The Effect of Mandatory Extraction Payment Disclosures on Corporate Payment and Investment Policies Abroad*

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Abstract

I examine how mandatory extraction payment disclosures (EPD)—a policy solution intended to discourage corporate payment avoidance in the oil, gas, and mining industries—affect fiscal revenue contributions and investments by multinational firms in foreign host countries. Using the staggered adoption of EPD across firms headquartered in Europe and Canada, I find that disclosing companies increase their payments to host governments, decrease investments, and obtain fewer extraction licenses relative to non-disclosing competitors. These effects are stronger for firms that face a high risk of public shaming, operate in corrupt host countries, and have a high exposure to bribery-prone payments, suggesting that EPD increases the reputational cost of corporate behavior that could be perceived as exploitative. The resulting reallocation of investments from disclosing to non-disclosing firms reduces drilling productivity and resource production in host countries, consistent with uneven disclosure regulation distorting capital allocation.

Keywords: Real Effects; Disclosure Regulation; Fiscal Revenues; Foreign Investment; Resource Allocation; Reputational Cost

JEL Classification: G14; G38; H20; H26; K22; L71; M41; M48; O47

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1 Introduction

Multinational corporations (MNCs) from developed countries play a significant economic role in foreign host countries (Brookings Institution, 2015). MNCs compensate host countries for their local business activities by making fiscal contributions, which are an important source of foreign government income (Collier, 2007). Policymakers are concerned that MNCs avoid payments to foreign countries that lack the institutions to effectively monitor multinational firms (United Nations, 2015). In response, several developed countries have imposed disclosure regulation on MNCs to facilitate payment transparency and increase the fiscal contributions that multinational companies make to host countries. Advocates of fiscal-payment disclosures argue that investors, consumers, and other interested parties use the newly available payment information to monitor multinational firms. However, it is unclear whether these reports impose sufficient costs on MNCs to incentivize actual changes in firm behavior. In this paper, I examine whether mandated fiscal-payment disclosures affect the payment and investment decisions of multinational firms abroad.

To examine this research question, I use the extractive industries as my setting. Extractive companies frequently venture abroad to extract oil, gas, or minerals in foreign countries that are endowed with natural resources and firms compensate host countries for the resource extraction. However, these firms often do not pay host countries their market-based share of extractive revenues, leading to payment losses of up to 20% of GDP (Acemoglu and Robinson, 2012; United Nations, 2015). The concern raised by policymakers and NGOs is that extractive firms *exploit* host countries, either because they bribe foreign officials to obtain payment concessions or because they use their expertise and financial resources to engage in other payment avoidance strategies (without paying bribes) (Humphreys et al., 2007; OECD, 2016; Global Witness, 2018).

To increase firms' fiscal contributions, European and Canadian legislators recently passed regulation requiring extractive companies to publish a yearly report on their corporate website that contains detailed project-level information on firms' payments to foreign governments (EPD reporting) (European Commission, 2013; Natural Resources Canada, 2014).[1] The main difference between EPD disclosures and previous payment reports made by host countries is that the information in extraction payment disclosures is substantially

[1]Throughout this paper, I use the terms "extraction payment disclosures", "EPD reporting", "EPD regulation", and "EPD" interchangeably.

more detailed. Unlike before, firm-level payments to governments are not only partitioned by the receiving host country, but also by extractive project and payment type. This additional layer of disaggregation is crucial for the effective monitoring of extractive firms as it allows interested parties to identify suspiciously low payments by uncovering discrepancies at the more granular project level (Global Witness, 2018).

Different developed countries implemented extraction payment disclosures at different points in time between 2014 and 2017. The staggered adoption of EPD across firms headquartered in Europe and Canada allows me to control for concurrent but unrelated market-wide events, alleviating concerns that my results could be driven by other economic, regulatory, or institutional changes. In my primary specification, I estimate the effects of EPD reporting by comparing changes in extractive payments and corporate investments between disclosing and non-disclosing firms.

I begin my empirical analysis by examining the effect of extraction payment disclosures on firms' payments to host countries. To this end, I construct a dataset based on individual host country reports from the *Extractive Industries Transparency Initiative* that cover payment practices by multinational oil, gas, and mining firms before and after EPD. This data differs from the information in EPD reports in the post-disclosure period since it is (i) compiled by host countries (not firms), (ii) only available at the firm-host country-year level, and (iii) not disaggregated by extractive project and payment type. Thus, I examine the impact of EPD on the *coarser* payments that are available both before and after the disclosure regulation. I document an increase in extractive payments for disclosing firms of approximately 12% after EPD reporting.

Since EPD imposes additional costs on extractive firms, the disclosure regulation might have unintended consequences. If extraction payment disclosures increase the marginal cost of investment, some investment opportunities will become NPV negative as a consequence of the higher operating costs in host countries. Since forgoing marginal investment opportunities does not entail significant adjustment costs, disclosing firms may invest less after the disclosure regulation. Consistent with this prediction, I find that after EPD reporting, disclosing companies reduce new segment-level investments by 28% relative to non-disclosing firms. In contrast, I do not find that EPD facilitates investment reallocations *within* disclosing firms across countries, likely because the adjustment costs of finding new extraction projects in other countries are high (EY, 2016).

Next, I examine whether the decrease in investments by disclosing firms *relative* to control firms is driven by capital reallocations across companies. If non-disclosing competitors invest in projects that disclosing firms forego due to EPD reporting, the disclosure mandate might trigger capital reallocations across firms (Hsieh and Klenow, 2009; Bloomberg, 2017; The Guardian, 2017). To assess this possibility, I compare the investment patterns of disclosing and non-disclosing companies around EPD across all host countries these firms are operating in. Treated and control firms have almost identical investment trends in the years prior to EPD reporting. However, while disclosing companies reduce their capital expenditures after EPD, non-disclosing competitors increase their investment activities, consistent with the disclosure regulation promoting capital reallocations across firms.

To provide direct evidence on how EPD facilitates across-firm capital reallocations, I examine whether the disclosure mandate affects the allocation of oil and gas licenses to MNCs. For this analysis, I focus on Africa, where I can uniquely observe the participants and outcomes of license auctions. More generally, the African oil and gas sector is a powerful setting to estimate the effect of EPD on license bidding as it is dominated by large multinational firms and inherently prone to exploitative business practices (Humphreys et al., 2007). If EPD imposes costs on regulated firms, disclosing companies might demand fewer licenses because some extraction opportunities now become unprofitable. Indeed, I find that, after EPD reporting, treated companies are less likely to submit bids for licenses. Consistent with this reduction in bidding activity, disclosing firms also win fewer auctions in the post-EPD period relative to unregulated competitors. The findings suggest that EPD reports facilitate the reallocation of licenses from disclosing to non-disclosing firms.

After having established that disclosing firms increase their extractive payments but reduce new investments, I examine one (non-exclusive) mechanism through which EPD reporting could affect MNC behavior. I posit that EPD reports facilitate the monitoring of corporate behavior that the public could *perceive* as exploitative.[2] Extractive firms cannot unrestrictedly maximize profits by avoiding payments since they face pressure to conform to societal expectations (e.g., Benabou and Tirole, 2006). Once fiscal contributions are disclosed in EPD reports, firms with low payments could face reputational costs from the public perception that they exploited host countries because some stakeholders have partially social (i.e., non-monetary) preferences ("reputational cost channel"). The repu-

[2]In Section IA5 of the Internet Appendix, I discuss and provide evidence against several alternative mechanisms.

tational costs of EPD reporting could include fewer sales to consumers (e.g., Chavis and Leslie, 2009), higher financing costs (e.g., Fama and French, 2007; Hong and Kacperczyk, 2008), or increased employee wages (e.g., Dewatripont et al., 1999; Novak and Bilinski, 2018).[3] Disclosing firms likely change their payment and investment behavior to limit these costs (Graham et al., 2013; Dyreng et al., 2016).

I perform three cross-sectional tests to provide empirical support for the reputational cost mechanism. First, I find significantly stronger payment and investment effects for firms with a high risk of public shaming that have been targets of NGO shaming campaigns or face high media coverage (Miller, 2006; Dyck et al., 2008; Christensen et al., 2020).[4] Second, I document stronger reactions to EPD reporting for subsidiaries in corrupt host countries where the public perception of low payments is particularly bad because these countries are easy to exploit (Shleifer and Vishny, 1993; Collier, 2007). Third, I find larger increases in fiscal contributions for firms with a high exposure to payments that are at the discretion of host country officials and thus vulnerable to bribery (Global Witness, 2018).

The result that EPD promotes license reallocations from disclosing to non-disclosing firms raises the question of whether the reporting mandate improves or distorts resource allocation in host countries. If disclosing firms are less productive than non-disclosing competitors but win licenses because they are more exploitative during the bidding process, EPD could shift contracts to more productive firms and thereby increase allocative efficiency (e.g., Banerjee and Munshi, 2004; Haselmann et al., 2018; Schoenherr, 2019). Alternatively, if contract allocations were already optimal prior to EPD (i.e., the most productive firms obtained extraction licenses), the regulation could distort capital allocation by strengthening the competitive position of non-disclosing, less productive firms.

To assess the impact of EPD on allocative efficiency, I examine changes in the average well productivity of oil and gas blocks after an extraction license has been reallocated to a non-disclosing firm during the post period.[5] My measure of productivity is the amount of natural resources that is extracted per drilling well. Output per well is a good measure of productivity as firms with more productive drilling processes extract more resources

[3] In Section 5.1, I discuss these costs in detail.

[4] Global Witness, the world's largest activist group against exploitation in the extractive industries, has recently developed a handbook on how to use the information in EPD reports to identify payment avoidance (Global Witness, 2018). Based on the handbook, Global Witness has organized data-training events around the world for journalists and activists (Global Witness, 2020).

[5] Oil and gas blocks are specific geographic areas in host countries where firms with licenses can drill for natural resources.

because they have a lower marginal cost of production.[6] I find that the average well productivity of oil and gas blocks decreases by 3.46 percentage points after license reallocations to non-disclosing firms in the post period (relative to license reallocations to disclosing firms). At the aggregate block level, total resource production decreases by 3.53 percentage points. The findings suggest that EPD reporting distorts capital allocation in host countries.[7]

Overall, my results indicate that EPD achieves its intended regulatory purpose of improving fiscal revenue collection from multinational firms in foreign host countries. However, at the same time, the regulation seems to put companies at a competitive disadvantage—disclosing firms decrease investments and obtain fewer extraction licenses relative to non-disclosing competitors.[8] My evidence suggests that it is the *uneven* application of EPD reporting to only a subset of firms, rather than the disclosure mandate itself, that is driving the observed distortions in competition and resource allocation.[9]

I contribute to three branches of the literature. First, I contribute to the literature on social responsibility reporting, which primarily focuses on capital market effects.[10] A recent line of research examines the real effects of mandatory CSR disclosures.[11] Christensen et al. (2017) and Chen et al. (2018) find that CSR disclosure mandates are associated with improvements in corporate social behavior but also reductions in the productivity and profitability of regulated firms. I contribute to this literature by documenting that mandatory

[6] In Figure IA3 of the Internet Appendix, I graphically illustrate this point.

[7] This conclusion also holds after taking into account the higher fiscal contributions by disclosing firms because, compared to disclosing firms, unregulated competitors do not increase their extractive payments. In other words, the counterfactual payments to the host country would have been higher in the post period had the license not been reallocated to a non-disclosing firm because of EPD reporting.

[8] EPD reporting imposes both direct and indirect costs on disclosing firms. Direct costs comprise higher payments to host countries for existing projects and costs related to the preparation of EPD reports. Indirect costs include firms' opportunity cost of losing access to certain profitable extraction projects. In Section IA2 of the Internet Appendix, I estimate the total (anticipated) net costs of the regulation by examining abnormal returns of disclosing firms around key events of the EPD rulemaking processes in Europe and Canada. My event-study analysis indicates that disclosing firms lose 2.8 percent of their market value around events that increase the adoption likelihood of EPD. This estimate implies that investors anticipate net costs of approximately USD 1.6 billion from EPD reporting for the average firm in my sample.

[9] In fact, large European extractive firms seem to recognize their competitive disadvantage and are currently lobbying the SEC to impose identical EPD reporting requirements on US companies. For example, the French firm Total S.A., one of the world's ten largest oil and gas companies (Statista, 2020), wrote in a comment letter to the SEC in February 2020 that *"[EPD reporting in the US] should restore a level playing field among major publicly listed oil and gas companies"* and that *"[differences in EPD reporting] result in a competitive disadvantage detrimental to EU issuers"* (Total, 2020).

[10] Christensen et al. (2019) provide a review of the literature on CSR and sustainability reporting.

[11] Leuz and Wysocki (2016), Roychowdhury et al. (2019), and Roychowdhury and Srinivasan (2019) survey the empirical accounting literature on the real effects of disclosure. Kanodia (2006) and Kanodia and Sapra (2016) develop an analytical framework to study real effects of disclosure. Jin and Leslie (2003), Christensen et al. (2020), and Duguay et al. (2019) study real effects of public-information disclosure in non-financial settings.

CSR reporting can distort resource allocation if it only applies to a subset of competing firms in the marketplace.[12] This insight echoes prior work (for example, in the cross-listing and interstate banking literatures) showing that uneven regulation can lead to market distortions (e.g., Black and Strahan, 2002; Piotriski and Srinivasan, 2008; Doidge et al., 2010; Amore et al., 2013). My results may apply to other disclosure settings where mandated transparency creates an unlevel playing field among competitors (e.g., public versus private firms).

Second, my findings contribute to the tax literature by showing that granular, public information disclosure of firms' payments to governments increases fiscal revenues from multinational companies and affects the investment behavior of disclosing firms and their non-disclosing competitors. In doing so, my paper responds to the call for research by Dyreng and Maydew (2018) on how the public disclosure of tax information affects the behavior of the firm and its competitors. Extraction payment disclosures are part of a larger regulatory agenda that attempts to reduce fiscal revenue avoidance by requiring multinational firms to publicly disclose their government payments on a disaggregated, country-by-country (CbC) basis. My paper provides direct evidence that CbC reporting in the extractive industries achieves its main policy objective of improving fiscal revenue collection but also highlights that the regulation has unintended investment consequences.[13]

Finally, my results speak to studies that examine the role of reputational costs for firms and managers. Karpoff et al. (2005) and Karpoff et al. (2008) quantify firms' direct legal penalties and market value changes in response to environmental violations and accounting fraud. Gow et al. (2018) show that managers strategically conceal directorships on boards of poorly performing firms to protect their reputations. These papers focus on reputa-

[12] Johannesen and Larsen (2016), Hombach and Sellhorn (2019), and Healy and Serafeim (2020) document negative abnormal returns for extractive firms around the announcement of EPD reporting in Europe and the US, consistent with investors expecting costly changes in firms' business activities. In Section IA2 of the Internet Appendix, I estimate similar event studies and also find negative firm-value effects in anticipation of EPD reporting in Europe and Canada. However, the focus of my paper is on the ex-post real effects of EPD and their underlying economic mechanism. My results suggest that EPD imposes costs on disclosing firms, which is in line with the ex-ante reduction in firm value.

[13] De Simone and Olbert (2020) and Joshi (2020) study how large European multinational firms change their tax behavior after being required to privately report tax information to Western tax authorities on a CbC basis. Joshi et al. (2020) and Overesch and Wolff (2019) examine the tax implications of public CbC reporting by European multinational banks. These papers find that public and private CbC reporting reduce tax avoidance and tax-motivated income shifting among regulated firms in developed countries. In contrast, I show that public CbC reporting in developed countries curbs fiscal revenue evasion by multinational firms in developing countries. Unlike these papers, my paper also examines the unintended investment consequences and competitive spillover effects of CbC reporting and sheds light on the role of reputation in driving the observed changes in multinational firm behavior.

tional costs ex-post, that is, *after* the adverse corporate event is revealed to the public. In contrast, I examine how firms change their behavior *before* an adverse event has occurred (e.g., negative media coverage, consumer boycotts, etc.) to reduce the expected reputational costs from corporate actions that the public could perceive as exploitative. My focus on ex-ante reputational costs is conceptually related to Christensen et al. (2020), who show that increased transparency of practices that do not align with societal expectations can lead to changes in the behavior of disclosing entities because of anticipated reputational costs.

2 Institutional Setting

By nature of their business, extractive companies frequently venture abroad to extract oil, gas, or minerals in foreign countries that are endowed with natural resources and firms compensate host countries for the resource extraction. Once a company successfully acquires an extraction license, it enters into an agreement with the host country. This agreement specifies the terms of the resource extraction process and governs the official payments that the company makes to the host country. Extractive companies make different payments depending on the stage of the project; these payments include royalties, license fees, and signature bonuses.[14]

Policymakers and NGOs are concerned that extractive firms fail to pay host countries their market-based share of extractive revenues, limiting the extent to which natural resources stimulate economic development in these nations (Acemoglu and Robinson, 2012; Global Witness, 2018). According to the United Nations (2015), African countries lost more than one trillion USD since the 1970s due to the bribery of public officials and other payment avoidance practices by multinational firms—a loss roughly equal to the official development assistance that Africa received over the same period. More than 75% of this financial outflow is attributable to activities in the oil, gas, and mining sector.[15]

Extractive firms typically avoid payments to host countries in two different ways. First, MNCs negotiate corrupt deals with foreign officials (Collier, 2007). The concern is that ex-

[14] Open Oil (2012) and Resource Contracts (2014) summarize the different stages of the extractive project lifecycle. Global Witness (2018) provides a detailed description of each payment type, including examples.

[15] In resource-rich developing countries, payment losses amount up to 20% of annual GDP (see, for example, the Republic of Congo, Nigeria, or Chad).

tractive firms bribe government bureaucrats to receive payment concessions in excess of the illicit kickback (Financial Times, 2012). In this context, even tiny concessions per unit of extracted resource translate into exceptionally high returns to bribery because of the nine- or ten-digit extraction volumes in typical oil, gas, and mining projects. The combination of high returns to bribery, weak institutional environments in many resource-rich countries, and frequent interactions with government officials make the extractive sector particularly prone to bribery (EY, 2013). Second, extractive firms use their financial resources and expertise to pursue legal but aggressive payment avoidance strategies (Humphreys et al., 2007).

To increase firms' fiscal contributions, the Canadian Ministry of Natural Resources and the European Parliament both passed accounting regulations that require companies in the oil, gas, and mining industries to publicly disclose their payments to host governments in a granular report on their corporate website and on the electronic filing platform of their national securities regulator. In June 2013, European policymakers enacted EPD regulation in the form of two directives (Directives 2013/34/EU and 2013/50/EU). Member countries are required to transpose European directives into national law within a window of two to four years, resulting in country-specific effective dates. However, the regulation itself is held constant across jurisdictions. In Canada, lawmakers enacted the "Extractive Sector Transparency Measures Act" in December 2014, which then entered into force on June 1, 2015. In Table 1, I provide the implementation details of EPD reporting for each adopting country.

EPD reports apply to all listed and large unlisted extractive companies headquartered in Canada or the European Single Market (excluding Switzerland).[16] Extractive firms are required to prepare extraction payment disclosures on an annual basis; these reports are almost always published on a different date than the annual filings and have to be provided within six months of the firm's fiscal year end. In the report, extractive payments are broken down by (i) the receiving government institution, (ii) extractive project, and (iii) payment type. Europe and Canada have identical payment disclosure requirements with a minimum materiality threshold of EUR 100,000 or C$ in total annual payments (when under this threshold, firms do not have to provide extraction payment reports). Audit firms review (Europe) or attest (Canada) EPD reports every financial year.

[16]The European Single Market includes EU member states as well as Norway, Iceland, Liechtenstein, and Switzerland.

The regulatory objective of extraction payment disclosures is to improve fiscal-revenue collection in host countries. The idea is that EPD reports (i) facilitate the monitoring of corporate payment behavior that could be exploitative and (ii) impose sufficient reputational costs to incentivize firms to increase their fiscal contributions (European Commission, 2013; Natural Resources Canada, 2014). Extraction payment reports differ from previous payment disclosures in two important ways. First, prior to EPD reporting, information about firm-level extractive payments was dispersed across several reports made by different host countries. Specifically, nations that participate in the Extractive Industries Transparency Initiative (EITI) publish (on a firm-year basis) payments by companies that extract natural resources in the given host country. In contrast, EPD reports are a one-stop information source for the extractive payments made by a particular company to every host country in which that firm operates. Prior to mandatory EPD reporting, firms did not voluntarily provide payment information in their annual filings or in separate stand-alone reports (Healy and Serafeim, 2020). Second, the payment information in EPD reports is substantially more disaggregated than in previous payment disclosures. Unlike before, firm-level payments to governments are not only partitioned by the receiving host-country institution, but also by extractive project and payment type. This additional layer of disaggregation is crucial for the monitoring of extractive firms and host governments as it allows interested parties to identify extractive revenue losses at the more granular project level (Global Witness, 2018). In Figure IA1, I provide an example of a typical EPD and EITI report to illustrate the differences in payment information before and after EPD reporting.

3 Data

3.1 Effective Dates of EPD Reporting

I obtain the adoption dates for the staggered implementation of EPD reporting from the European Commission and the Canadian Ministry of Natural Resources. For each country, I cross-validate the implementation dates with official notifications in federal law gazettes. These notifications specify the entry-into-force dates when the disclosure regulation became national law and also indicate the fiscal year when EPD reports were first required for extractive firms listed or headquartered in a particular country.

Table 1 provides the implementation details of EPD reporting by home country. Extraction payment disclosures became effective in Norway for fiscal years starting on or after January 1, 2014. The United Kingdom, Canada, and France followed in 2015. In all remaining countries, extraction payment disclosures became mandatory for fiscal years starting on or after January 1, 2016 or 2017. Thus, the adoption window is four years in total.

For each sample firm, I verify whether the company prepared a payment report and obtain information on the time period that the report covers. In total, I collect extraction payment disclosures for 308 consolidated oil, gas, and mining companies from 15 different countries. In Panel A of Table IA1, I report the number of disclosing parent firms for each regression sample by effective year and find that most companies become subject to EPD starting in 2015 and 2016. Panel B shows that the majority of disclosing firms are located in Canada, Norway, and the United Kingdom, where many of the world's largest oil, gas, and mining companies are headquartered.

3.2 Extractive Payment Data

I obtain micro-level data on extractive payments from the Extractive Industries Transparency Initiative (EITI). The EITI is an NGO based in Oslo, Norway, that encourages the open and accountable management of extractive resources by promoting a global standard that host countries can implement. Countries adopt the EITI standard to gain better access to international aid and cheaper funding from the International Monetary Fund, the World Bank, and other financial institutions. Once a nation implements the EITI standard, it is required to deliver an annual EITI report that describes the country's natural-resource value chain in detail. This report includes a reconciliation of extractive payments at the firm-host country-year level. The reconciliation covers data on (i) payments made by extractive firms and (ii) payments received by the government. The reconciliation is typically reviewed by a Big-Four accounting firm, which independently gathers the required payment data from extractive firms and host governments. The reconciliation covers all extractive companies that are active in a particular host country. If firms refuse to deliver the data, host countries are required to impose monetary and reputational penalties.

I manually collect payment-level data from EITI reports for 13 host countries between 2010 and 2016.[17] Each of the host country reports covers data from extractive firms headquartered in Europe, North America, Australia, South Africa, China, or other nations. I exclude observations from very small firms with consolidated assets of less than ten million USD since these micro firms are fundamentally different from disclosing multinational companies. Adoption of the EITI standard is voluntary. As a result, corrupt and poorly governed host countries might choose not to implement the standard. To the extent that the EITI does not cover the most poorly governed countries (where the real effects of extraction payment disclosures are arguably most pronounced), the sample selection biases my estimates towards zero and makes my inferences conservative.

3.3 Extractive Licensing and Resource Production Data

I obtain information on oil and gas block auctions from *Enverus International*, a company that provides exploration data and energy analytics services for firms in the extractive industries. My dataset contains detailed operational information for every major oil and gas block in Africa that is larger than 1,000 square kilometers in size and was licensed to multinational firms between 2000 and 2018. For each block, I observe (i) the identity of the licensees and their operating percentage, (ii) the award date, duration, and type of license (exploration or production), and (iii) the GPS coordinates, size (in square kilometers), type (oil, gas, or both), and environment (land or offshore). Overall, my sample contains 1,250 oil and gas licenses for 319 extractive firms in 28 African countries.

For certain license auctions, I am also able to observe the identity of all companies that submitted bids during the bidding process, including both winning and losing firms. My auction participation sample contains 36 oil and gas block auctions in eight host countries for which 31 extractive firms submitted bids. The bid participation sample covers fewer auctions than the license award sample because it starts in 2010 and most African host countries only publicly disclose the winning bidder but not the losing participants of license auctions.

Finally, I obtain monthly well-level production data from *Enverus International* for 119 oil and gas blocks operated by 49 extractive firms in four African host countries between

[17] Specifically, I obtain micro-level payment data for Azerbaijan, Ethiopia, Ghana, Iraq, Liberia, Mauritania, Myanmar, Norway, Seychelles, Tanzania, Trinidad and Tobago, the United Kingdom, and Zambia.

2010 and 2017. The production sample covers fewer host countries and blocks than my license award sample because *Enverus International* only provides reliable production data for wells located in Angola, Ghana, Nigeria, and Tunisia.

3.4 Firm Fundamentals and Host Country Characteristics

I collect financial statement data for listed extractive firms between 2010 and 2017 from *Compustat Global*, *Compustat North America*, and *Worldscope Geographic Segments*. I restrict my analysis to firms with a two-digit NAICS code of 21 ("Mining, Quarrying, and Oil and Gas Extraction") or a three-digit NAICS code of 324 ("Petroleum and Coal Products Manufacturing"). I obtain country-level data on corruption perceptions from *Transparency International*.

I exclude segment countries that the IMF classifies as offshore financial centers (OFCs) because investments in OFCs are likely financial rather than real investments. Moreover, I exclude observations if segment-level capital expenditures in a *single* host country are larger than 10% of a company's lagged *total assets* or if the parent firm's consolidated assets are less than ten million USD. Table 2 provides descriptive statistics for my regression variables.

4 The Effect of Extraction Payment Disclosures on Multinational Firm Behavior

4.1 Extractive Payments to Host Countries

I begin my empirical analysis by examining the effect of EPD reporting on the amount of extractive payments that multinational oil, gas, and mining firms make to foreign host governments. I use a difference-in-differences (DD) design to identify the effect of EPD on firms' transfers to host countries. The DD estimator compares changes in extractive payments around the staggered adoption of EPD reporting between disclosing and non-disclosing firms extracting the same natural resource in the same host country in the same year across all host countries. More generally, this model estimates the impact of the disaggregated payment information in EPD reports on the coarser payments from EITI reconciliation reports that are available both before and after the disclosure regulation.

Figure 1 illustrates my identification strategy. I estimate the following OLS regression model:

$$\text{Extractive Payment}_{\text{i,hc,t}} = \alpha_{\text{hc,t}} + \alpha_{\text{i,hc}} + \alpha_{\text{r,t}} + \alpha_{\text{tr/c,t}} + \beta \cdot \text{EPD}_{\text{i,t}} + \gamma' \cdot \text{X}_{\text{i,t}} + \epsilon_{\text{i,hc,t}} \,. \quad (1)$$

The dependent variable *Extractive Payment*$_{i,hc,t}$ is the natural logarithm of one plus the extractive payment by firm i to host country hc in year t, divided by total parent-firm consolidated assets in t-1 and multiplied by 100.[18] *EPD*$_{i,t}$ is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining firm. Given the staggered adoption of EPD, different European or Canadian firms are treated at different points in time. Firms headquartered or listed outside of Europe or Canada do not produce EPD reports and therefore serve as unaffected control group.

$X_{i,t}$ is a vector of control variables at the parent-company level that includes firm size, return on assets, and leverage. The staggered adoption of EPD reporting allows me to use high-dimensional time fixed effects, which alleviates concerns that my results could be driven by concurrent but unrelated market-wide events such as macroeconomic shocks or other regulations. Specifically, I include host-country-by-year fixed effects $\alpha_{hc,t}$ to control for time-varying host-country characteristics (e.g., GDP growth). $\alpha_{r,t}$ conditions the DD design on time-varying trends common to each type of natural resource, such as changes in commodity prices. I assign firms to resource types based on their three-digit NAICS industry subsector classification. I also add firm-subsidiary fixed effects $\alpha_{i,hc}$ to control for time-invariant firm characteristics in each host country. Finally, I add treatment- or control-group-by-year fixed effects to account for other macroeconomic, regulatory, or institutional changes that differentially affect all treated and control firms. As extractive payments are likely correlated cross-sectionally and over time within a given home country, I adjust standard errors for within-group clusters at the level of the parent-company's headquarters country (Bertrand et al., 2004; Petersen, 2009).

I report the results of my extractive payment regressions in Table 3. In Column (1), I find that *EPD* is positively associated with extractive payments (coefficient: 0.121; t-statistic: 2.99). Disclosing firms could make higher payments to host governments because

[18] I log transform the dependent variable to mitigate the impact of extreme values. In Internet Appendix Table IA3 Panel A Column (2), I show that my results are robust to not log transforming extractive payments.

they pursue larger extraction projects, operate more profitably, or are less financially constrained at the time that EPD reporting becomes effective. Therefore, in Column (2), I control for the natural logarithm of the parent company's lagged total assets, leverage, and return on assets. I find that the EPD treatment effect remains robust. The coefficient magnitude of 0.114 (t-statistic: 2.85) implies that extractive firms increase their transfers to host governments by approximately 12% once they are subject to EPD reporting.

The key identifying assumption of my DD design is that payment trends across disclosing and non-disclosing firms would have been the same in the absence of EPD reporting (Roberts and Whited, 2012). While there is no formal test to examine the counterfactual treatment effect, I can assess the validity of this parallel-trends assumption. I visualize the estimated treatment effect in event time by replacing the EPD indicator with separate interactions, each marking one time period relative to the entry-into-force-year (t=0). In Figure 2, I find that disclosing and non-disclosing firms have similar payment patterns before the adoption of EPD reporting, suggesting that the parallel trends assumption is valid.

4.2 Corporate Investment

So far, my findings indicate that EPD reporting achieves its main policy objective: it increases the amount of extractive payments that firms make to host countries. However, since the disclosure mandate imposes additional costs on firms, it might have consequences for corporate investment. In this section, I examine whether extractive firms change their investment policies in response to EPD reporting.

4.2.1 New Investments

If EPD increases the marginal cost of investment, some investment opportunities will become NPV negative due to the higher costs of operating in host countries (Christensen et al., 2020). Since forgoing marginal investment opportunities does not entail significant adjustment costs, disclosing firms will likely invest less after the regulation.

To examine the effect of extraction payment disclosures on firms' new investments in host countries, I estimate the following DD specification that compares changes in firm-segment-level capital expenditures between disclosing and non-disclosing companies around the staggered adoption of EPD:

$$\text{Segment CAPEX}_{\text{i,hc,t}} = \alpha_{\text{hc,t}} + \alpha_{\text{i,hc}} + \alpha_{\text{r,t}} + \alpha_{\text{tr/c,t}} + \beta \cdot \text{EPD}_{\text{i,t}} + \gamma' \cdot \text{X}_{\text{i,t}} + \epsilon_{\text{i,hc,t}} \quad . \tag{2}$$

Segment CAPEX$_{i,hc,t}$ is the amount of yearly capital expenditures by extractive company i in host country hc and year t, divided by the firm's consolidated assets in t-1 and multiplied by 100. The definition of my *EPD*$_{i,t}$ indicator is identical to the payment analysis. I include the same fixed effects and covariates as in Equation (1).

In Table 4 Column (1), I find that the association between EPD reporting and corporate investment is negative and highly statistically significant (coefficient: -0.896; t-statistic: -3.34), suggesting that the regulation is costly for disclosing firms. In Column (2), I show that my main coefficient of interest, β, remains negative and significant when I control for financial characteristics of the parent company. The coefficient magnitude implies that disclosing firms reduce their segment investments by 0.781 percentage points (or 28%) relative to non-disclosing firms.

In Figure 3, I provide evidence that treated and control firms have similar investment patterns during the pre-EPD period, suggesting that the parallel-trends assumption is valid (Roberts and Whited, 2012). Moreover, disclosing firms sharply reduce their segment investments following EPD. Given these treatment dynamics, remaining threats to identification would need to come from omitted variables that are correlated with (i) the *distribution* of EPD effective dates across adopting countries and (ii) concurrent changes in capital expenditures. Although this is not impossible, it seems unlikely. The decrease in segment investments is statistically significant through the end of my sample period.

One concern with identifying the causal investment effects of EPD reporting based on variation in implementation dates across adopting countries is that these dates are not exogenous and that correlated omitted country-level factors could also drive legislators' decision to adopt the disclosure regulation (Ball, 1980; Mulherin, 2007). I address this endogeneity concern by exploiting the fact that within each adopting country, the roll-out of EPD across companies depends on firms' fiscal year end since payment reports have to be published within six months of the last financial year (Daske et al., 2008). In addition, I draw on the fact that in Europe and Canada, EPD reporting does not apply to small and medium-sized unlisted firms.

These institutional features allow me to estimate the following within-home country-by-quarter specification, which compares changes in the investment policies of disclosing firms to (i) firms that have not yet disclosed (because their fiscal year ends at a later date) and (ii) unregulated firms, both of which are located in the same home country:

$$\text{CAPEX}_{\text{i,t}} = \alpha_{\text{i}} + \alpha_{\text{r,t}} + \alpha_{\text{c,t}} + \alpha_{\text{tr/c,t}} + \beta \cdot \text{EPD}_{\text{i,t}} + \gamma' \cdot \text{X}_{\text{i,t}} + \epsilon_{\text{i,t}} \quad . \tag{3}$$

$CAPEX_{i,t}$ is the amount of consolidated capital expenditures by extractive firm i in quarter t, normalized by the company's lagged total assets and multiplied by 100. Equations (2) and (3) differ from each other in two important ways. First, I now use quarterly instead of annual investment data because part of the identification in my within-home country model relies on quarterly variation in EPD adoption dates. However, information about firms' quarterly capital expenditures is only available for parent companies and, as such, I have to conduct my investment analysis at the consolidated-group instead of the geographic-segment level. Second, I replace my host country-by-year with home country-by-quarter fixed effects $\alpha_{\text{c,t}}$, which condition the analysis on time-varying, country specific factors that could influence national legislators' decision to adopt the disclosure regulation.

In Table 5 Column (1), I again find that disclosing firms reduce corporate investment following EPD reporting, which corroborates the results of my earlier segment-level analysis and indicates that my baseline inferences are not spuriously driven by omitted home-country factors (coefficient: -0.367; t-statistic: -5.40). In Column (2), I obtain almost identical and slightly stronger results when I control for financial characteristics of the parent company.

My consolidated investment sample contains a substantial number of very small, non-disclosing firms that (i) do not provide an investment breakdown by geographic segment and (ii) primarily extract natural resources domestically. These companies might be so fundamentally different from disclosing firms that imbalances in the covariate distributions of treated and control firms could bias my inferences and introduce model dependence (Ho et al., 2007). In fact, in Table IA2 of the Internet Appendix, I document that disclosing firms in my consolidated investment sample are on average larger, more profitable, and less levered than non-disclosing companies. To improve the estimation of my treatment effects, I coarsen exact match control to disclosing firms based on their financial characteristics at the end of 2013 (before the first country adopted EPD reporting). Table IA2 shows that

this matching reduces the covariate imbalance for each of the three variables. In Table 5 Column (3), I find that the matched-sample coefficient of EPD increases to -0.572 and remains highly statistically significant (t-stat: -4.44), indicating that my baseline inferences in Columns (1) and (2) were conservative.

4.2.2 Capital Reallocation from Disclosing to Non-Disclosing Firms

In this section, I examine whether the decrease in investments by disclosing firms *relative* to control firms is driven by capital reallocations across companies. If non-disclosing competitors take on investment projects that disclosing firms forego because of the disclosure mandate, EPD might trigger capital reallocations across firms (Hsieh and Klenow, 2009).

To assess this argument, I plot the average residualized capital expenditures from my consolidated investment analysis for disclosing firms and their unregulated competitors around the adoption of EPD reporting. For ease of exposition, I normalize the residualized investments of disclosing and non-disclosing firms by each group's standard deviation, average this number by year, and then subtract the mean from 2014 (the benchmark period). To compare average capital expenditures within the same time period across treatment and control groups, I focus on investment changes around 2015.

In Figure 4, I document that treated and control firms have almost identical investment trends in the years leading up to the disclosure regulation, suggesting that the parallel trends assumption is valid. However, once EPD reporting becomes effective, the investment patterns of the two groups diverge. Disclosing firms reduce their capital expenditures while non-disclosing competitors increase their investment activities, suggesting that EPD promotes capital reallocations across firms.

4.3 Allocation of Extraction Licenses

The analysis in Section 4.2.2 indicates that EPD reporting facilitates investment reallocations from disclosing to non-disclosing firms. One plausible explanation for this result is that EPD changes the allocation of extraction licenses to MNCs. Since EPD reporting imposes additional costs on regulated firms (see results in Sections 4.1 and 4.2.1), it is likely that disclosing companies demand fewer licenses because some extraction opportunities now become unprofitable (i.e., NPV negative).

To assess the impact of EPD on firms' demand for extraction licenses, I examine changes in the probability of submitting bids for oil and gas blocks in Africa. The African oil and gas sector is a powerful setting to estimate the effect of EPD on license bidding as it is dominated by large multinational firms and prone to exploitative business practices (Humphreys et al., 2007). I estimate the following DiD model:

$$\text{Submitted Bid}_{\text{i,b,t}} = \alpha_{\text{hc}} + \alpha_{\text{i}} + \alpha_{\text{r,t}} + \alpha_{\text{tr/c,t}} + \beta \cdot \text{EPD}_{\text{i,t}} + \gamma' \cdot \text{Z}_{\text{b}} + \epsilon_{\text{i,b,t}} \quad . \tag{4}$$

Submitted Bid$_{i,b,t}$ is a binary indicator equal to one if firm i submits a bid in year t for extraction rights in block b. I consider firms eligible to submit bids for auctions if they participated in at least one auction during the sample period. The definition of *EPD*$_{i,t}$ is the same as in previous analyses. I add controls (Z_b) for the size of the block (*Ln(Size of Oil & Gas Block)*) and the license type (i.e., exploration or production). License auctions are infrequent events that do not occur multiple times within a given host country-year. Therefore, I include host country fixed effects instead of host country × year fixed effects.

In Table 6 Column (1), I document that disclosing firms are significantly less likely to submit bids for license auctions after EPD reporting (coefficient: -0.100; t-statistic: -2.81). In Column (2), I limit the sample to firms that participate in more than one auction and find almost identical results (coefficient: -0.090; t-statistic: -2.35). To assess the reasonableness of the parallel-trends assumption, in Figure IA2, I map out the EPD treatment effect over time. In support of the parallel-trends assumption, disclosing and non-disclosing firms have similar patterns in auction participation during the pre-period.[19]

Since disclosing companies are less likely to submit bids after EPD reporting, they may ultimately obtain fewer licenses relative to non-disclosing competitors. To test this prediction, I examine changes in the *outcomes* of license auctions, by estimating the following OLS regression:

$$\text{Obtained License}_{\text{i,hc,t}} = \alpha_{\text{hc,t}} + \alpha_{\text{i}} + \alpha_{\text{r,t}} + \alpha_{\text{tr/c,t}} + \beta \cdot \text{EPD}_{\text{i,t}} + \epsilon_{\text{i,hc,t}} \quad . \tag{5}$$

[19]My auction participation analysis cannot speak to whether EPD reporting affects the overall level of competition for licenses. If the decrease in bidding by disclosing firms increases the likelihood that non-disclosing competitors win licenses, it is possible that the number of bids remains unchanged because non-disclosing firms are more willing to take part in the bidding process. In Section IA4 of the Internet Appendix, I indeed find that the total number of submitted bids stays constant around EPD reporting. That is, the disclosure regulation has an effect on who participates in oil and gas block auctions but does not seem to impact the level of competition for licenses.

Obtained License$_{i,hc,t}$ is a binary indicator equal to one if extractive firm i obtains a new oil and gas license in host country hc and year t. $EPD_{i,t}$ is defined as before. Since most extractive firms only acquire one license in a given host country during my sample period, I include firm fixed effects instead of firm $\times$ host country fixed effects. All other fixed effects are the same as in Equation (1).

In Table 7, I present the results. In Column (1), I consider all African host countries and years. Consistent with the reduction in bidding activity, I document that disclosing companies are 0.774 percentage points less likely to win license auctions following EPD reporting (t-statistic: -1.82). In Column (2), I limit the analysis to host countries in which firms held at least one extractive license during my sample ("active operating areas") and find that the negative treatment effect of EPD remains robust (t-statistic: -1.91). The coefficient magnitude increases to -12.338 percentage points when I drop firm-host country pairs where *Obtained License* equals zero throughout the entire sample. These "inactive" observations dilute the EPD estimate in Column (1) because they can be treated without explaining any variation in the dependent variable (since there is none to begin with). In Figure 5, I provide graphical evidence to support the parallel trends assumption: treated and control firms have similar patterns in acquiring new licenses prior to EPD.

Overall, the results of my corporate investment analysis indicate that EPD reporting has unintended regulatory consequences. Extractive firms reduce the level of new capital expenditures, suggesting that the reporting mandate increases the marginal cost of investment for disclosing firms. EPD facilitates the reallocation of new investments from disclosing to non-disclosing companies, in part because disclosing firms demand fewer extraction licenses.

5 Reputational Cost Channel

In this section, I examine the role of reputation in explaining firms' responses to EPD reporting. In Section IA5 of the Internet Appendix, I discuss and provide evidence against several alternative mechanisms.

5.1 Conceptual Underpinnings

Extractive firms cannot unrestrictedly maximize profits by avoiding payments because they face normative pressure to conform to societal expectations (e.g., Benabou and Tirole, 2006). That is, firms trade off economic and social objectives when operating abroad. One likely (non-exclusive) mechanism for the change in MNC behavior is that EPD reports facilitate the monitoring of corporate behavior that the public could *perceive* as exploitative. Once fiscal contributions are disclosed in EPD reports, firms with low payments could face reputational costs from the public perception that they exploited host countries because some stakeholders have, at least partially, social (i.e., non-monetary) preferences ("reputational cost channel"). The reputational costs of EPD reporting could include (i) fewer sales to consumers, (ii) higher financing costs, and (iii) increased employee wages. Under the reputational cost channel, disclosing firms change their payment and investment behavior to limit these costs.

Consumers with social preferences tend to boycott products from firms that do not adhere to social norms (e.g., John and Klein, 2003; Chavis and Leslie, 2009; Wang et al., 2018).[20] The public perception that disclosing firms with low reported payments exploit host countries could facilitate NGO- or media-orchestrated consumer boycotts that reduce product sales for these companies.

Similarly, prior research indicates that some investors prefer firms that conform to social norms (e.g., Fama and French, 2007; Hartzmark and Sussman, 2019). Firms that do not meet societal expectations have a higher cost of capital and more binding capital constraints because norm-constrained investors neglect these companies (e.g., Hong and Kacperczyk, 2008; Cheng et al., 2013). Therefore, extractive firms that avoid payments and exploit host countries could face higher financing costs.

Finally, employees with non-pecuniary preferences could demand compensation for the stigma of working for a firm that does not conform to societal expectations (e.g., Novak and Bilinski, 2018). The employee's disutility from social stigma can manifest on a personal (e.g., shame) or professional (e.g., career concerns) level (Dewatripont et al., 1999). Thus,

[20]For example, British consumers boycotted Starbucks and Amazon after the financial press revealed that these companies paid almost no corporate income tax to the United Kingdom despite strong UK sales (Dyreng et al., 2016). Similarly, BP faced substantial declines in gasoline sales following consumer boycotts orchestrated by NGOs in response to the Deepwater Horizon oil spill in the Gulf of Mexico (BBC, 2010; The Telegraph, 2010).

it is possible that, after EPD, firms with a reputation for exploiting host countries have to pay higher wages to attract and retain workers.

Below, I perform three cross-sectional analyses to examine whether reputational concerns are a likely explanation for the observed changes in multinational firm behavior.

5.2 Public Shaming Risk

To empirically assess whether EPD reports increase firms' vulnerability to public pressure, I introduce two non-overlapping partitioning variables into my baseline payment and investment specifications (Equations (1) and (2)). My partitioning variables proxy for firms' shaming risk and capture high or low realizations of the given firm characteristic. I interact both partitioning variables with my *EPD* treatment indicator and test for significant cross-sectional differences to provide evidence for the reputational cost channel.

I quantify shaming risk in two different ways. First, I focus on firms' prior shaming experiences. Companies that have previously been targeted by an exploitation-related shaming campaign face stricter scrutiny by activist groups and are more aware of the adverse reputational consequences of NGO interventions. I manually collect data on the targets of all extractive-sector campaigns by the world's nine largest activist groups since 2000 and partition disclosing firms by whether or not they were targeted before the adoption of EPD reporting.[21] In Columns (1) and (3) of Table 8, I find that the increase in extractive payments and decrease in investments are significantly stronger for disclosing firms that were previously targeted by an NGO shaming campaign (p-values of difference in EPD coefficients: 0.072 (payments), 0.041 (investments)).

Second, disclosing firms that are subject to high media attention are more vulnerable to public shaming because activist groups can collaborate with media outlets to expose perceivably exploitative business practices and thereby exert public pressure (Miller, 2006; Dyck et al., 2008; Christensen et al., 2020). To test whether the magnitude of my treatment effects increases in media coverage, I use data collected from *Factiva* to compute each firm's average annual number of unique mentions in English-language business newspapers between the year 2000 and the adoption of EPD reporting. I classify companies as *High (Low) Media Coverage* if their average press coverage exceeds (is below) the 75th percentile

[21] I obtain information about NGO shaming campaigns from the websites of Global Witness, the Natural Resource Governance Institute, Publish What You Pay, Transparency International, the World Resources Institute, Tax Justice Network, Oxfam, Earthrights International, and Greenpeace.

of all sample firms. In Table 8 Columns (2) and (4), I interact both media-coverage indicators with my *EPD* treatment variable and find that the payment and investment effects are significantly stronger for disclosing firms that experience high media attention (p-values of coefficient differences: 0.027, 0.092).

5.3 Operations in Corrupt Host Countries

To further support the interpretation that reputational concerns contribute to the observed changes in extractive firm behavior, I use geographic variation in MNCs' subsidiary locations and examine whether disclosing firms react more to EPD reporting if they operate in corrupt countries that are easy to exploit. The reputational costs of EPD are particularly high if firms make low payments in corrupt environments where the bribery of public officials is pervasive and the technical capacity of local governments is low (Shleifer and Vishny, 1993; Collier, 2007). To empirically assess this argument, I separately estimate my treatment effects for highly- and less-corrupt host countries. I classify countries as highly corrupt if Transparency International assigned them a Corruption Perceptions Index (CPI) of less than or equal to the 25th percentile of all countries ranked in 2013 (CPI score of 28), the year before the first developed country adopted EPD reporting.[22]

In Table 9, I present regression results for the estimated effects of *EPD* × *Highly Corrupt Host Country* and *EPD* × *Less Corrupt Host Country* on extractive payments and segment investments. In Column (1), I find that payments increase significantly more if disclosing firms operate in highly corrupt countries (coefficient: 0.275; t-statistic: 3.39; p-value of difference in EPD coefficients: 0.020). The OLS coefficient of *EPD* × *Less Corrupt Host Country* is positive and statistically significant, indicating that disclosing companies also partially increase their fiscal contributions to less corrupt host countries (coefficient: 0.086; t-stat: 2.00). Countries which I classify as *less* corrupt (e.g., Ethiopia or Ghana), still suffer from sufficient public-sector corruption and bureaucratic inefficiencies to impose reputational costs on firms that make low payments to these nations.

Consistent with my payment results, in Column (2), I find that the decrease in capital expenditures is also larger for subsidiaries located in highly corrupt host countries (coefficient: -2.655; t-statistic: -3.03; p-value of difference in EPD coefficients: 0.014). The

[22]In 2013, Transparency International's Corruption Perceptions Index ranked 177 countries and territories by their perceived levels of public-sector corruption, using a scale from 0 (highly corrupt) to 100 (uncorrupt).

negative (but statistically insignificant) coefficient for *EPD* × *Less Corrupt Host Country* of -0.494 suggests that EPD reporting does not facilitate investment reallocations from highly- to less-corrupt countries within disclosing firms, likely because the adjustment costs of finding new extraction projects in other countries are high (EY, 2016).

5.4 Exposure to Bribery-Prone Payments

In this section, I move away from country-level identification and use firms' exposure to different payment types to isolate the reputational cost channel. Extractive payment types can be divided into two groups: (i) payments that are at the discretion of host country officials who oversee resource extraction projects (i.e., license fees, production bonuses, royalties, production entitlements, infrastructure improvements, and dividends); and (ii) corporate income taxes that are mechanically imposed by the host country's tax laws. If reputational concerns contribute to the observed changes in MNC behavior, the estimated treatment effects should be larger for firms with a high exposure to payment types that are under the influence of public officials and thus vulnerable to bribery (Global Witness, 2018).

To test this prediction, I collect information on the amount of extractive payments by payment type from firms' first published EPD report. I use this granular data to compute the fraction of corporate tax payments, which are *not* under the influence of bureaucrats who oversee natural resource extraction. I classify firms as vulnerable to bribery if the company's share of non-tax payments exceeds the first tercile of all firms subject to EPD reporting. In Table 10, I find that the estimated payment increase is larger and concentrated among firms with a sizeable share of bribery-prone payments (coefficient: 0.193; t-statistic: 2.82; p-value of difference in EPD coefficients: 0.063).

Overall, the cross-sectional results in Section 5 support the interpretation that MNCs change their behavior because EPD reports increase the reputational cost of corporate actions that the public could perceive as exploitative.

6 Allocative Efficiency Implications of Extraction Payment Disclosures in Host Countries

The licensing and investment analyses in Sections 4.2 and 4.3 indicate that EPD reporting facilitates the reallocation of extractive contracts to non-disclosing firms. However, these results do not speak to whether the redistribution of contracts improved or distorted capital allocation in host countries. In this section, I examine the allocative efficiency implications of extraction payment disclosures.

If disclosing firms are less productive than non-disclosing competitors but win licenses because they are more exploitative during the bidding process, EPD reporting could shift contracts to less exploitative but more productive firms and thereby increase allocative efficiency (e.g., Banerjee and Munshi, 2004; Haselmann et al., 2018; Schoenherr, 2019). Alternatively, if contract allocations were already optimal prior to EPD (i.e., the most productive firms obtained extraction licenses), the regulation could distort capital allocation by strengthening the competitive position of less productive, non-disclosing firms.

To assess the impact of EPD reporting on allocative efficiency in host countries, I perform two complementary tests. First, I compare the productivity of drilling wells between disclosing and non-disclosing firms during the pre-EPD period. My measure of productivity is firms' average quarterly oil or gas production per drilling well in the host country. Output per well is a good measure of productivity since firms with more productive drilling processes extract more resources because they have a lower marginal cost of production (e.g., due to better technology or more highly skilled employees). In Figure IA3 of the Internet Appendix, I graphically illustrate this point by comparing the marginal cost curves and optimal production levels of two extractive firms that have differentially productive drilling processes.

In Figure 6, I plot the probability density functions of average well productivity for disclosing firms (red solid line) and non-disclosing firms (black dashed line) in the pre-EPD period. I take the natural logarithm to account for the skewness in well productivity (*Ln(Output per Well)*). I find that the productivity distribution of EPD firms is rightward shifted relative to the distribution of non-disclosing firms (p-value of differences in distributions: 0.014). The graphical evidence suggests that disclosing firms are, on average,

more productive than non-disclosing firms in the pre period since they extract more oil or gas whenever they successfully drill a well.

As a second test, I examine how the average well productivity and total resource production in a given oil or gas block changes after an extraction license has been reallocated to a non-disclosing firm in the post-EPD period. Blocks are specific geographic areas in host countries where firms with licenses can drill for oil and gas. Given the substantial size of many African blocks, host governments frequently award different portions of the same block to different multinational firms (PwC, 2018).

To identify the effect of EPD reporting on allocative efficiency at the block-level, I estimate the following OLS regression that (i) compares changes in average well productivity and total resource production between license reallocations to non-disclosing and disclosing firms before and after EPD reporting and (ii) takes into account the size of the acquired ownership share:

$$\begin{aligned} &\text{Ln(Output per Well)}_{\text{b,t}} \text{ or } \text{Ln(Total Output)}_{\text{b,t}} = \alpha_{\text{b}} + \alpha_{\text{r,t}} \\ &+ \beta \cdot \text{Non-EPD Firm Entry}_{\text{b,t}} \cdot \text{Post 2013}_{\text{t}} \cdot \text{Ln(Acquired Share)}_{\text{b,t}} \\ &+ \gamma \cdot \text{Main Effects and 2-Way Interactions}_{\text{b,t}} + \epsilon_{\text{b,t}} \quad . \end{aligned} \tag{6}$$

Ln(Output per Well)$_{b,t}$ is the average production per well and *Ln(Total Output)*$_{b,t}$ is the total amount of oil or gas extracted in block b and quarter t. *Ln(Non-EPD Firm Entry)*$_{b,t}$ is a binary indicator equal to one beginning in the quarter in which an extraction license for block b has been reallocated to a non-disclosing firm. *Post 2013*$_t$ is an indicator equal to one for block-quarters after 2013, and zero otherwise. *Ln(Acquired Share)*$_{b,t}$ is the natural logarithm of the ownership share (in percent) that the non-disclosing firm acquired in the oil or gas block. Since I log transform both my outcome variables and the acquired ownership percentage (to account for skewness), I can interpret the coefficient of my continuous treatment interaction as an elasticity. I include block fixed effects α_{b} to control for differences in block productivity arising from time-invariant factors such as geological conditions. $\alpha_{\text{r,t}}$ controls for changes in oil or gas prices.

In Table 11, I present the regression results for Equation (6). Consistent with the graphical evidence in Figure 6, in Column (1), I find that the average well productivity of oil and gas blocks decreases significantly after license reallocations to non-disclosing firms in the post-EPD period. The coefficient magnitude of -0.096 implies that a one-percentage

point increase in non-EPD-firm block ownership reduces well output by 0.096 percentage points. Given that the mean acquired share equals 36%, this elasticity translates into an average decrease in productivity of 3.46 percentage points (-0.096 × 36%). In Figure 7, I map out the productivity effect over time by replacing the single Non-EPD Firm Entry × Post 2013 × Ln(Acquired Share) variable with separate interactions for each year relative to the license reallocation (except for period t-1, which serves as the benchmark). In support of the parallel-trends assumption, treated and control blocks have similar patterns in well productivity prior to the entry of non-disclosing firms.

In Table 11 Column (2), I examine whether the decrease in drilling productivity reduces the overall resource output per block. Indeed, I find a negative and statistically significant treatment effect on total production. The Non-EPD Entry × Post 2013 × Ln(Acquired Share) coefficient indicates a non-EPD ownership—output elasticity of -0.098, which translates into an average decrease in production of 3.53 percentage points (= -0.098 × 36%).

Overall, the results of my allocative efficiency tests are consistent with the interpretation that EPD reporting distorts capital allocation in host countries. Prior to EPD reporting, multinational firms from around the world competed on a level playing field and the more productive firms ultimately won extractive licenses. After EPD, licenses get allocated to less productive, non-disclosing competitors who emerge as winners in the new post-disclosure equilibrium. At the block level, average well productivity and resource production decrease.

7 Conclusion

I examine how mandatory extraction payment disclosures (EPD) affect fiscal revenue contributions and investments by multinational oil, gas, and mining firms in foreign host countries. In Europe and Canada, extractive firms have to publicly disclose their payments to foreign host governments in a granular report on their website to discourage corporate payment avoidance. Extraction payment disclosures are substantially more detailed compared to previous payment records, allowing interested parties to identify payments that are suspiciously low by uncovering discrepancies at the more granular project level.

I exploit plausibly exogenous variation in the adoption of EPD across firms headquartered in Europe and Canada to disentangle the disclosure effects from concurrent but

unrelated macroeconomic or regulatory changes. Using data on firms' extractive activities abroad, I find that disclosing companies increase their payments to host governments but decrease investments and obtain fewer extraction licenses relative to non-disclosing competitors. My cross-sectional evidence suggests that MNCs change their behavior because EPD reports increase the reputational cost of corporate actions that the public could perceive as exploitative. The resulting reallocation of investments to non-disclosing firms reduces drilling productivity and resource production in host countries.

Overall, my results indicate that EPD reporting achieves its intended regulatory purpose of improving fiscal revenue collection from multinational firms in foreign host countries. However, at the same time, the regulation seems to put disclosing companies at a competitive disadvantage. My evidence suggests that it is the *uneven* application of EPD reporting to only a subset of firms, rather than the disclosure mandate itself, that is driving the observed distortions in competition and resource allocation. This insight may apply to other transparency settings where regulatory interventions create an unlevel disclosure playing field among otherwise similar competitors.

The findings of this paper should be interpreted with four caveats in mind. First, although my results support the interpretation that disclosing firms pay fewer bribes following EPD, I cannot observe changes in the actual kickbacks that companies pay to host country officials. Therefore, I acknowledge that I am unable to assess whether firms change their behavior because they bribe less and lose their preferential treatment by host country officials or because they do not want to be perceived as exploitative when operating abroad, even though they do not pay any bribes.

Second, my focus on extraction payment disclosures in the oil, gas, and mining industries could limit the external validity of my findings (Glaeser and Guay, 2017). While the extractive-sector setting enables better identification along the causal path, my inferences on the fiscal payment effects, investment consequences, and reputational cost channel are likely generalizable to public tax disclosure mandates with similar institutional features.

Third, my findings are based on a relatively short post period (of up to 5 years) during which EPD reporting was only effective for European and Canadian firms. If more developed countries adopt extraction payment disclosures in the future (e.g., the United States), my capital reallocation results could become weaker because there will be less room for investment substitution by non-disclosing firms.

Finally, my paper cannot speak to the aggregate effect of extraction payment disclosures on economic development in foreign host countries because my research design absorbs any confounding variation from potentially correlated omitted country-level factors (such as GDP growth). Conceptually, it is unclear whether EPD reporting enhances economic conditions in resource rich countries since the disclosure regulation improves fiscal revenue collection but discourages corporate investment and facilitates capital reallocations. I leave the investigation of country level effects to future research.

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Tables and Figures

Table 1: Implementation Details of Extraction Payment Disclosures
This table provides implementation details of EPD reporting across Europe and Canada. The *EPD Entry-Into-Force Date* indicates when the disclosure regulation was transposed into national law. *Applicable for Fiscal Years Starting on/after* is the first fiscal year in which EPD reporting became effective for oil, gas, and mining companies in the respective country (* in Greece, EPD reporting became effective for fiscal years *ending* on/after July 07, 2016; ** in Cyprus and Ireland, EPD applied *retroactively* for financial years starting on/after Jan 01, 2016 and Jan 01, 2017, respectively). I obtain entry-into-force dates from the European Commission, the Canadian Ministry of Natural Resources, and federal law gazettes.

Country	EPD Entry-Into-Force Date	Applicable for Fiscal Years Starting on/after
Austria	Jul 20, 2015	Jan 01, 2016
Belgium	Jan 01, 2016	Jan 01, 2016
Bulgaria	Jan 01, 2016	Jan 01, 2016
Canada	Jun 01, 2015	Jun 01, 2015
Croatia	Jan 01, 2016	Jan 01, 2016
Cyprus**	Sep 23, 2016	Jan 01, 2016
Czech Republic	Jan 01, 2016	Jan 01, 2016
Denmark	Jul 01, 2015	Jan 01, 2016
Estonia	Jan 01, 2016	Jan 01, 2016
Finland	Jan 01, 2016	Jan 01, 2016
France	Dec 31, 2014	Jan 01, 2015
Germany	Jul 23, 2015	Jan 01, 2016
Greece*	Jul 07, 2016	Jul 07, 2016
Hungary	Jan 01, 2016	Jan 01, 2016
Iceland	Oct 30, 2015	Jan 01, 2016
Ireland**	Jun 09, 2017	Jan 01, 2017
Italy	Jan 01, 2016	Jan 01, 2016
Latvia	Jan 01, 2016	Jan 01, 2016
Liechtenstein	Oct 30, 2015	Jan 01, 2016
Lithuania	Jul 01, 2015	Jan 01, 2016
Luxembourg	Dec 28, 2015	Jan 01, 2016
Malta	Jan 01, 2016	Jan 01, 2016
Netherlands	Nov 10, 2015	Jan 01, 2016
Norway	Dec 05, 2013	Jan 01, 2014
Poland	Sep 23, 2015	Jan 01, 2016
Portugal	Jun 02, 2015	Jan 01, 2016
Romania	Jan 01, 2016	Jan 01, 2016
Slovakia	Jan 01, 2016	Jan 01, 2016
Slovenia	Aug 08, 2015	Jan 01, 2016
Spain	Jul 21, 2015	Jan 01, 2016
Sweden	Jan 01, 2016	Jan 01, 2016
United Kingdom	Dec 01, 2014	Jan 01, 2015

Table 2: Descriptive Statistics

This table reports descriptive statistics for key variables of my empirical analysis. I report the number of observations (N), mean, standard deviation (SD), 10% quantile (p10), 25% quantile (p25), median (p50), 75% quantile (p75), and 90% quantile (p90). Panel A provides statistics for the variables used in my payment analysis, Panel B reports summary statistics for the variables used in my investment analysis at the geographic segment level, Panel C tabulates descriptive statistics for the variables used in the consolidated investment analysis, Panel D provides statistics for the variables of my auction participation analysis, Panel E reports summary statistics for the variables used in the oil & gas licensing analysis, and Panel F provides statistics for the variables used in the oil & gas block productivity analysis. *Extractive Payment/Total Assets$_{t-1}$* is the ratio of a firm's payments to a given host government in a given year, divided by the company's lagged total assets. *EPD* is an indicator variable equal to one beginning in the year or quarter in which EPD reporting becomes effective for the respective oil, gas, or mining company. *Ln(Total Assets$_{t-1}$)* is the natural logarithm of the parent company's lagged total assets. *Return on Assets$_{t-1}$* is the parent company's lagged operating income before depreciation, divided by the firm's total assets at the beginning of the period. *Leverage$_{t-1}$* is the parent company's lagged leverage ratio. *Highly Corrupt Host Country* is an indicator variable equal to one if the host country's Corruption Perceptions Index in 2013 is smaller than or equal to the 25th percentile of all countries ranked by Transparency International. *Less Corrupt Host Country* is a dummy variable equal to one if the host country's Corruption Perceptions Index in 2013 is larger than the 25th percentile of all countries ranked by Transparency International. *Segment Capex/Total Assets$_{t-1}$* is equal to the firm's capital expenditures in the given host country, divided by lagged total assets. *Parent Capex/Total Assets$_{t-1}$* is the ratio of the parent company's consolidated capital expenditures to lagged total assets. *Submitted Bid* is a binary indicator equal to one if the firm submitted a bid for extraction rights in a given block and year. *Obtained License* is an indicator variable equal to one if the firm successfully obtained a new oil and gas license in the given African host country and year. *Ln(Output per Well)* is the natural logarithm of the average oil or gas production per well in the given block and quarter. *Ln(Total Output)* is the natural logarithm of the total amount of oil or gas extracted in the given block and quarter. *Non-EPD Firm Entry* is a binary indicator equal to one beginning in the quarter in which an extraction license for a given block has been reallocated to a non-disclosing firm. *Post 2013* is an indicator equal to one for block-quarters after 2013, and zero otherwise. *Ln(Acquired Share)* is the natural logarithm of the percentage ownership that the non-disclosing firm acquired in the oil and gas block. I obtain payment data from the Extractive Industries Transparency Initiative (EITI) and retrieve implementation dates of EPD reporting from the European Commission, the Canadian Ministry of Natural Resources, federal law gazettes, and firms' extraction payment disclosures. I download firm fundamentals from Compustat and Worldscope Geographic Segments and obtain the Corruption Perceptions Index from Transparency International. I obtain oil & gas licensing, auction participation, and production data from Enverus International. I describe the sample selection in Section 3.

Panel A: Variables used in Extractive Payment Analysis

	N	Mean	SD	p10	p25	p50	p75	p90
Extractive Payment/Total Assets t-1 × 100	769	2.997	16.010	0.000	0.002	0.132	1.216	5.781
Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)	769	0.566	0.895	0.000	0.002	0.124	0.795	1.914
EPD	769	0.143	0.350	0.000	0.000	0.000	0.000	1.000
Highly Corrupt Host Country	769	0.254	0.435	0.000	0.000	0.000	1.000	1.000
Less Corrupt Host Country	769	0.746	0.435	0.000	0.000	1.000	1.000	1.000
Ln(Total Assets$_{t-1}$)	769	9.283	2.508	5.573	7.507	9.867	11.419	12.126
Return on Assets$_{t-1}$	769	0.114	0.134	-0.049	0.077	0.128	0.174	0.242
Leverage$_{t-1}$	769	0.200	0.125	0.035	0.109	0.193	0.276	0.361

Panel B: Variables used in Segment Investment Analysis

	N	Mean	SD	p10	p25	p50	p75	p90
Segment Capex/Total Assets$_{t-1}$ × 100	1,954	2.763	2.761	0.005	0.292	1.858	4.533	7.308
EPD	1,954	0.058	0.234	0.000	0.000	0.000	0.000	0.000
Ln(Total Assets$_{t-1}$)	1,954	19.957	1.987	17.476	18.513	19.719	21.278	22.772
Return on Assets$_{t-1}$	1,954	-0.024	0.126	-0.189	-0.075	0.005	0.056	0.102
Leverage$_{t-1}$	1,954	0.334	0.228	0.035	0.136	0.318	0.525	0.662
Highly Corrupt Host Country	1,954	0.069	0.253	0.000	0.000	0.000	0.000	0.000
Less Corrupt Host Country	1,954	0.931	0.253	1.000	1.000	1.000	1.000	1.000

Panel C: Variables used in Parent Investment Analysis

	N	Mean	SD	p10	p25	p50	p75	p90
Parent Capex/Total Assets$_{t-1}$ × 100	49,956	3.271	4.398	0.014	0.453	1.782	4.269	8.240
EPD	49,956	0.048	0.213	0.000	0.000	0.000	0.000	0.000
Ln(Total Assets$_{t-1}$)	49,956	3.976	2.914	0.570	1.951	3.734	6.011	7.887
Return on Assets$_{t-1}$	49,956	-0.060	0.236	-0.172	-0.050	-0.010	0.022	0.048
Leverage$_{t-1}$	49,956	0.529	1.509	0.026	0.078	0.280	0.527	0.773

Table 2: Descriptive Statistics (continued)

Panel D: Variables used in Auction Participation Analysis

	N	Mean	SD	p10	p25	p50	p75	p90
Submitted Bid	1,116	0.054	0.226	0.000	0.000	0.000	0.000	0.000
EPD	1,116	0.106	0.308	0.000	0.000	0.000	0.000	1.000

Panel E: Variables used in Licensing Analysis

	N	Mean	SD	p10	p25	p50	p75	p90
Obtained License	8,284	6.953	25.437	0.000	0.000	0.000	0.000	0.000
EPD	8,284	0.032	0.176	0.000	0.000	0.000	0.000	0.000

Panel F: Variables used in Productivity Analysis

	N	Mean	SD	p10	p25	p50	p75	p90
Ln(Output per Well)	2,332	7.531	2.212	4.221	6.134	7.600	9.100	10.252
Non-EPD Firm Entry	2,332	0.010	0.101	0.000	0.000	0.000	0.000	0.000
Post 2013	2,332	0.619	0.486	0.000	0.000	1.000	1.000	1.000
Ln(Acquired Share)	2,332	0.260	0.892	0.000	0.000	0.000	0.000	0.000
Ln(Total Output)	2,326	13.710	2.472	10.731	11.945	13.758	15.676	16.920

Table 3: Effect of Extraction Payment Disclosures on Payments to Host Countries
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on payments to host governments (Equation (1)). The dependent variable *Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)* is the natural logarithm of one plus the firm's payments to a given host government in a given year, divided by the company's lagged total assets and multiplied by 100. *EPD* is an indicator equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. *Ln(Total Assets$_{t-1}$)* is the natural logarithm of the firm's lagged total assets. *Return on Assets$_{t-1}$* is the company's lagged operating income before depreciation, divided by the firm's total assets at the beginning of the period. *Leverage$_{t-1}$* is the parent company's lagged leverage ratio. I trim *Return on Assets$_{t-1}$* at the 1st and 99th percentiles and *Leverage$_{t-1}$* at the 99th percentile to account for extreme values due to potential data errors. All specifications include host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. Extractive payment data is from EITI reports and firm fundamentals are from Compustat. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (29 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)	(1) All Firms	(2) Including Controls
EPD	0.121***	0.114***
	(2.99)	(2.85)
Control Variables:		
Ln(Total Assets$_{t-1}$)		-0.336***
		(-4.05)
Return on Assets$_{t-1}$		-0.148
		(-0.46)
Leverage$_{t-1}$		-0.107
		(-0.42)
Observations	769	769
Adjusted R-Squared	0.861	0.882
Fixed Effects:		
Host Country × Year	Yes	Yes
Resource Type × Year	Yes	Yes
Treatment or Control Group × Year	Yes	Yes
Firm-Subsidiary	Yes	Yes

Table 4: Effect of Extraction Payment Disclosures on Segment Investments
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on geographic segment-level investments (Equation (2)). The dependent variable *Segment Capex/Total Assets$_{t-1}$* is the firm's capital expenditures in a given host country, divided by lagged total assets. *EPD* is an indicator equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. *Ln(Total Assets$_{t-1}$)* is the natural logarithm of the firm's lagged total assets. *Return on Assets$_{t-1}$* is the company's lagged operating income before depreciation, divided by the firm's total assets at the beginning of the period. *Leverage$_{t-1}$* is the parent company's lagged leverage ratio. To account for extreme values due to potential data errors, I exclude observations if segment Capex in a single host country is larger than 10% of a company's lagged consolidated assets. I trim *Return on Assets$_{t-1}$* at the 5th and 95th percentiles and *Leverage$_{t-1}$* at the 95th percentile. I require that each geographic segment has at least one observation in the pre- and post-2013 periods. All specifications include host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. Segment-level investment data is from Worldscope Geographic Segments and firm fundamentals are from Compustat. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (41 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Segment Capex/Total Assets$_{t-1}$ × 100	(1) All Firms	(2) Including Controls
EPD	-0.896***	-0.781**
	(-3.34)	(-2.68)
Control Variables:		
Ln(Total Assets$_{t-1}$)		0.072
		(0.36)
Return on Assets$_{t-1}$		1.053*
		(1.77)
Leverage$_{t-1}$		-0.127
		(-0.16)
Observations	1,954	1,954
Adjusted R-Squared	0.503	0.504
Fixed Effects:		
Host Country × Year	Yes	Yes
Resource Type × Year	Yes	Yes
Treatment or Control Group × Year	Yes	Yes
Firm-Subsidiary	Yes	Yes

Table 5: EPD Reporting and Investments – Within Parent Country-Quarter Analysis
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on consolidated investments (Equation (3)). The dependent variable *Parent Capex/Total Assets$_{t-1}$* is the firm's consolidated capital expenditures, divided by lagged total assets. *EPD* is an indicator equal to one beginning in the quarter in which EPD reporting becomes effective for the respective oil, gas, or mining company. *Ln(Total Assets$_{t-1}$)* is the natural logarithm of the firm's lagged total assets. *Return on Assets$_{t-1}$* is the company's lagged operating income before depreciation, divided by the firm's total assets at the beginning of the period. *Leverage$_{t-1}$* is the parent company's lagged leverage ratio. I trim *Parent Capex/Total Assets$_{t-1}$* and *Leverage$_{t-1}$* at the 99th percentile and *Return on Assets$_{t-1}$* at the 1st and 99th percentiles to account for extreme values due to potential data errors. All specifications include parent country-by-quarter, resource type-by-quarter (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-quarter, and firm fixed effects. Firm fundamentals are from Compustat. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (25 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Parent Capex/Total Assets$_{t-1}$ × 100	(1) All Firms	(2) Including Controls	(3) Coarsened Exact Matched
EPD	-0.367***	-0.390***	-0.572***
	(-5.40)	(-5.90)	(-4.44)
Control Variables:			
Ln(Total Assets$_{t-1}$)		-0.243	-0.296**
		(-1.58)	(-2.33)
Return on Assets$_{t-1}$		-0.230	-0.222
		(-1.32)	(-0.99)
Leverage$_{t-1}$		-0.086***	-0.144***
		(-5.43)	(-6.80)
Observations	49,956	49,956	47,938
Adjusted R-squared	0.355	0.356	0.378
Fixed Effects:			
Parent/Firm Country × Quarter	Yes	Yes	Yes
Resource Type × Quarter	Yes	Yes	Yes
Treatment or Control Group × Quarter	Yes	Yes	Yes
Firm	Yes	Yes	Yes

Table 6: Effect of EPD Reporting on Participation Likelihood in License Auctions
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on the participation likelihood of extractive firms in license auctions in Africa (Equation (4)). The dependent variable *Submitted Bid* is a binary indicator equal to one if the firm submitted a bid for extraction rights in a given block and year. All specifications include host country, resource type-by-year (where resource types are based on the main hydrocarbon of the license), treatment- or control group-by-year, and firm fixed effects. Auction participation data is from Enverus International. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the firm level (31 clusters) . ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
Dependent Variable: Submitted Bid	All Auctions	Firms with more than 1 Bid
EPD	-0.100***	-0.090**
	(-2.81)	(-2.35)
Observations	1,116	720
Adjusted R-Squared	0.053	0.078
Control Variables	Yes	Yes
Firm FE	Yes	Yes
Treatment or Control Group × Year FE	Yes	Yes
Resource Type × Year FE	Yes	Yes
Host Country FE	Yes	Yes

Table 7: Effect of Extraction Payment Disclosures on Oil and Gas Block Licensing
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on oil and gas block licensing in Africa (Equation (5)). The dependent variable *Obtained License* is an indicator variable equal to one if the firm successfully obtained a new oil and gas license in the given African host country and year. *EPD* is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil and gas company. All specifications include host country-by-year, resource type-by-year (where resource types are based on the main hydrocarbon of the license), treatment- or control group-by-year, and firm fixed effects. Oil and gas licensing data is from Enverus International. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (73 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Obtained License × 100	(1) All Firm-Country-Years	(2) Active Operating Areas
EPD	-0.774*	-12.338*
	(-1.82)	(-1.91)
Observations	187,891	8,284
Adjusted R-Squared	0.016	0.178
Fixed Effects:		
Host Country × Year	Yes	Yes
Resource Type × Year	Yes	Yes
Treatment or Control Group × Year	Yes	Yes
Firm	Yes	Yes

Table 8: The Role of Public Shaming for the Effects of EPD Reporting
This table reports the coefficients of OLS regressions examining the role of public shaming for the effects of EPD reporting on extractive payments and segment investments. The dependent variable in Columns (1) and (2) is the natural logarithm of one plus the firm's payments to a given host government in a given year, divided by the company's lagged total assets and multiplied by 100 (*Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)*). The outcome variable in Columns (3) and (4) is the firm's capital expenditures in a given host country, divided by lagged total assets (*Segment Capex/Total Assets$_{t-1}$*). *EPD* is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. *(Never) Target of NGO Shaming Campaign* is an indicator variable equal to one if the company was (never) target of a NGO shaming campaign before EPD reporting. *High (Low) Media Coverage* is an indicator variable equal to one if the company's average number of media articles per year was higher (lower) than the 75th percentile across all firms before the adoption of EPD reporting. All specifications include parent company controls and host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. NGO shaming data is from the websites of the world's 9 largest activist groups and press coverage data is from Factiva. Extractive payment data is from EITI reports, segment-level investment data is from Worldscope Geographic Segments, and firm fundamentals are from Compustat. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (29 clusters in Columns (1) and (2); 41 clusters in Columns (3) and (4)). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	Ln(1+Extractive Payment/ Total Assets$_{t-1}$ × 100)		Segment Capex/ Total Assets$_{t-1}$ × 100	
	(1) NGO Shaming	(2) Media Coverage	(3) NGO Shaming	(4) Media Coverage
EPD × Target of NGO Shaming Campaign	0.197***		-2.361***	
	(4.41)		(-3.29)	
EPD × Never Target of NGO Shaming Campaign	0.051		-0.678**	
	(0.74)		(-2.19)	
EPD × High Media Coverage		0.193***		-0.435**
		(3.61)		(-2.51)
EPD × Low Media Coverage		0.049		0.265
		(0.86)		(0.58)
Observations	769	769	1,954	1,954
Adjusted R-Squared	0.883	0.883	0.503	0.503
Difference in EPD Coefficients (p-value)	0.072	0.027	0.041	0.092
Control Variables	Yes	Yes	Yes	Yes
Host Country × Year FE	Yes	Yes	Yes	Yes
Resource Type × Year FE	Yes	Yes	Yes	Yes
Treatment or Control Group × Year FE	Yes	Yes	Yes	Yes
Firm-Subsidiary FE	Yes	Yes	Yes	Yes

Table 9: The Role of Host Country Corruption for the Effects of EPD Reporting
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on payments to foreign governments and geographic segment-level investments in corrupt and less corrupt host countries. The dependent variable in Column (1) is the natural logarithm of one plus the firm's payments to a given host government in a given year, divided by the company's lagged total assets and multiplied by 100 (*Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)*). The outcome variable in Column (2) is the firm's capital expenditures in a given host country, divided by lagged total assets (*Segment Capex/Total Assets$_{t-1}$*). *EPD* is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. *Highly Corrupt Host Country* is an indicator variable equal to one if the host country's Corruption Perceptions Index in 2013 is smaller than or equal to the 25th percentile of all countries ranked by Transparency International. *Less Corrupt Host Country* is a dummy variable equal to one if the host country's Corruption Perceptions Index in 2013 is larger than the 25th percentile of all countries ranked by Transparency International. All specifications include parent company controls and host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. Extractive payment data is from EITI reports, segment-level investment data is from Worldscope Geographic Segments, firm fundamentals are from Compustat, and corruption perceptions data is from Transparency International. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (29 clusters in Column (1) and 41 clusters in Column (2)). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	(1) Ln(1+Extractive Payment/ Total Assets$_{t-1}$ × 100)	(2) Segment Capex/ Total Assets$_{t-1}$ × 100
EPD × Highly Corrupt Host Country	0.275***	-2.655***
	(3.39)	(-3.03)
EPD × Less Corrupt Host Country	0.086*	-0.494
	(2.00)	(-1.65)
Observations	769	1,954
Adjusted R-Squared	0.882	0.505
Difference in EPD Coefficients (p-value)	0.020	0.014
Control Variables	Yes	Yes
Host Country × Year FE	Yes	Yes
Resource Type × Year FE	Yes	Yes
Treatment or Control Group × Year FE	Yes	Yes
Firm-Subsidiary FE	Yes	Yes

Table 10: EPD Payment Effects by Exposure to Bribery-Prone Payments
This table reports the coefficients of OLS regressions examining whether the payment effects of extraction payment disclosures differ depending on the information that firms disclose in EPD reports. The dependent variable *Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)* is the natural logarithm of one plus the firm's payments to a given host government in a given year, divided by the company's lagged total assets and multiplied by 100. *EPD* is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. *Low Share of Bribery-Prone Payments* is a binary indicator equal to one if the company's average share of non-tax related payments to host countries is in the first tercile of all firms that are subject to EPD reporting. *High Share of Bribery-Prone Payments* is a binary indicator equal to one if the company's average share of non-tax related payments to host countries exceeds the first tercile of all firms that are subject to EPD reporting. The specification includes parent company controls and host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. Extractive payment data is from EITI reports and firm fundamentals are from Compustat. Payment-type data is from firms' first published EPD report. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (29 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Ln(Extractive Payment/Total Assets$_{t-1}$ × 100)	(1) Type of Payment
EPD × High Fraction of Bribery-Prone Payments	0.193***
	(2.82)
EPD × Low Fraction of Bribery-Prone Payments	0.027
	(0.49)
Observations	769
Adjusted R-Squared	0.883
Difference in EPD Coefficients (p-value)	0.063
Control Variables	Yes
Host Country × Year FE	Yes
Resource Type × Year FE	Yes
Treatment or Control Group × Year FE	Yes
Firm-Subsidiary FE	Yes

Table 11: Allocative Efficiency Implications of EPD Reporting in Host Countries
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on average well productivity and total resource production in oil and gas blocks in Africa (Equation (6)). The dependent variable in Column (1) is the natural logarithm of the average oil or gas production per well in the given block and quarter (*Ln(Output per Well)*). The outcome variable in Column (2) is the natural logarithm of the total amount of oil or gas extracted in the given block and quarter (*Ln(Total Output)*). *Non-EPD Firm Entry* is a binary indicator equal to one beginning in the quarter in which an extraction license for the given block has been reallocated to a non-disclosing firm. *Post 2013* is an indicator equal to one for block-quarters after 2013, and zero otherwise. *Ln(Acquired Share)* is the natural logarithm of the percentage ownership that the non-disclosing firm acquired in the oil and gas block. I trim *Output per Well* and *Total Output* at the 99th percentile to account for extreme values due to potential data errors. All specifications include resource type-by-quarter (where resource types are based on the main hydrocarbon of the block) and block fixed effects. Oil & gas licensing and production data is from Enverus International. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the host-country province where the block is located (31 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	Ln(Output per Well)	Ln(Total Output)
	(1)	(2)
Non-EPD Firm Entry × Post 2013 × Ln(Acquired Share)	-0.096**	-0.098**
	(-2.23)	(-2.08)
Observations	2,332	2,326
Adjusted R-Squared	0.954	0.961
Main Effects & Two-Way Interactions	Yes	Yes
Block FE	Yes	Yes
Resource Type × Quarter FE	Yes	Yes

Figure 1: Identification Strategy
This figure illustrates the identification strategy of my baseline payment and investment analyses (Equations (1) and (2)). I employ a generalized difference-in-differences design based on the staggered adoption of extraction payment disclosures across Europe and Canada. Each of my host countries covers payment and investment data from multinational extractive firms on a firm-host country-year level. Given the staggered and quasi-exogenous implementation of extraction payment disclosures, different subsidiaries of disclosing extractive firms get treated at different points in time. I fix the host country, year, and natural resource that is extracted. I then compare the change in payments or capital expenditures by subsidiaries whose parent companies become subject to EPD reporting before and after with the corresponding payment or investment change of subsidiaries whose parents are not (yet) affected by the disclosure regulation. For example, Statoil, the largest Norwegian oil and gas company, became subject to EPD reporting in 2014. For Shell the disclosure regulation only became effective in 2015. Chevron is never treated and part of the non-disclosing control group since the United States did not implement extraction payment disclosures.

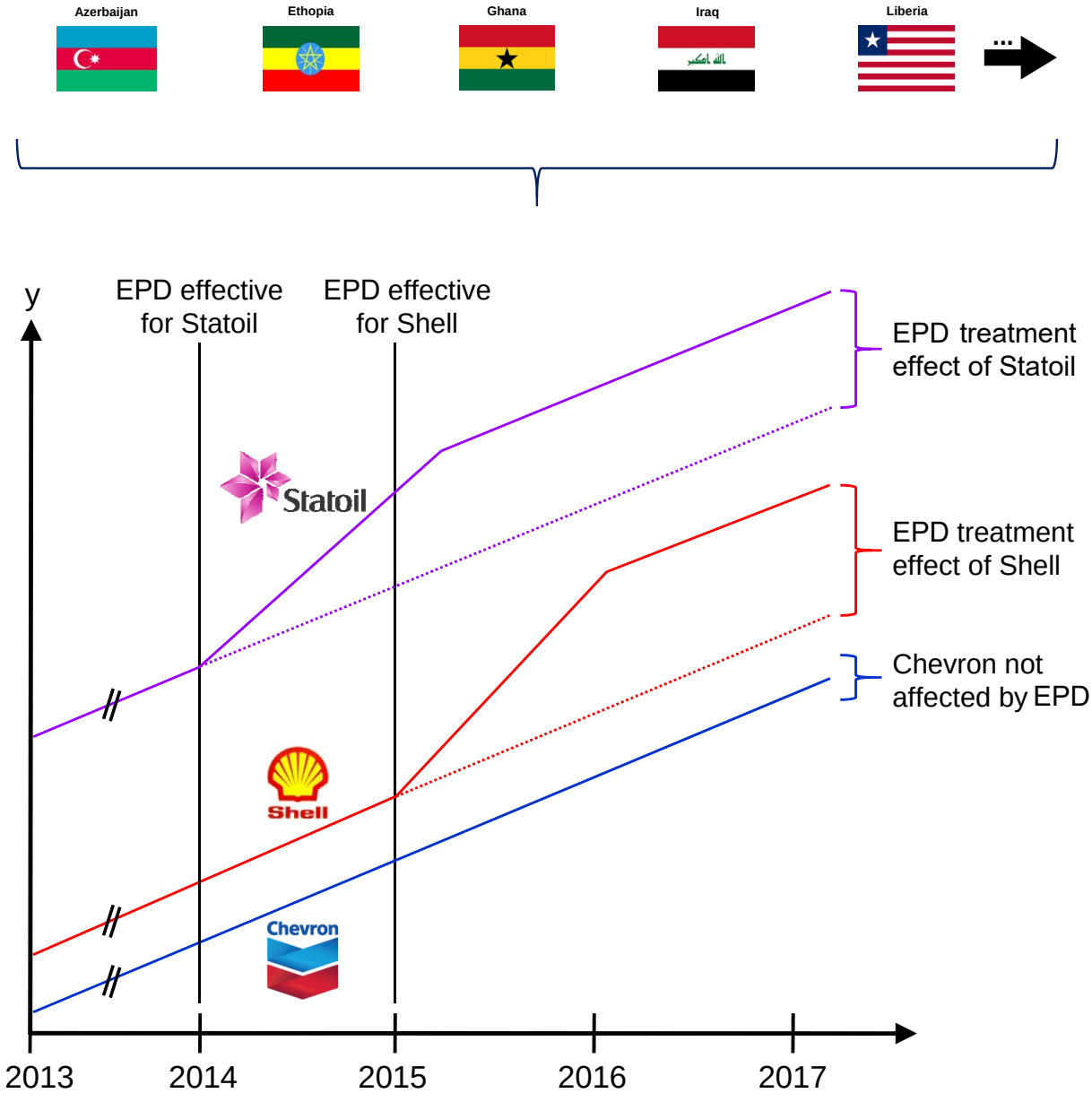


Figure 2: Extractive Payment Patterns of Disclosing Firms in Event Time
This figure reports the coefficients of OLS regressions examining the effect of EPD reporting on payments to host governments in event time. I estimate the model from Column (2) of Table 3 but replace the *EPD* indicator with separate interactions, each marking one time period relative to the entry-into-force-year (t=0). I omit the indicator for year t-1, which serves as the benchmark period with an OLS coefficient and standard error of zero. Vertical bands represent 95% confidence intervals for the point estimates in each period.

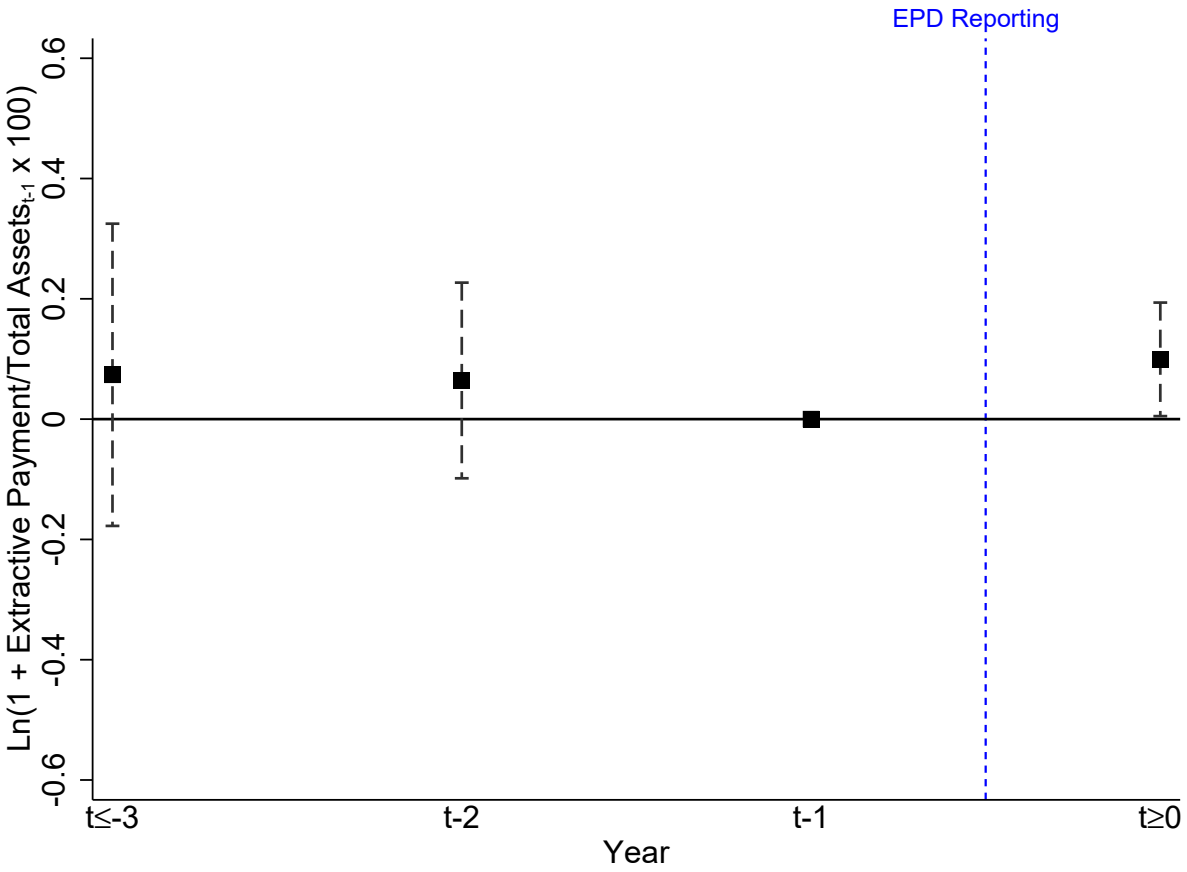


Figure 3: Investment Patterns of Disclosing Firms in Event Time
This figure reports the coefficients of OLS regressions examining the effect of EPD reporting on segment-level investments in event time. I estimate the model from Column (1) of Table 4 but replace the *EPD* indicator with separate interactions, each marking one time period relative to the entry-into-force-year (t=0). I omit the indicator for year t-1, which serves as the benchmark period with an OLS coefficient and standard error of zero. Vertical bands represent 95% confidence intervals for the point estimates in each period.

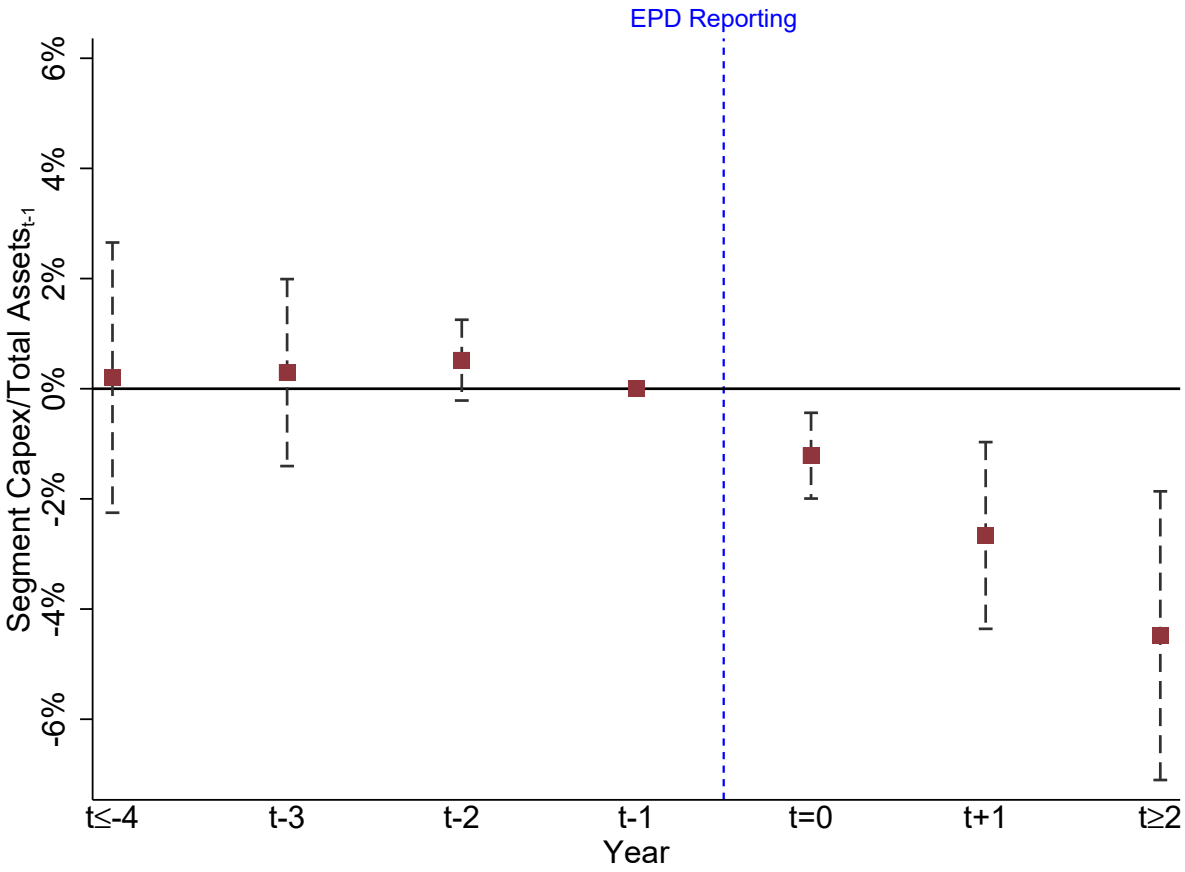


Figure 4: Capital Reallocation from Disclosing to Non-Disclosing Firms
This figure illustrates that EPD reporting triggers capital reallocations across firms from disclosing companies to non-disclosing competitors. I plot the average residualized capital expenditures from my investment analysis for both types of companies on an annual basis. For ease of exposition, I normalize average investments by subtracting the mean from 2014 and dividing by the standard deviation of each group. In order to compare average capital expenditures within the same calendar year across treatment and control groups, I focus on investment changes around the year 2015.

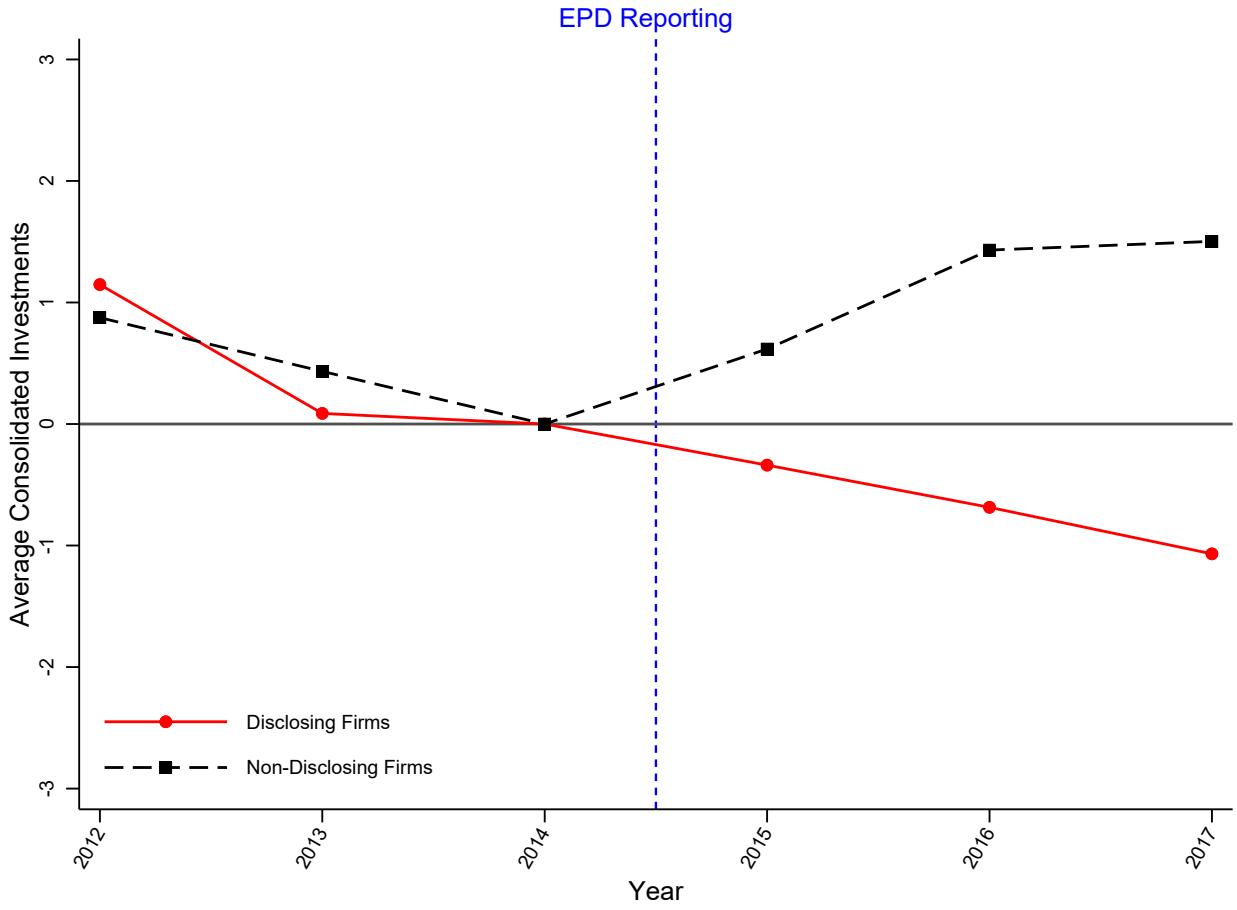


Figure 5: Probability that Disclosing Firms Obtain Oil & Gas Licenses in Event Time
This figure reports the coefficients of OLS regressions examining the effect of EPD reporting on the probability of disclosing firms successfully obtaining new oil and gas licenses in Africa in event time. I estimate the model from Column (1) of Table 7 but replace the *EPD* indicator with separate interactions, each marking one time period relative to the entry-into-force-year (t=0). I omit the indicator for year t-1, which serves as the benchmark period with an OLS coefficient and standard error of zero. Vertical bands represent 95% confidence intervals for the point estimates in each period.

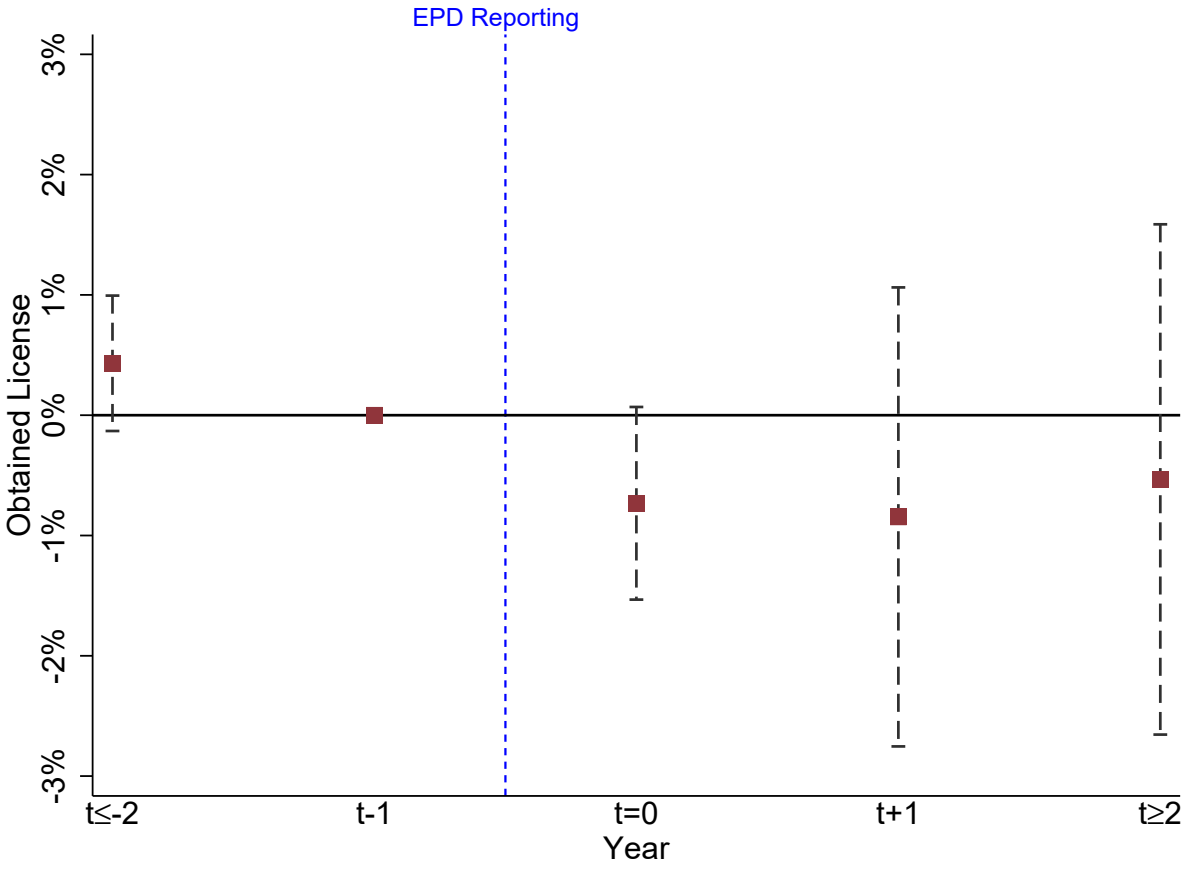


Figure 6: Well Productivity Distributions of Disclosing and Non-Disclosing Firms
This figure shows kernel density plots of average well productivity for disclosing firms (red solid line) and non-disclosing competitors (black dashed line) in the pre-EPD period. *Ln(Output per Well)* is the natural logarithm of the average oil or gas production per well. The p-value of the difference in distributions is based on a two-sample Kolmogorov-Smirnov test.

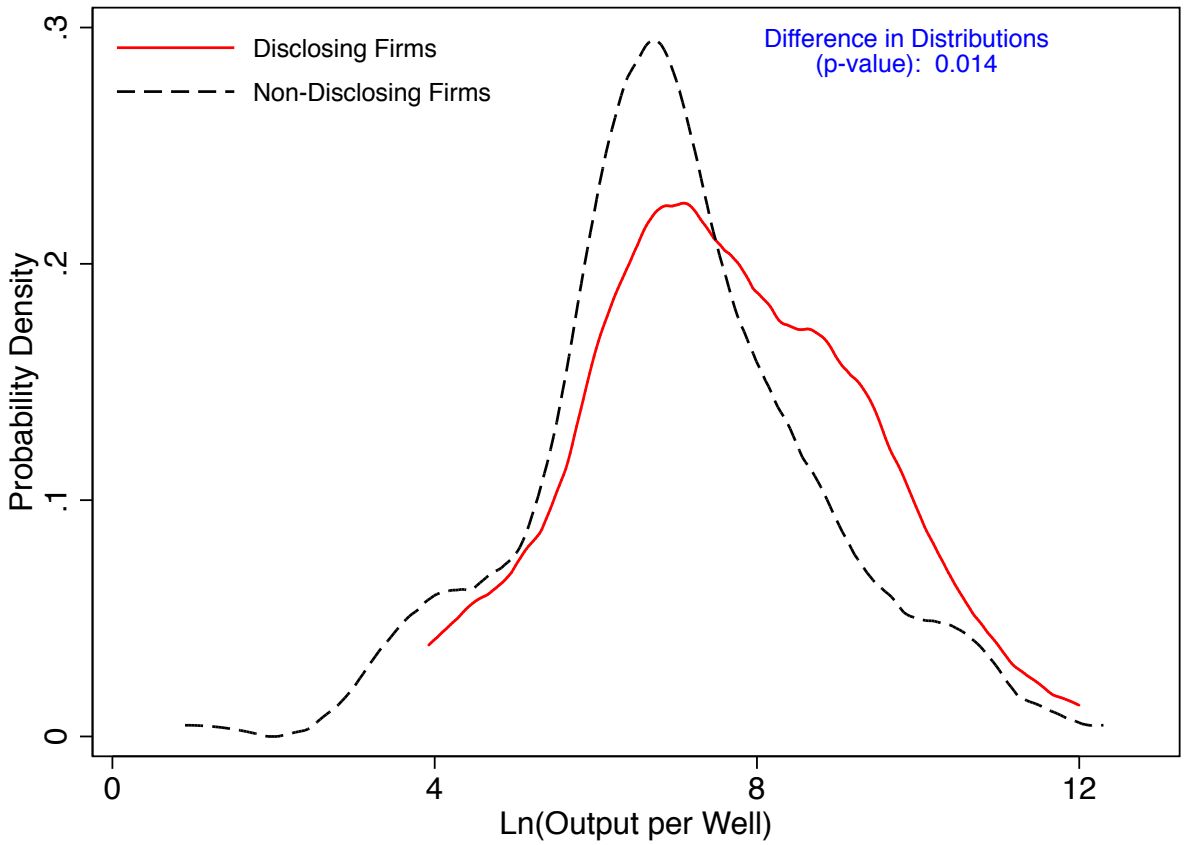
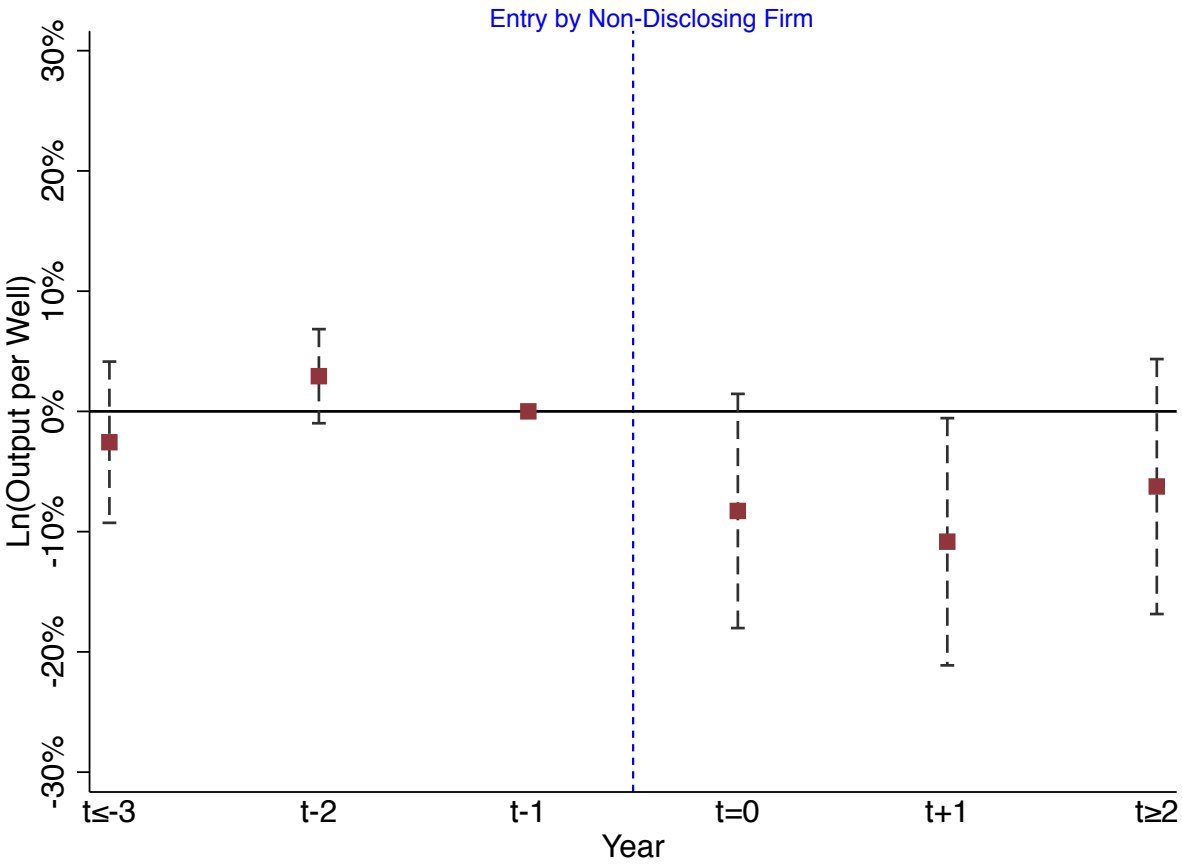


Figure 7: Productivity of Oil and Gas Blocks around License Reallocations to Non-EPD Firms
This figure reports the coefficients of OLS regressions examining changes in average well productivity of oil and gas blocks that experienced license reallocations to non-disclosing firms in the post-EPD period. I estimate the model from Column (1) of Table 11 but replace the *Non-EPD Firm Entry* × *Post 2013* × *Ln(Acquired Share)* indicator with separate interactions, each marking one time period relative to the entry-into-force-year (t=0). I omit the indicator for year t-1, which serves as the benchmark period with an OLS coefficient and standard error of zero. Vertical bands represent 95% confidence intervals for the point estimates in each period.



Internet Appendix to

The Effect of Mandatory Extraction Payment Disclosures on Corporate Payment and Investment Policies Abroad

Thomas Rauter

August 2020

Table of Contents

IA1 Robustness Tests

In Table IA3, I present several robustness tests for the main results reported in Tables 3 and 4. Overall, my main inferences are robust to a variety of different sampling and research-design choices.

First, I assess whether my inferences are potentially confounded by unrelated information in annual filings. Approximately 97% of companies that provide extraction payment disclosures record their payments in a standalone report published separately from the annual filings. In Column (1) of Table IA3 (Panels A and B), I find that my payment and investment effects are robust to removing the 3% of firms that embed extraction payment information in their annual report.

Second, I use different definitions for my dependent variables. My inferences remain unchanged when I do not log transform extractive payments (Panel A Column 2), though the EPD coefficient is significantly larger (i.e., more positive), which likely reflects the influence of extreme values. In Panel B, I log transform segment Capex and find that the estimated investment effect of EPD is both economically and statistically similar to my main results in Table 4 because the variable's distribution is not heavily skewed to begin with.

Third, I assess whether the real effects of EPD reporting only materialize abroad or whether disclosing firms also adjust their payment and investment behavior in their headquarter country. In Panel A Column (3), I document that the increase in extractive payments is only statistically significant in foreign host countries (coefficient: 0.128; t-statistic: 3.50). In Panel B, I find that disclosing firms reduce foreign segment investments (coefficient in Column (3): -1.496; t-stat: -3.84), but do not alter their domestic capital expenditures (p-value of coefficient differences: 0.026). Overall, these results indicate that extraction payment disclosures change firm behavior abroad, which is in line with their regulatory objective.

IA2 How Costly is EPD Reporting for Disclosing Firms?

In this section, I try to quantify the net costs of EPD reporting for disclosing firms. My estimation is based on several simplifying assumptions and should therefore be viewed as a rough approximation only.

Extraction payment disclosures impose both direct and indirect costs on disclosing firms. Direct costs include (i) higher payments to host countries for existing projects and (ii) costs related to the preparation of EPD reports. The estimated payment increase of 12% (see Table 3 Column 2) and anecdotal evidence both suggest that the direct costs of EPD reporting are non-trivial.[23] In addition to direct costs, disclosing firms also lose the opportunity to access certain profitable extraction projects because of EPD reporting. This indirect cost is likely significant but difficult to quantify because one cannot observe the counterfactual firm value of disclosing firms in the absence of EPD.

To estimate the total (anticipated) *net* costs of the regulation, I examine abnormal returns of disclosing firms around key events of the EPD rulemaking processes in Europe and Canada. I collect daily return data for listed European and Canadian firms that are subject to EPD reporting from *Thomson Reuters Eikon* (formerly *Datastream*). I exclude smaller firms with a market capitalization below USD 10 billion (on the last trading day before the first event) because these companies typically only extract natural resources in the country where the firm is headquartered (which is not the focus of this paper).[24] My event-study sample contains daily stock returns of 114 disclosing firms between 2010 and 2015. I obtain key dates in the European and Canadian EPD rulemaking processes from Johannesen and Larsen (2016) (four events) and Linder and Marbuah (2019) (seven events), which I apply to European and Canadian firms, respectively.

For each disclosing firm, I compute daily abnormal returns ($AR_{i,t}$) during event windows by subtracting expected returns ($ER_{i,t}$) from realized returns ($RR_{i,t}$):

$$\mathrm{AR_{i,t}} = \mathrm{RR_{i,t}} - \mathrm{ER_{i,t}} \quad . \tag{IA1}$$

Each of my event windows covers the day prior to the EPD-related event, the event day itself, and the three days thereafter. To compute expected returns $ER_{i,t}$, I estimate a

[23] For example, oil and gas company Total S.A. recently disclosed that the internal costs of preparing EPD reports are equal to USD 200,000 per year (Total, 2020).

[24] I obtain qualitatively and quantitatively similar results if I keep these smaller firms.

market model for each sample firm during the pre-event window (400 days to seven days before the first event) using either changes in the MSCI World or MSCI World Energy index as market return (e.g., MacKinlay, 1997).

In Table IA4, I report regression results for my event-study analysis. Consistent with prior research examining the ex-ante value implications of EPD reporting (e.g., Johannesen and Larsen, 2016; Hombach and Sellhorn, 2019; Healy and Serafeim, 2020), I document an economically and statistically significant decrease in the firm value of disclosing companies. In Column (1), the coefficient estimate of *EPD Event* indicates that disclosing firms lose 2.8 percent of their market value around regulatory events that increase the adoption likelihood of EPD reporting (t-statistic: -3.10). The OLS estimate of -0.028 suggests that investors expect net costs from EPD reporting in the amount of approximately USD 1.6 billion for the average firm in my sample. In Column (2), I use the MSCI World Energy index (instead of the MSCI World index) to compute expected returns and find very similar results (coefficient: -0.026; t-statistic: -2.90).

Event studies are useful in providing estimates on the firm-value effects of regulation. However, the weakness of abnormal return tests is that it is difficult to identify all value-relevant events and to reliably quantify changes in the likelihood of regulatory adoption around each event (Binder, 1985). Therefore, I caution readers to interpret the estimates of my event-study analysis carefully.

IA3 The Effect of Extraction Payment Disclosures on Firms' Existing Investments

IA3.1 Discontinued Operations

My Capex analysis in Section 4.2 examines changes in firms' *new* investments around EPD but cannot speak to whether extraction payment disclosures also affect the level of *existing* investments. In this section, I examine the effect of EPD reporting on the likelihood that disclosing firms discontinue foreign operations. If existing investment projects become NPV negative due to the reputational costs imposed by EPD, disclosing firms could abandon their operations and withdraw from a host country. Alternatively, if the costs of EPD are low and the costs of divesting are high, extractive firms will continue to operate in the country following the disclosure regulation.

To assess whether disclosing firms are more likely to discontinue foreign operations after EPD, I estimate the following OLS regression:

$$\text{Discontinued Segment}_{\text{i,hc,t}} = \alpha_{\text{hc,t}} + \alpha_{\text{i,hc}} + \alpha_{\text{r,t}} + \alpha_{\text{tr/c,t}} + \beta \cdot \text{EPD}_{\text{i,t}} + \gamma' \cdot \text{X}_{\text{i,t}} + \epsilon_{\text{i,hc,t}} \quad . \quad \text{(IA2)}$$

Discontinued Segment$_{i,hc,t}$ is a binary indicator equal to one if extractive firm i discontinued its geographic segment in host country hc and year t. All other variables and fixed effects are the same as in Equation (1).

In Table IA5, I present results for the estimated effect of EPD reporting on the likelihood that disclosing firms abandon operations in foreign host countries. In Column (1), I find that the estimate of EPD is positive but not statistically significant. The EPD coefficient remains statistically indistinguishable from zero when I estimate the treatment effect separately for highly and less corrupt host countries in Column (2).

These results indicate that while disclosing companies decrease their level of new investments, they do not shut down existing foreign segments in response to the disclosure regulation, likely because the adjustment costs of withdrawing from a given region are high for firms in the extractive industries.

IA3.2 Host Countries where National Law Prohibits Extraction Payment Reports

Angola, Cameroon, China, and Qatar passed regulation making it illegal for foreign firms to disclose extractive payments in EPD reports (Shell, 2011). However, the European and Canadian EPD rules do not grant reporting exemptions based on disclosure prohibitions in host-country law (Publish What You Pay, 2013; Bildfell, 2016). Both EPD disclosure mandates require "universality" in extractive payment reporting across all host countries to prevent firms from exploiting loopholes. The conflicting legal frameworks in home and host countries could impact firms' operations in one of two ways. On the one hand, the strict EPD reporting regime could increase disclosing companies' negotiating power over host country bureaucrats, allowing these firms to comply with EPD without increasing compliance risks to the extent that firms have to withdraw operations. On the other hand, if the ex-ante bargaining power of the host government is sufficiently high (because they can, for example, threaten to expropriate existing licenses or withhold new licenses), the increase in compliance costs could outweigh the benefits of operating in that country, forcing firms to discontinue their operations even in the presence of significant adjustment costs.

To empirically understand which of these forces dominates, I examine whether disclosing firms are more likely to discontinue their operations in host countries that prohibit extraction payment disclosures. I re-estimate Equation (IA2) replacing the dependent variable with a binary indicator equal to one if extractive firm i discontinued its segment in Angola, Cameroon, China, or Qatar in year t. In Table IA6, I find that the point estimate of EPD is close to zero and statistically insignificant, indicating that disclosing firms do not abandon segments in EPD-prohibiting countries more frequently than their non-disclosing competitors.

Overall, these results suggest that for disclosing firms, the risks of violating foreign law do not outweigh the costs of divesting and the benefits of operating in host countries where EPD is prohibited.

IA4 Does EPD Reporting Affect the Level of Competition for Licenses?

The results in Table 6 indicate that EPD reporting lowers the demand from disclosing firms for oil and gas licenses. However, these results do not speak to whether EPD affects the overall level of competition for licenses. If the decrease in bidding participation by disclosing firms increases the likelihood that non-disclosing competitors win licenses, it is possible that the total number of submitted bids remains unchanged because non-disclosing firms are more willing to take part in the bidding process.

To assess potential changes in the level of competition for oil and gas licenses, I conduct two additional tests. First, I examine the total number of submitted bids for auctions around 2013, the year before the first developed country introduced EPD reporting (Norway in 2014; see Table 1). In Table IA7 Column (1), I find that the *Post 2013* coefficient is not statistically significant. The weakness of this pre-versus-post analysis is that *Post 2013* does not only reflect the potential impact of EPD but also captures any other shock that differentially affects the number of submitted bids around 2013.

Therefore, to tighten identification, I estimate the following DiD model that compares changes in the number of bids between auctions with high versus low participation rates by disclosing firms in the pre-period:

$$\begin{aligned} \text{Ln(Number of Submitted Bids)}_{\text{b,t}} = \alpha \cdot \text{High EPD Exposure}_{\text{b}} \\ + \beta \cdot \text{High EPD Exposure}_{\text{b}} \cdot \text{Post 2013}_{\text{t}} \\ + \gamma \cdot \text{Post 2013}_{\text{t}} + \delta' \cdot \text{Z}_{\text{b}} + \epsilon_{\text{b,t}} \quad . \end{aligned} \tag{IA3}$$

Ln(Number of Submitted Bids)$_{b,t}$ is the natural logarithm of the total number of bids that disclosing *and* non-disclosing firms submit for a given license. I take the natural logarithm to account for the variable's skewness. *High EPD Exposure*$_b$ is a binary indicator equal to one for license auctions of either offshore blocks or large (i.e., above median-sized) blocks, both of which are particularly likely to receive bids from disclosing firms in the pre period because they require substantial capital investments and EPD firms are more highly represented among large oil and gas firms. The identifying assumption of Equation (IA3) is that auctions with a higher exposure to disclosing firms in the pre-period are more

treated by EPD reporting. *Post 2013*$_t$ is an indicator variable equal to one for auctions after 2013. The control variables (Z_b) are identical to Equation (4).

Columns (2) and (3) of Table IA7 report the results from estimating Equation (IA3). Irrespective of whether I define *High EPD Exposure*$_b$ based on the type of license (i.e., off- vs. onshore; Column 2) or size of the petroleum block (Column 3), the coefficients of the treatment interaction (*Post 2013*$_t$ $\times$ *High EPD Exposure*$_b$) are close to zero and statistically insignificant. Again, these results suggest that EPD reporting does not affect the level of competition in license auctions.

Due to data limitations, my auction participation analysis is based on a relatively small sample of only 36 license auctions in 8 host countries for which 31 firms submitted bids. The sample covers fewer auctions than the license award analysis in Table 7 primarily because most African host countries only disclose the winning but not the losing participants of license auctions. Readers should interpret the results of my auction participation tests with this data constraint in mind.

IA5 Alternative Mechanisms

IA5.1 Mechanical Association between Extractive Payments and Capital Expenditures

Extractive firms can partially recoup a project's development costs by deducting capital expenditures from net revenues. Since net revenues are the basis for computing extractive payments, Capex deductions lower the amount that firms owe to host governments.

Disclosing firms could become more careful, lower capital expenditures, and claim lower project development costs against net revenues after EPD reporting, leading to a mechanical increase in extractive payments. However, it is institutionally unlikely that the observed increase in payments is mechanically driven by the reduction in investments. First, host countries allow Capex deductions only within a given extraction project but not across projects (Open Oil, 2012; Global Witness, 2018). My results in Section 4 indicate that disclosing firms reduce *new* investments and increase their payments for *existing* projects. Extractive companies incur most capital expenditures during the initial development of a new drilling site and not during the production phase when firms typically make payments to host governments. Therefore, the lower capital expenditures are likely attributable to new projects and thus not eligible for payment deductions on existing projects. Moreover, extractive firms cannot fully but only partially recover their capital expenditures. Host countries only allow firms to deduct up to a maximum of 50% to 75% of their development costs, a provision commonly referred to as "cost recovery limit" (Resource Contracts, 2019).

To provide direct evidence that the observed payment increase is not mechanically driven by reductions in investments, I estimate the association between a firm's extractive payments and its capital expenditures. In Table IA8 Column (1), I document that extractive payments are not significantly associated with capital expenditures (both contemporaneously and up to four years before). Consistent with these results, in Column (2), I find that the positive effect of EPD on firms' payments to host governments remains robust when I directly control for capital expenditures in my main payment specification. These findings indicate that the observed increase in extractive payments around EPD is not the result of a mechanical, negative relationship with capital expenditures.

IA5.2 Better Price Information for Natural Resources

EPD reports could potentially provide better information on the market prices for natural resources. However, if the disclosure regulation helps extractive companies and other stakeholders (e.g., NGOs and host governments) improve their commodity price measures, EPD will affect both disclosing and non-disclosing firms. My results are inconsistent with this learning channel because I find that disclosing firms change their payment and investment behavior *relative* to non-disclosing competitors extracting the same natural resource in the same host country and year.

IA5.3 Higher Bargaining Power of Host Country Officials

EPD reporting might increase host country officials' bargaining power vis-à-vis extractive firms. In a hypothetical world where all firms are required to uniformly disclose their payments and where government officials act in the best interest of their country, bureaucrats could pressure firms into paying more because they are now able to uncover unfair deals by observing other payments from the same firm to neighboring host countries. In reality, however, only European and Canadian firms disclose their payments and government officials are often willing to extract private rents for facilitating business. Therefore, instead of imposing their increased negotiation power on disclosing firms to receive higher official payments, host country officials still have strong incentives to engage in exploitative activities with non-disclosing firms to obtain private benefits.

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Table IA1: EPD Adoption Characteristics of Disclosing Parent Firms
This table provides adoption characteristics of disclosing parent firms across my main regression samples. Panel A summarizes the time-series variation in effective dates of EPD regulation for all treated firms. For each regression sample and effective year, I count the number of unique parent firms that provide extraction payment disclosures. *EPD Effective Year* indicates the first fiscal year in which extraction payment disclosures became effective for the respective oil, gas, and mining company. Panel B reports the number of unique disclosing parent firms by country of incorporation. I obtain the entry-into-force dates of EPD reporting from the European Commission, the Canadian Ministry of Natural Resources, and federal law gazettes.

Panel A: Time-Series Variation in Effective Dates of Extraction Payment Disclosures

EPD	**Number of Disclosing Parent Firms**			
Effective	**Payment**	**Segment**	**Consolidated**	**Oil & Gas**
Year	**Analysis**	**Investment Analysis**	**Investment Analysis**	**Licensing Analysis**
2014	4	2	7	1
2015	16	18	63	10
2016	7	67	235	4
2017	0	1	3	0

Panel B: Disclosing Parent Firms by Country of Incorporation

EPD	**Number of Disclosing Parent Firms**			
Effective	**Payment**	**Segment**	**Consolidated**	**Oil & Gas**
Year	**Analysis**	**Investment Analysis**	**Investment Analysis**	**Licensing Analysis**
Austria	0	0	1	1
Canada	4	69	246	1
Cyprus	0	0	2	0
France	2	2	2	1
Germany	0	0	1	0
Ireland	0	0	1	0
Italy	1	0	0	1
Netherlands	0	0	1	1
Norway	3	2	3	0
Poland	0	0	3	0
Portugal	0	0	0	1
Romania	0	1	1	0
Spain	1	0	0	1
Sweden	0	0	2	0
United Kingdom	16	14	45	8

Table IA2: Coarsened Exact Matching

This table reports covariate imbalances before and after coarsened exact matching (CEM) for the variables used in my consolidated investment analysis. The $\mathcal{L}_1$ distance measures the covariate imbalance between disclosing and non-disclosing firms based on financial characteristics before the adoption of extraction payment disclosures. $\mathcal{L}_1$ is bounded between zero and one and a lower value indicates a lower imbalance (Iacus et al., 2012). I also report differences in the mean, minimum, 25% quantile (p25), median (p50), 75% quantile (p75), and maximum across treatment and control groups.

	$\mathcal{L}_1$ Distance	$\Delta Mean$	ΔMin	$\Delta p25$	$\Delta p50$	$\Delta p75$	ΔMax
Before CEM:							
Total Assets$_{\text{2013-Q4}}$	0.245	6,357.018	0.000	34.824	243.946	1,685.853	13,347.537
Return on Assets$_{\text{2013-Q4}}$	0.266	0.005	0.000	0.000	0.000	0.022	-0.011
Leverage$_{\text{2013-Q4}}$	0.257	-0.116	0.000	0.064	0.154	0.023	-23.829
After CEM:							
Total Assets$_{\text{2013-Q4}}$	0.166	2,099.868	0.000	32.201	202.735	844.942	13,347.537
Return on Assets$_{\text{2013-Q4}}$	0.143	0.000	0.000	0.000	0.000	-0.000	0.002
Leverage$_{\text{2013-Q4}}$	0.178	-0.008	0.000	0.043	0.023	-0.046	-0.687

Table IA3: Robustness Tests

This table reports coefficients of OLS regressions assessing the robustness of my baseline payment and investment results. I reestimate Equations (1) and (2) but apply a variety of different sampling and research design choices (see Section IA1). T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A:

Dependent Variable: Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)	(1) Excluding EPDs in Annual Reports	(2) Extractive Payment/ Total Assets$_{t-1}$ × 100	(3) Foreign vs. Domestic
EPD	0.119***	3.339***	
	(3.20)	(3.13)	
EPD × Foreign Host Country			0.128***
			(3.50)
EPD × Domestic Host Country			-0.007
			(-0.04)
Observations	737	767	769
Adjusted R-Squared	0.882	0.848	0.882
Difference in EPD Coefficients (p-value)	-	-	0.433
Control Variables	Yes	Yes	Yes
Host Country × Year FE	Yes	Yes	Yes
Resource Type × Year FE	Yes	Yes	Yes
Firm-Subsidiary FE	Yes	Yes	Yes
Treatment or Control Group × Year FE	Yes	Yes	Yes

Panel B:

Dependent Variable: Segment Capex/Total Assets$_{t-1}$ × 100	(1) Excluding EPDs in Annual Reports	(2) Ln(1+Segment Capex/ Total Assets$_{t-1}$ × 100)	(3) Foreign vs. Domestic
EPD	-0.781**	-0.189**	
	(-2.68)	(-2.24)	
EPD × Foreign Host Country			-1.496***
			(-3.84)
EPD × Domestic Host Country			0.026
			(0.06)
Observations	1,954	1,954	1,954
Adjusted R-Squared	0.504	0.605	0.506
Difference in EPD Coefficients (p-value)	-	-	0.026
Control Variables	Yes	Yes	Yes
Host Country × Year FE	Yes	Yes	Yes
Resource Type × Year FE	Yes	Yes	Yes
Firm-Subsidiary FE	Yes	Yes	Yes
Treatment or Control Group × Year FE	Yes	Yes	Yes

Table IA4: Firm Value Effects of EPD Reporting

This table reports cumulative abnormal returns of disclosing firms around key events of the EPD rulemaking processes in Europe and Canada (Equation (IA1)). I obtain EPD event dates from Johannesen and Larsen (2016) (4 events) and Linder and Marbuah (2019) (7 events), which I apply to European and Canadian firms, respectively. My event windows (*EPD Event*) cover the day prior to the EPD-related event, the event day itself and the three days thereafter. The dependent variable is firms' cumulative abnormal return during event windows, which I calculate by subtracting expected returns from realized returns. To compute expected returns, I estimate a market model for each sample firm during the pre-event window (400 days to 7 days before the first event) using either changes in the MSCI World or MSCI World Energy index as market return (e.g., MacKinlay, 1997). Stock return data is from Thomson Reuters Eikon (formerly Datastream). I describe the sample selection in Section IA2. T-statistics, reported in parentheses, are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Predicted Return Benchmark	
Dependent Variable: Cumulative Abnormal Returns	MSCI World Index (1)	MSCI World Energy Index (2)
EPD Event	-0.028***	-0.026***
	(-3.10)	(-2.90)
Observations	622	622
Number of Disclosing Firms	114	114
Average Loss in Firm Value (USD millions)	1,614	1,510

Table IA5: Effect of EPD Reporting on Discontinued Segments

This table reports the coefficients of OLS regressions examining the effect of EPD reporting on the probability that disclosing firms discontinue their operations in host countries (Equation IA2). *Discontinued Segment* is an indicator variable equal to one if the firm abandons the given geographic segment in the given year. *EPD* is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. *Highly Corrupt Host Country* is an indicator variable equal to one if the host country's Corruption Perceptions Index in 2013 is smaller than or equal to the 25^{th} percentile of all countries ranked by Transparency International. *Less Corrupt Host Country* is a dummy variable equal to one if the host country's Corruption Perceptions Index in 2013 is larger than the 25^{th} percentile of all countries ranked by Transparency International. All specifications include host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. Segment-level data is from Worldscope Geographic Segments, firm fundamentals are from Compustat, and corruption perceptions data is from Transparency International. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (70 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Discontinued Segment	(1) Including Controls	(2) Corrupt vs. Less Corrupt Host Countries
EPD	0.103	
	(1.28)	
EPD × Highly Corrupt Host Country		0.072
		(0.78)
EPD × Less Corrupt Host Country		0.107
		(1.30)
Observations	7,953	7,953
Adjusted R-Squared	0.194	0.194
Difference in EPD Coefficients (p-value)	-	0.582
Control Variables	Yes	Yes
Host Country × Year FE	Yes	Yes
Resource Type × Year FE	Yes	Yes
Treatment or Control Group × Year FE	Yes	Yes
Firm-Subsidiary FE	Yes	Yes

Table IA6: Effect on Discontinued Segments in EPD-Prohibiting Host Countries
This table reports the coefficients of OLS regressions examining the effect of EPD reporting on the probability that disclosing firms discontinue their operations in Angola, China, Cameroon, and Qatar, where national law prohibits the public disclosure of extraction payment information in EPD reports. *Discontinued Segment in EPD-Prohibiting Host Country* is an indicator variable equal to one if the firm abandons a geographic segment in Angola, China, Cameroon, or Qatar in the given year. *EPD* is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. All specifications include host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. Segment-level data is from Worldscope Geographic Segments and firm fundamentals are from Compustat. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (70 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	(1) Discontinued Segment in EPD-Prohibiting Host Country
EPD	0.002
	(0.41)
Observations	7,953
Adjusted R-Squared	0.181
Fixed Effects:	
Host Country × Year FE	Yes
Resource Type × Year FE	Yes
Treatment or Control Group × Year FE	Yes
Firm-Subsidiary FE	Yes

Table IA7: EPD Reporting and the Level of Competition for Licenses

This table reports the coefficients of OLS regressions examining the effect of EPD reporting on the level of competition in license auctions in Africa. The dependent variable *Ln(Number of Submitted Bids)* is the natural logarithm of the total number of bids that disclosing and non-disclosing firms submit for a given license. *High EPD Exposure* is a binary indicator equal to one for license auctions of either offshore blocks or large (i.e., above median-sized) blocks. *Post 2013* is an indicator variable equal to one for auctions that take place after 2013. Auction participation data is from Enverus International. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	Pre- vs. Post 2013	On- vs. Offshore Licenses	Large vs. Small Blocks
Ln(Number of Submitted Bids)	(1)	(2)	(3)
Post 2013	0.345	0.248	0.297
	(1.57)	(0.53)	(0.82)
Post 2013 × High EPD Exposure		0.113	-0.035
		(0.22)	(-0.09)
High EPD Exposure		-0.021	-0.272
		(-0.05)	(-0.90)
Observations	36	36	36
Adjusted R-Squared	0.205	0.155	0.182
Control Variables	Yes	Yes	Yes

Table IA8: Association between Extractive Payments and Investments

This table reports the coefficients of OLS regressions examining the association between extractive payments to host governments and corporate investment. The dependent variable *Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)* is the natural logarithm of one plus the firm's payments to a given host government in a given year, divided by the company's lagged total assets and multiplied by 100. *Capex$_t$/Total Assets$_{t-i}$* is defined as the firm's consolidated capital expenditures in period t, divided by total assets in period t-i. *EPD* is an indicator variable equal to one beginning in the year in which EPD reporting becomes effective for the respective oil, gas, or mining company. I trim *Capex$_t$/Total Assets$_{t-i}$* at the 99th percentile to account for extreme values due to potential data errors. All specifications include parent company controls and host country-by-year, resource type-by-year (where resource types are defined using the 3-digit NAICS code), treatment- or control group-by-year, and subsidiary fixed effects. Extractive payment data is from EITI reports and firm fundamentals are from Compustat. I describe the sample selection in Section 3. T-statistics, reported in parentheses, are based on standard errors clustered at the level of the parent company's headquarter country (29 clusters). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Ln(1+Extractive Payment/Total Assets$_{t-1}$ × 100)	(1) Baseline Association	(2) EPD Effect
EPD		0.120**
		(2.64)
Capex/Total Assets$_{t-1}$	0.631	0.588
	(0.88)	(0.83)
Capex$_{t-1}$/Total Assets$_{t-2}$	-0.968	-0.973
	(-1.21)	(-1.23)
Capex$_{t-2}$/Total Assets$_{t-3}$	0.059	0.054
	(0.07)	(0.06)
Capex$_{t-3}$/Total Assets$_{t-4}$	-0.707	-0.704
	(-1.16)	(-1.17)
Capex$_{t-4}$/Total Assets$_{t-5}$	0.164	0.138
	(0.49)	(0.41)
Observations	552	552
Adjusted R-Squared	0.901	0.901
Control Variables	Yes	Yes
Host Country × Year FE	Yes	Yes
Resource Type × Year FE	Yes	Yes
Treatment or Control Group × Year FE	Yes	Yes
Firm-Subsidiary FE	Yes	Yes

Figure IA1: Payment Information in EPD vs. EITI Reports

This figure illustrates the type of publicly available payment information before and after EPD reporting. Panels A and B show parts of BP's extraction payment report for the financial year ended on 31 December 2015. Consistent with EPD reporting, BP disaggregates extractive payments by host country and payment type (Panel A). For each host country (e.g., Trinidad and Tobago) and payment type, BP has to additionally provide a payment break down by extractive project and receiving government institution (Panel B). Figures in both panels are reported in million USD. Panel C illustrates the coarser payment information available in EITI reports before (and after) the adoption of extraction payment disclosures. For example, Trinidad and Tobago's (TT) EITI report only disaggregates BP's extractive payments (to the host country) by subsidiary, but not by payment type, extractive project, or specific government institution (figures are reported in TT dollars). Overall, the payment information in extraction payment disclosures is substantially more detailed than in EITI reports, allowing interested parties to uncover payment discrepancies and exert pressure on disclosing firms (Global Witness, 2018).

Panel A: Granular Payment Disaggregation in EPD Reports by Host Country and Payment Type

Country	Production Entitlements	Taxes	Royalties	Fees	Bonuses	Infrastructure Improvements	Total
Algeria		134.0					134.0
Angola	1,985.9	641.2		0.4	48.3	0.5	2,676.4
Argentina		0.2					0.2
Australia		71.1	129.9				201.0
Azerbaijan	8,019.1	237.5		2.1			8,258.8
Brazil				187.7			187.7
Canada		1.5	0.4	0.7			2.6
Egypt		348.1		0.2	5.7		353.9
India	2.1	21.0					23.1
Indonesia	550.8	333.8		1.2			885.9
Iraq		59.0		2.1		6.6	67.7
Libya				0.6			0.6
Norway		6.8		9.6			16.3
Oman				0.4		25.1	25.5
Qatar		0.8					0.8
Russia		34.0					34.0
Trinidad and Tobago		407.6	129.6	2.6			539.9
United Arab Emirates		1,060.1					1,060.1
United Kingdom		(317.6)		7.8			(309.8)
United States	33.2	138.0	764.6	22.8	4.9		963.4
Uruguay				0.3			0.3
Venezuela		0.2					0.2
Vietnam		75.5					75.5
Total	10,591.2	3,252.8	1,024.5	238.5	58.8	32.3	15,198.0

Panel B: Granular Payment Disaggregation in EPD Reports by Project and Government Institution

TRINIDAD AND TOBAGO

$ million

GOVERNMENTS	Production Entitlements	Taxes	Royalties	Fees	Bonuses	Infrastructure Improvements	Total
Board of Inland Revenue		387.1					387.1
Ministry of Energy & Energy Affairs		20.6	38.8	2.6			62.0
National Gas Company of Trinidad & Tobago Ltd			90.8[a]				90.8
Total		407.6	129.6	2.6			539.9

PROJECTS	Production Entitlements	Taxes	Royalties	Fees	Bonuses	Infrastructure Improvements	Total
Block 5B				2.5			2.5
BPTT Blocks		407.6	129.6[a]	0.2			537.5
Total		407.6	129.6	2.6			539.9

Panel C: Coarse Payment Disaggregation in EITI Reports by Extractive Firm and Subsidiary

Company	Adjusted total per Government	Adjusted total per company	Difference after adjustments
	TT$	TT$	TT$
Amoco Trinidad Gas BV Trinidad Branch	28,313,870	28,313,931	(61)
BP Exploration Operating Co Ltd Trinidad Branch	56,959	56,959	-
BP Trinidad and Tobago LLC Trinidad Branch	4,427,618,484	4,452,299,889	(24,681,405)
BP Trinidad Processing Limited	54,212,919	54,212,919	-
BP Group	**4,510,202,232**	**4,534,883,698**	**(24,681,466)**

Figure IA2: Auction Participation by Disclosing Firms in Event Time
This figure reports the coefficients of OLS regressions examining the effect of EPD reporting on the likelihood that disclosing firms participate in license auctions in event time. I estimate the model from Column (2) of Table 6 but replace the *EPD* indicator with separate interactions, each marking one time period relative to the entry-into-force-year (t=0). I omit the indicator for period t-2 to t-1, which serves as the benchmark period with an OLS coefficient and standard error of zero. Vertical bands represent 95% confidence intervals for the point estimates in each period.

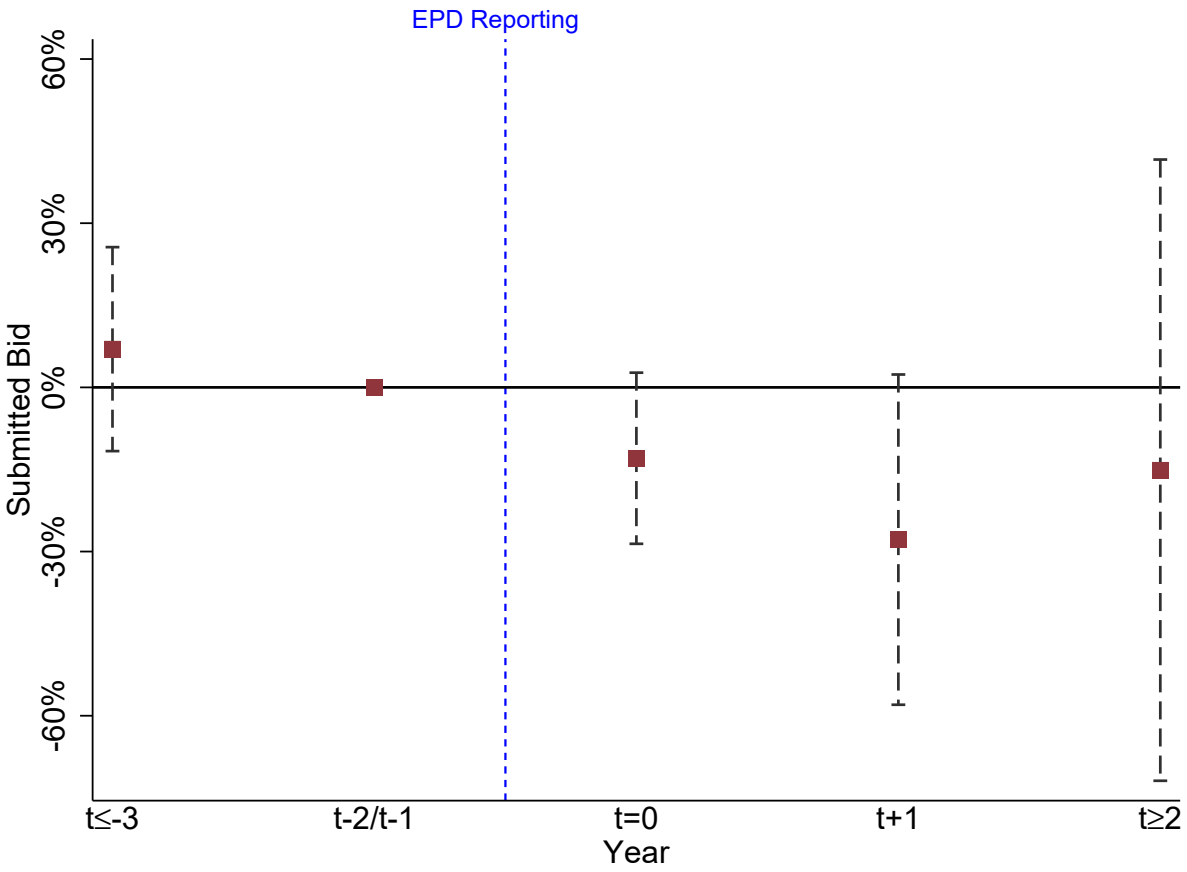

Figure IA3: Optimal Production Decisions by Oil & Gas Firms
This figure graphically illustrates that firms with more productive drilling processes extract more oil or gas per well because they have a lower marginal cost of production (e.g., due to better technology or more highly skilled employees). In the example below, firm 1 is more productive than firm 2 because it can produce the same output at a lower marginal cost. Both firms face identical, i.e. constant, marginal revenues because the world prices of oil and gas are exogenously determined by global demand and supply forces. The optimal production level q* is the extraction quantity at which marginal cost equals marginal revenue.