is an autocracy or not. To limit the risk of endogeneity in the institutional setting of a country, we measure the regime at the beginning of the sample, in 1990.

Finally, to test for complementarities across the awarding of exploration licences, the dependency on the oil sector, and the institutional setting, we run a triple difference-in-differences specification:

$$ihs(\text{Number of Entities})_{it} = \alpha_i + \mu_t + \beta \text{Around Award}_{it} + \gamma \text{Around Award}_{it} \times \text{High Oil Rent}_i + \delta \text{Around Award}_{it} \times \text{Autocracy}_i + \eta \text{Around Award}_{it} \times \text{High Oil Rent}_i \times \text{Autocracy}_i + \epsilon_{it} \quad (3)$$

4   Results

4.1   Linear probability model

Table 2 reports estimates of our coefficient of interest β, estimated according to equation [1]. In the first three columns, the dependent variable is the IHS of the number of new entities incorporated (intensive margin). In columns (4) to (6), the dependent variable is a dummy for any new entity incorporated in a month (extensive margin). We do not detect any statistically significant change in the incorporation of offshore entities around the timing of the award of licences (columns (1) and (4)). However, results change when we distinguish by type of award. The number of new entities increases by 11.1 per cent in the six months around the award of an exploration licence. Similarly, the probability of observing a new entity increases by 1.9 percentage points. We do not observe a similar increase or an effect that is statistically different from zero around the award of a production licence (columns (3) and (6)).

Table 2: Opening of offshore shell companies and licence awards

	Number of new entities (in IHS)			New entity dummy		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Around any award	0.0517			0.0099		
	(0.0390)			(0.0096)		
Around exploration award		0.1112***			0.0192**	
		(0.0354)			(0.0096)	
Around production award			0.0406			0.0102
			(0.0508)			(0.0125)
Fixed effects						
Country	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes
Observations	35268	35268	35268	35268	35268	35268

Note: this table reports estimates of the coefficient β from equation [1]. The first three columns report estimates for model specifications where the number of new entities incorporated (after we apply the IHS transformation) is our main outcome variable. Columns (4) to (6) report estimates for specifications where our outcome variable is a dummy variable that takes the value of one if at least one new entity has been incorporated. Standard errors are clustered at the country level. Significance codes: *** 0.01, ** 0.05, * 0.1.

Source: authors' calculations.

4.2   Role of an oil boom

Table 3 shows the results of the estimates of specification [2], in which we test for potential complementarities between the awarding of exploration licences and oil booms. The results confirm that oil booms increase the scope for corruption. Panel B shows that the incorporation of offshore entities increases around the awarding of exploration licences. The coefficients on both the intensive (11.0 percent) and extensive margin (1.9 percentage points) are almost unchanged with respect to Table 2. They confirm that the period of the award of an exploration licence is associated with an increase in activities in tax havens even when there is no increase in the price of oil. The positive coefficient on the interaction term between the awarding of an exploration licence and the change in the oil price shows that the effect is exacerbated during an oil boom. We do not detect an effect statistically different from zero for the interaction term on the extensive margin (column (2)). This evidence supports the claim that the awarding of exploration licences triggers activity in offshore entities.

Table 3: Licence awards and price of oil

Model	Number of new entities (in IHS) (1)	New entity dummy (2)
A: any award		
Around any award	0.0513	0.0097
	(0.0390)	(0.0096)
Around any award × oil price change	0.0933	0.0477
	(0.1222)	(0.0466)
B: exploration licences		
Around exploration award	0.1102***	0.0191*
	(0.0353)	(0.0096)
Around exploration award × oil price change	0.2748**	0.0358
	(0.1309)	(0.0499)
C: production licences		
Around production award	0.0404	0.0100
	(0.0508)	(0.0125)
Around production award × oil price change	0.0420	0.0457
	(0.1480)	(0.0498)
Fixed effects		
Country	Yes	Yes
Month	Yes	Yes
Observations	35268	35268

Note: this table reports estimates of the coefficients β and γ from equation [2]. Panel A shows the results obtained when any type of award (exploration or production) is considered. Panel B shows estimates that are obtained when only awards for exploration licences are included. Panel C shows estimates that are obtained when only awards for production are included. Column (1) shows estimates obtained when the dependent variable is the IHS transformation of the number of entities incorporated by a given country in a given year. Column (2) shows estimates obtained when the dependent variable is a dummy variable that takes the value of one if at least one incorporation happened in a given month and in a given country. Standard errors are clustered at the country level. Significance codes: *** 0.01, ** 0.05, * 0.1.

Source: authors' calculations.

4.3 Relevance of the oil sector and institutional setting

In Table 4 we investigate whether the effect of the awarding of exploration licences is concentrated in countries whose economy relies more on the oil sector (columns (1) and (4)), and how the institutional setting of a country affects this relationship (columns (2) and (5)). The dummy 'high oil rent' identifies countries whose oil rents as a share of GDP are above the median. High oil rent countries are more likely to display the presence of at least one new entity around the awarding of an exploration licence (column (4)). The coefficient is positive but not statistically significant when we look at the intensive margin (column (1)).

When comparing the effect across countries with different institutional regimes, we do find a negative and statistically significant effect on the interaction with the institutional regime. One potential explanation is that tax havens are typically characterized by a high level of secrecy. This makes them an appealing destination in which to hide the proceeds of dirty deals made in countries with high accountability and transparency. Corrupt politicians face higher risks of being caught, and potentially higher chances of losing power, in democracies than they do in autocracies.

Finally, in columns (3) and (6) we test for the joint complementarity of the dependency on the oil sector and the institutional setting. The coefficient on the timing of the exploration continues to

be positive and significant around the award of an exploration licence. This suggests that the awarding is crucial in itself, independently of a country's institutional setting. Countries with a high dependence on the oil sector react to the awarding of exploration licences with a further increase in offshore entities (second and fourth rows). When we focus on the complementarity between oil wealth and the institutional setting, the effect is driven by autocracies on the intensive margin (column (3), fourth row). However, there is no distinguishable difference between autocracies and non-autocracies on the extensive margin (column (6), fourth row).

Table 4: Awarding of licences and offshore entity incorporations: analysis by relevance of the oil sector and institutional regime

	Number of new entities (in IHS)			New entity dummy		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Around exploration award	0.0924*	0.1712***	0.2073***	-0.0062	0.0345***	0.0089
	(0.0548)	(0.0442)	(0.0652)	(0.0132)	(0.0127)	(0.0161)
Around exploration award × high oil rent	0.0290		-0.0589	0.0392*		0.0410
	(0.0891)		(0.0997)	(0.0221)		(0.0273)
Around exploration award × autocracy		-0.2119**	-0.4927***		-0.0540**	-0.0651**
		(0.1057)	(0.0819)		(0.0224)	(0.0304)
Around exploration award × high oil rent × autocracy			0.4031**			0.0106
			(0.1628)			(0.0420)
Fixed effects						
Country	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	35268	35268	35268	35268	35268	35268

Note: this table reports estimates of several specifications of equation [3]. The first three columns show specifications where the outcome variable is the IHS transformation of the number of entities incorporated by a given country in a given year. Columns (4) to (6) show specifications where the outcome variable is a dummy variable that takes the value of one if at least one incorporation happened in a given month and in a given country. Columns (1) and (4) report results from a specification where we include an interaction between our around exploration award dummy and a dummy that takes the value of one if a country's economy is highly reliant on oil. Columns (2) and (5) report results from a specification where we include an interaction between our around exploration award dummy and a dummy that takes the value of one if a country was an autocracy in 1990. Columns (3) and (6) show results from a specification where we interact our around exploration award dummy with both dummies used in the previous columns. Standard errors are clustered at the country level. Significance codes: *** 0.01, ** 0.05, * 0.1

Source: authors' calculations.

5   Conclusions

How can we detect corruption in the oil sector? This question requires an urgent answer. Detecting the massive funds that are lost to bribes and rent embezzlement (Gillies 2019) is a vital step in stopping corruption, but it is also a prerequisite to redirect the management of extractive resources towards sustainable development (Addison and Roe 2018). Providing an answer is challenging, as corruption is by definition hard to detect. Researchers and policy-makers have been trying to pin down indicators that signal the need for extra monitoring in specific stages of the management of natural resources (Sayne et al. 2017).

In this paper we provide systematic evidence of a relationship between the awarding of exploration licences and the incorporation of entities in tax havens. Our study sheds light on the role that shell

companies play in limiting transparency and accountability in the awarding of licences. These features may prepare the ground for corruption to take root (Sharife and Dieng 2019). Politically exposed persons may exploit secrecy to hide their identities behind shell companies, award the exploration rights to themselves, and then make profits by selling those same rights to oil corporations.

From a policy perspective, the results of this paper call for further attention and more transparency during the delicate times of awarding procedures. It is fundamental that the authorities in charge of monitoring the awarding of oil licences should be independent and not subject to any political interference. Potentially, policy institutions such as the Extractive Industries Transparency Initiative or international authorities such as the World Bank could take the lead and ensure transparency is satisfactory over the different stages of the awarding procedure. Finally, in accordance with previous work by the National Resource Governance Institute (Sayne et al. 2017), our paper underlines the importance of verifying that the awardees of oil licences are equipped with adequate capital, experience, and capabilities to carry out the exploration operations they are supposedly entitled to.

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