Mandatory extraction payment disclosures and tax haven use: Evidence from United Kingdom

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Abstract

Research Question: Does public country by country reporting (CbCr) deter multinationals' tax avoidance practices operating in extractive industries?

Motivation: Public CbCr has already been implemented for two specific sectors, namely the financial and extractive sectors. Prior studies have focused on tax avoidance of EU banks around the implementation of public CbCr requirement (Joshi *et al.*, 2020; Eberhartinger *et al.*, 2020; Overesch & Wolff, 2021). However, studies on how resource-extracting multinationals respond to the CbCr regulation are scarce. This study seeks to fill this gap by examining the effect of public CbCr on tax avoidance with a special focus on extractive industries.

Idea: To improve fiscal transparency, Canadian and European legislators have adopted regulations requiring multinational corporations (MNCs) to provide, annually, their Extraction Payment Disclosures (EPD) (Public CbCr standard for extractive industries) to governments (EC, 2013; Natural Resource Canada, 2014). This study examines the effect of mandatory EPD adoption on the extent of tax haven use.

Data: For a 10-year period surrounding the mandatory EPD adoption (2010-2019), we selected a sample of UK MNCs operating in the oil, gas, and mining sectors and listed on the London Stock Exchange. The analysis is mainly based on firm-level information taken from DATASTREAM database. Based on hand-collected data from annual reports, we measured the extent of tax haven use using the percentage of multinational subsidiaries located in tax haven jurisdictions/countries as listed in Dyreng and Lindsey (2009). An alternative list identified by the Organization for Economic Co-operation and Development (OECD) (2006) was also used in a robustness test.

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Tools: To examine our research question, we estimated a linear regression model with panel data using STATA software.

Findings: The results show that the increased transparency resulting from public EPD does not appear to significantly affect the intensity of tax haven use.

Contribution: This study extends and complements prior literature examining the effect of CbCr on tax avoidance and profit shifting by focusing on a specific setting i.e. extractive sector. To the best of our knowledge, apart from Johannesen and Larsen (2016) and Rauter (2020), no studies have provided empirical evidence on how resource-extracting multinationals respond to the EPD regulation.

Keywords: Country-by-country reporting; Extractive industries; Tax havens; Extraction Payment Disclosures.

JEL codes: M41, H71

1. Introduction

This study examines the effect of mandatory Extraction Payment disclosures (EPD) adoption on the intensity of tax haven use by United Kingdom (UK) multinational corporations (MNCs). MNCs have been accused of exploiting loopholes in tax legislation to avoid taxes (Rego, 2003; Hanlon & Heitzman, 2010; Joshi, 2020). "Profit shifting" through the use of "tax havens" is one of their main aggressive tax planning strategies (Rego, 2003; Hanlon & Heitzman, 2010; Akamah *et al.*, 2018; Joshi, 2020, Tørsløv *et al.*, 2020; Bilicka & Scur, 2022). Particularly, by exploiting foreign affiliates' statistics, Tørsløv *et al.* (2020) estimated the misreporting of profits. They found that close to 40% of multinationals profits are shifted to tax havens globally, in 2015. In the same vein, Bilicka and Scur (2022) documented that there are substantial and significant differences in reported profitability depending on the statutory tax rates of the multinational's subsidiaries locations i.e. tax havens or not.

To address tax avoidance and profit shifting and giving the increasing development of MNCs, several fiscal transparency initiatives have been introduced around the world. The aim is to improve tax collections and combat tax avoidance practices by forcing MNCs to pay their fair share in jurisdictions where they operate. Particularly, the Organization for Economic Co-operation and Development (OECD) released, in July 2013, a global action plan against Base Erosion and Profit Shifting (BEPS). It highlighted the usefulness of country-by-country reporting (CbCr) which aims to enhance the disclosure quality of tax-related information. Currently, public country-specific information regulation has already been put in place, albeit only for specific sectors, namely the financial and extractive sectors.

In the specific setting of extractive industries, MNCs are generally accused of exploiting host countries through illicit financial flows such as corruption, tax avoidance and money laundering (United Nations, 2015; Lemaître, 2019; Rauter, 2020; Stausholm *et al.*, 2022). Such behavior could explain the phenomenon of "resource curse" (Auty, 2002) or "Paradox of plenty" (Karl, 1999) which refers to the failure of many resource-rich countries to take full advantage of this wealth to effectively meet public welfare needs. Thus, in order to improve their transparency and to increase their tax contributions, Canadian and European legislators have adopted regulations requiring these multinationals to provide, annually, their extraction payment disclosures (EPD) to governments in the form of a publicly report (EC, 2013; Natural Resource Canada, 2014).

As of January 1, 2015, oil, gas and mining MNCs headquartered in the United Kingdom (UK) or listed on the London Stock Exchange are required to publicly provide annually the amounts they have paid to governments anywhere in the world. These amounts must be broken down by host country, by project and by type of payment. This study tests whether this requirement deters tax avoidance practices via tax haven use.

To achieve our objective, we selected for a 10-year period surrounding the mandatory EPD adoption (2010-2019), a sample of UK MNCs operating in the oil, gas, and mining sectors. The analysis is mainly based on firm-level information taken from DATASTREAM database. Based on hand-collected data from annual reports, we measured the extent of tax haven use using the percentage of multinational subsidiaries located in tax haven jurisdictions/countries as listed in Dyreng and Lindsey (2009). An alternative list identified by the OECD (2006) was also used in a robustness test.

This study makes two main contributions. First it extends and complements prior literature examining the effect of CbCr on tax avoidance and profit shifting by focusing on a specific setting i.e. extractive sector. Studies in this literature have focused on tax avoidance of EU banks around the implementation of public CbCr (Joshi *et al.*, 2020; Eberhartinger *et al.*, 2020; Overesch & Wolff, 2021) or of EU MNCs around the private CbCr requirement (Joshi, 2020). Second, to the best of our knowledge, apart from Johannesen and Larsen (2016) and Rauter (2020), no studies have provided empirical evidence on how resource-extracting multinationals respond to the EPD regulation. Johannesen and Larsen (2016) tested the effect of the EPD requirement on firm value and Rauter (2020) investigated its effect on tax revenue contributions and investments by MNCs in foreign host countries. We provide evidence that the intensity of tax haven use is unaffected after the mandatory EPD came into effect. These findings should be relevant in that they deal with the ongoing debate between the European Parliament, the OECD and accounting standard setters on the appropriateness of requiring multinationals to provide public CbCr.

The rest of the article is structured as follows. The next section presents the research background and hypothesis. Section 3 deals with the research design. Section 4 presents and discusses the main empirical results. Section 5 provides robustness tests. Section 6 concludes.

2. Background and hypothesis development

2.1 Country-by-country reporting and extraction payment disclosures

Resource-extracting multinationals from developed countries play an important economic role in foreign resource-rich countries (host countries) (Brookings Institution, 2015). They significantly contribute to their government income through tax payments (Collier, 2008). However, given their illicit financial flows and tax aggressiveness practices; they deprive host countries to take full advantage of their natural resources to effectively meet public welfare needs. To address this issue, improving tax transparency and information exchange becomes at the heart of a global effort.

In order to combat tax aggressiveness, several regulatory bodies have recommended that MNCs make public all information relating to their activities in each country/jurisdiction in which they operate (Murphy, 2003; Publish What You Pay, 2005). In September 2008, the European Parliament recommended that the European Commission (EC) asks the IASB to include in its international accounting standards the requirement of CbCr for all MNCs. The OECD, in partnership with the G20, has addressed this issue in the form of a project, known as the BEPS project aiming to combat base erosion and profit shifting (OECD, 2015).

Over time, CbCr has been implemented through public or private initiatives. On the one hand, according to Action Item 13 of the OECD's BEPS project, multinationals with consolidated revenues of €750 million or more should privately provide country-by-country information to tax authorities. On the other hand, public CbCr has already been implemented for the two specific sectors, namely the financial and extractive sectors. Indeed, in July 2013, the EC required EU financial institutions to publicly provide CbCr (Article 89 of the EU Capital Requirements Directive IV- CRD IV). In the extractive industries, Canadian and European legislators have adopted regulations requiring MNCs to provide, annually, their extraction payment disclosures (EPD) to governments in the form of a publicly report (EC, 2013; Natural Resource Canada, 2014)[1]. This regulation allows for increased oversight of extractive companies (Rauter, 2020). In June 2013, European policymakers enacted the EPD regulation in the form of two directives 2013/34/EU and 2013/50/EU. Member countries are required to transpose the EU directives into national law within two to four years; resulting in country-specific effective dates[2]. Particularly, As of January 1, 2015, oil, gas and mining MNCs

headquartered in the United Kingdom (UK) or listed on the London Stock Exchange are required to publicly report annually the amounts they have paid to governments anywhere in the world in excess of £86,000. These amounts should be broken down by host country, by project and by type of payment.

2.2 The effect of mandatory EPD adoption on the intensity of tax haven use: hypothesis development

Policymakers often rely on deterrence policies to combat tax aggressiveness. For example, they may mandate tax disclosures to combat tax avoidance and profit shifting under the theory that "*sunlight is the best disinfectant*" (Shevlin & Venkat, 2020). According to Shevlin and Venkat (2020), there are three possible behavioral responses to a fiscal transparency requirement. First, an increased transparency may achieve policymakers' intended effects i.e. reducing tax avoidance. Second, taxpayers may tend to avoid disclosures, for example by manipulating taxable income to avoid disclosure thresholds (Hasegawa *et al.*, 2013). Third, taxpayers may save taxes through channels unaffected by the mandated tax transparency.

According to political cost theory, fiscal transparency might allow for greater scrutiny of the firms' tax affairs while also leading to public backlash, including reputational damage, citizen group anger, policy makers' criticism and foreign tax authorities' scrutiny (Hope *et al.*, 2013; Johannessen & Larsen, 2016; Rauter, 2020; Shevlin & Venkat, 2020).

Recently, studies have investigated the economic consequences of CbCr requirement (Johannesen & Larsen, 2016; Joshi *et al.*, 2020; Joshi, 2020; Eberhartinger *et al.*, 2020; Rauter, 2020; Overesch & Wolff, 2021). They yielded mixed results. Other studies have exploited the country-by-country data to evaluate the size of tax-minimization misalignments (Brown *et al.*, 2019; Fatica & Gregori, 2020; Stausholm *et al.*, 2022).

Joshi (2020) focused on the effect of private CbCr requirement on corporate tax outcomes. Specifically, he examined EU multinational firms' tax avoidance and income shifting following the CbCr requirement implementation. Based on a sample of EU MNCs, he found an increase in consolidated GAAP effective tax rates, following the implementation of the new private disclosure requirement. However, he found little evidence consistent with CbCr reduces affiliate-level income shifting. The author concluded that private country-level disclosures can curb overall tax avoidance, though there is little effect on profit shifting.

In the banking sector, Joshi *et al.* (2020) examined the effect of public CbCr requirement on tax planning behavior. Based on a sample of 171 European banks examined over the period 2011-2017, they treated the CbCr requirement as an exogenous shock. Results found provide little evidence consistent with a decline in income shifting at the bank affiliate level following the mandatory CbCr adoption.

However, at the bank level, consolidated effective tax rates did not significantly change. The researchers concluded that the increased transparency resulting from public CbCr may discourage European banks to save taxes through profit shifting, but it does not appear to significantly affect banks' overall tax avoidance. Likewise, Eberhartinger *et al.* (2020) tested whether the public CbCr increases the costs of tax haven activities of EU banks. They found that the number of banks' affiliates in tax havens decreased significantly after the mandatory public CbCr came into effect. In the same vein, Overesch and Wolff (2021) documented a significant increase in the worldwide effective tax rates of exposed European multinational banks after the public CbCr adoption[3].

In the extractive industries, research on the effects of the EPD requirement is scarce. The studies that fit into this stream of research include Johannesen and Larsen (2016) and Rauter (2020). Johannesen and Larsen (2016) examined the effect on firm value of four key dates in the European legislative process leading to the EPD regulation. Using an event study, the authors found that the new regulation is associated with a significant decline in firm value. They concluded that tax avoidance creates significant rents for extractive companies. Then, an increased transparency, through the EPD requirement, is a potentially powerful tool to reduce these rents and combat tax avoidance. In the same vein, Rauter (2020) tested the effect of the EPD adoption on the tax contributions and investments of MNCs in foreign host countries. Based on a selected sample of European and Canadian extractive multinationals, he showed that multinationals affected by the EPD regulation increased their payments to host governments, but decreased investments and obtained fewer extraction licenses than their counterparts. These effects seem to be stronger for MNCs that face a very high public shame risk, operate in corrupt host countries, and are highly exposed to corruption-prone payments. The author concluded that the EPD regulation has achieved its intended objective of collecting tax revenues from MNCs in foreign host countries. Nevertheless, it seems penalizing them compared to their counterparts not affected by such regulation.

By focusing on the three implemented CbCr standards i.e. CbCr for banks, CbCr for large multinationals and CbCr for extractives industries, Stausholm *et al.*, (2022) evaluated whether CbCr requirement allows a better measurement of the amount of MNCs' tax avoidance and, then correct existing macro-statistics. They found that these standards lack coherence and workability. Notably, they concluded that the CbCr standard for extractive industries does not allow carrying out an in-depth research on profit reporting and tax- motivated misalignments by MNCs.

By exploiting banks' country-by country data, Fatica and Gregori (2020) analyzed the extent of profit shifting by the largest European banks. They found that the international allocation of bank profits depends on the international tax rate differences between countries in which their affiliates operate. Particularly, they

documented high profits in subsidiaries located in tax havens which emphasize the propensity of multinational banks to lower their tax burden by shifting profits to these jurisdictions characterized by low taxes. Similarly, Brown *et al.* (2019) documented an intensive presence of EU banks in tax havens based on information provided in country-by-country reports.

This study considers the tax haven use as a proxy for tax avoidance practices. Indeed, operations in tax haven jurisdictions/countries are often considered in prior literature as firms' attempts to shift profits to avoid taxes (Desai *et al.*, 2006; Hope *et al.*, 2013; Jaafar & Thornton, 2015; Kobbi-Fakhfakh, 2021).

Based on the aforementioned theoretical arguments and the mixed empirical findings, we can conclude that the effect of the mandatory EPD adoption on the intensity of tax haven use seems reasonable but is not clear ex-ante. Thus, we state our hypothesis in the alternative form, as follows:

Hypothesis: The mandatory EPD adoption affects the intensity of tax haven use.

3. Research design

3.1 Sample selection

To test our hypothesis, we used the extractive industries as our setting which is concerned by the obligation of EPD. Extractive companies frequently venture abroad to extract oil, gas, or minerals in foreign countries that are endowed with natural resources (Rauter, 2020). Therefore, the initial sample of the study includes 168 British companies listed on the London Stock Exchange and operating in the "oil and gas producers" or "mining" sectors. It covers the ten year period from 2010 to 2019, and so includes five years before and five years after the mandatory EPD requirement adoption. Only firms active in the DATASTREAM database from 2010 to 2019 are selected.

To constitute the study sample, we eliminated firms whose creation date began during our study period[4]. Another group of firms was dropped due to unavailability of annual reports or because they did not have at least one foreign subsidiary.

The primary sample is composed of 93 firms and a total of 930 firm-year observations. Next, we removed firm-year observations for which data on the extent of tax haven use was difficult to obtain[5] or with missing data values of control variables. Table 1 summarizes the sample selection procedure.

Table 1. Summary of the sample selection process and sample characteristics

PANEL A : SAMPLE SELECTION CRITERIA	
All UK extractive firms active in the DATASTREAM database and listed on the London Stock Exchange	**168**
Excluding firms :	
✓ Created during the study period	(66)
✓ Due to unavailability of annual reports	(7)
✓ Without at least one foreign subsidiary	(2)
Number of firms in the initial sample	**93**
Total initial firm-year observations	**930**
Excluding firm-year observations:	
✓ Because of difficulty of collecting data on the extent of tax haven use	(7)
✓ With missing data from any of the necessary control variables	(357)
Total final firm-year observations	**566**

PANEL B : DISTRIBUTION OF FIRM-YEAR OBSERVATIONS BY YEAR		
Year	**Number of obs.**	**Percentage**
2010	53	9.36
2011	52	9.19
2012	54	9.54
2013	54	9.54
2014	57	10.07
2015	60	10.60
2016	60	10.60
2017	58	10.25
2018	57	10.07
2019	61	10.78
TOTAL	**566**	**100.00**

PANEL C : DISTRIBUTION OF FIRM-YEAR OBSERVATIONS BY SECTOR		
Sector		
Mining	345	60.95%
Oil and gaz producers	221	39.05%
TOTAL	**566**	**100.00**

Table 1, Panel B reports the yearly distribution of our sample. Panel C, shows that the sample spans two types of sectors; the most represented is the "Mining" sector followed by the "Oil and gas producers" sector.

3.2 Variables measurement

3.2.1 Mandatory extraction payment disclosures (EPD) adoption

In the UK, extractive MNCs are required to provide publicly reports on their payments to the governments (host countries) as of 2015 (Rauter, 2020). Therefore, we measured the mandatory EPD adoption using a dichotomous variable which takes 1 for firm-years after mandatory adoption of the EPD requirement, and zero

otherwise. Therefore, we consider the post-mandatory EPD adoption period (post-EPD) to be from 2015 onward.

3.2.2 Extent of tax haven use (HAVENS)

The data on tax havens was hand-collected from annual reports. Following prior studies (Dyreng & Lindsey, 2009; Markle & Shackelford, 2012; Dyreng *et al.*, 2016; Jaafar & Thornton, 2015; Richardson *et al.*, 2020; Eulaiwi *et al.*, 2021; Kobbi-Fakhfakh, 2021), we counted the percentage of subsidiaries established in jurisdictions/countries classified as tax havens, based on the consolidated subsidiaries list. A higher HAVENS score implies higher intensity of tax haven use.

To classify a jurisdiction/country as a tax haven, we used the list provided in Dyreng and Lindsey (2009) which is extensively adopted by prior studies of which we can cite Brown *et al.* (2019), Richardson *et al.* (2020) and Kobbi-Fakhfakh (2021)[6].

3.3 Model specification

In order to test the effect of the mandatory EPD adoption on the intensity of tax haven use, we estimated the following regression model:

$$\underline{\textbf{Model}}: HAVENS_{i,t} = \beta_0 + \beta_1 EPD_{i,t} + \beta_n (CONTROLS)_{n,i,t} + \varepsilon_{i,t}$$

Where HAVENS is the percentage of subsidiaries located in tax havens and the EPD is a dichotomous variable coded 1 for firm-years after mandatory adoption of the EPD requirement, and zero otherwise. The main coefficient of interest in the model is β_1 which reflects the effect of EPD on HAVENS. The hypothesis predicts that β_1 should be significant.

In addition, we include firm-level characteristics as control variables (CONTROLS). They include the firm size (SIZE), leverage (LEV), profitability (ROA), growth (GROWTH), intensity of intangible (INTANG) and tangible assets (PPE) and importance of inventories (INVENT). These control variables are previously shown in the literature to be related to the level of corporate tax avoidance and tax haven operations (Derashid & Zhang, 2003; Richardson & Lanis, 2007; Dyreng & Lindsey, 2009; Markle & Shackelford, 2012; Taylor & Richardson, 2013; Jaafar & Thornton, 2015; Higgins *et al.*, 2015). Furthermore, we added the variable MINING to control the effect of the two sectors that constitute our sample, namely "Mining" and "Oil and gas producers" sectors. Finally, to control for the effect of time, we included year fixed effects (FE) in our model.

All control variables are collected from DATASTREAM database. Table 2 summarizes the definition of all study variables.

To examine our research question, we estimated a linear regression model with panel data using STATA software. To achieve robust estimations, several econometric tests were performed, including tests of specification, heteroskedasticity and autocorrelation. A *"Breusch -Pagan test"* for heteroskedasticity and a "*Wooldridge test"* for autocorrelation indicate the presence of both heteroskedasticity and autocorrelation problems for our regression model. We therefore estimated it using "*Feasible Generalized Least Square*" to obtain robust results.

Table 2. Variables definition

VARIABLES	MEASURES	SOURCES	REFERENCES[7]
HAVENS	Percentage of subsidiaries established in jurisdictions/countries classified as tax havens, based on the consolidated subsidiaries list. We used two lists of tax havens. The first list (List 1) was described in Dyreng and Lindsey (2009) as follows: *Andorra , Anguilla, Antigua and Barbuda, Aruba, The Bahamas, Bahrain, Barbados, Belize, Bermuda, Cayman Islands, Cook Islands, Costa Rica, Cyprus, Dominica, Gibraltar, Grenada, Guernsey, Hong Kong, Ireland, Isle of Man, Jersey, Lebanon, Liberia, Liechtenstein, Luxembourg, Macau, Malaysia, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, Netherlands Antilles, Niue, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Seychelles, Singapore, Switzerland, Turks and Caicos Islands, and Vanuatu.* In a robustness test, we used an alternative list (List 2) of tax havens as described in the OECD (2006): *Anguilla, Antigua and Barbuda, Bahamas, Bahrain, Bermuda, Belize, British Virgin Islands, Cayman Islands, Cook Islands, Cyprus, Dominica, Gibraltar, Grenada, Guernsey, Isle of Man, Jersey, Liberia, Malta, Marshall Islands, Mauritius, Montserrat, Nauru, Netherlands Antilles, New Caledonia, Panama, Samoa, San Marino, Seychelles, St. Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Turks and Caicos Islands, and Vanuatu.*	ANNUAL REPORTS	OECD (2006), Dyreng and Lindsey (2009), Markle and Shackelford (2012), Dyreng *et al.* (2016), Jaafar and Thornton (2015), Richardson *et al.* (2020), Kobbi-Fakhfakh (2021) and Eulaiwi *et al.* (2021)

VARIABLES	MEASURES	SOURCES	REFERENCES[7]
EPD	A dichotomous variable which takes 1 for firm-years after mandatory adoption of the EPD requirement (from 2015 onward), and zero otherwise	-	Rauter (2020)
CONTROL VARIABLES			
SIZE	Natural logarithm of total assets	DATASTREAM	Richardson and Lanis (2007), Dyreng and Lindsey (2009), Markle and Shackelford (2012), Richardson (2013) and Jaafar et Thornton (2015)
LEV	Total debt to total assets	DATASTREAM	Richardson and Lanis (2007), Dyreng and Lindsey (2009), Richardson (2013) and Jaafar et Thornton (2015)
ROA	Net income to total assets	DATASTREAM	Richardson (2013) and Jaafar and Thornton (2015)
GROWTH	Market-to-Book ratio	DATASTREAM	Derashid and Zhang (2003) and Higgins *et al.* (2015)
INTANG	Intangible assets to total assets	DATASTREAM	Richardson (2013)
PPE	Net property plant and equipment to total assets	DATASTREAM	Richardson and Lanis (2007) and Jaafar and Thornton (2015)
INVENT	Inventory to total assets	DATASTREAM	Richardson and Lanis (2007) and Jaafar and Thornton (2015)
MINING	Dummy variable equal to 1 (0 otherwise) for firms operating in the "Mining" sector	DATASTREAM	-
FE	Year-fixed effects	-	-

4. Empirical results and discussion

4.1 Descriptive statistics

All continuous variables were winsorized using the 5th and 95th percentiles of each variable as limit values in order to avoid any problem related to the presence of outliers or extreme data. Table 3 summarizes the descriptive statistics for all the study variables.

Table 3. Summary descriptive statistics for variables

Variables	Obs	Mean	SD	P25	P50	P75	Skewness	Kurtosis
HAVENS	566	0.164	0.154	0.000	0.143	0.250	0.610	2.275
EPD	566	0.523	0.500	0	1	1	-0.092	1.008
SIZE	566	11.434	2.871	9.370	10.571	12.541	1.178	3.522
LEV	566	0.096	0.140	0.000	0.015	0.151	1.565	4.521
ROA	566	-0.127	0.219	-0.189	-0.069	0.019	-1.497	4.843
GROWTH	566	1.501	1.376	0.590	1.080	1.820	1.665	5.193
INTANG	566	0.289	0.314	0.008	0.143	0.559	0.728	2.031
PPE	566	0.342	0.334	0.008	0.237	0.667	0.325	1.471
INVENT	566	0.018	0.029	0.000	0.000	0.033	1.450	3.707
MINING	566	0.610	0.488	0	1	1	-0.449	1.202

Note. This table reports the descriptive statistics for the study variables using 566 firm-year observations from 2010 to 2019. All variables are defined in Table 2. All continuous variables were winsorized at the 5th and 95th percentiles.

Table 3 shows that the average (median) percentage of tax haven use is about 0.164 (0.143). A more detailed analysis of this percentage shows that almost 71% of our sample has at least one subsidiary located in a jurisdiction classified as a tax haven. This confirms the massive use of tax havens by extractive companies as a tax avoidance strategy (Johannesen & Larsen, 2016).

The estimation of our regression model requires, as a preliminary step, the verification of the absence of multicollinearity between the independent variables. Therefore, to test for multicollinearity, Table 4 reports the Pearson (presented in the bottom left of Table 4) and Spearman (presented in the top right left of Table 4) correlation matrices for all the explanatory variables included in our analysis. Table 4, also, presents "*Variance Inflation Factors*" (VIF) coefficients.

Table 4 shows that the magnitude and direction of both parametric and non-parametric coefficients are very similar and don't exceed a threshold that had been accepted in prior literature (Green, 1978; Kennedy, 2008; Neter *et al.*, 1990)[8]. Furthermore, all VIF do not exceed 10, indicating that no serious multicollinearities exist (Hair et al, 1995).

Table 4. Correlation matrix

	VIF	1	2	3	4	5	6	7	8	9	10
1. HAVENS	-		0.022	-0.033	-0.041	-0.040	-0.056	-0.048	0.011	0.002	-0.052
2. EPD	5.03	0.006		0.040	0.126***	0.035	-0.137***	-0.055	0.102**	0.035	0.033
3. SIZE	2.29	-0.182***	0.001		0.468***	0.644***	0.025	-0.345***	0.538***	0.668***	-0.038
4. LEV	1.40	-0.077*	0.173***	0.395***		0.234***	0.087**	-0.274***	0.464***	0.492***	0.059
5. ROA	1.55	-0.056	0.016	0.472***	0.104**		-0.117***	-0.268***	0.383***	0.428***	0.036
6. GROWTH	1.19	-0.023	-0.090**	-0.017	0.105**	-0.299***		-0.027	-0.044	0.079*	-0.004
7. INTANG	1.90	-0.057	-0.032	-0.425***	-0.285***	-0.216***	-0.037		-0.627***	-0.357***	-0.065
8. PPE	2.33	0.022	0.127***	0.483***	0.412***	0.342***	-0.074*	-0.665***		0.549***	-0.024
9. INVENT	2.11	-0.039	-0.004	0.650***	0.384***	0.295***	0.022	-0.427***	0.481***		0.088**
10. MINING	1.11	-0.074*	0.033	0.037	0.041	0.017	-0.041	-0.039	-0.001	0.239***	

Note. This table reports the correlation matrix using 566 firm-year observations from 2010 to 2019. All variables are defined in Table 2. All continuous variables were winsorized at the 5th and 95th percentiles. The bottom left half of the table contains Pearson's parametric correlation coefficients, while the upper right half of the table shows Spearman's non-parametric correlation coefficients. ***, **, and * denote significant at the 1%, 5%, and 10% levels, respectively.

4.2 Regression results

Table 5 summarizes the "Feasible Generalized Least Square" (FGLS) estimates of our regression model. It shows that the "Wald Chi2" test of overall significance of the estimated regression model is significant at the 1% level (Prob>Chi2 = 0.000) which indicates that the model has a significant explanatory power.

Table 5. Baseline results of regression model estimation

VARIABLES	Coef	Z statistic	P-Value
	HAVENS		
EPD	0.001	0.09	0.932
SIZE	-0.018	-8.05***	0.000
LEV	0.072	2.39**	0.017
ROA	0.022	2.06**	0.039
GROWTH	-0.001	-0.40	0.687
INTANG	-0.007	-0.51	0.612
PPE	0.01	0.60	0.550
INVENT	0.470	2.60***	0.009
MINING	-0.023	-1.71*	0.087
Intercept	0.337	11.54***	0.000
Year FE		Yes	
Wald chi2		88.66	
Prob>chi2		0.0000	
Adjusted R^2 (%)		4.99	
Observations		566	

Note. This table reports the baseline results of regression model FGLS estimation. HAVENS is the dependent variable and it was measured using the list (List 1) from Dyreng and Lindsey (2009). The sample selection process is described in Table 1 and all variables are defined in Table 2. All continuous variables were winsorized at the 5th and 95th percentiles. All models include year fixed effects. ***, **, and * denote significant at the 1%, 5%, and 10% levels, respectively.

Our empirical study tests the effect of the mandatory EPD adoption on the intensity of tax haven use. Table 5 reveals that the estimated coefficient of the EPD variable is not statistically significant (ß = 0.001, z-stat =0.09). This indicates that the mandatory EPD adoption does not appear to significantly affect the intensity of tax haven use in the extractive industries. This empirical evidence does not support the research hypothesis but we cannot conclude that the EPD requirement is ineffective in curbing tax avoidance given prior literature evidence (Rauter, 2020). Indeed, Rauter (2020) found an increase of MNCs tax contributions to host countries after the EPD requirement came into effect which confirms a decrease in tax avoidance following this requirement.

Accordingly, one plausible interpretation to our findings is that this new mandated tax transparency i.e. EPD does not offer sufficient information to tax authorities on the use of tax havens as a tax avoidance practice. Indeed, contrary to the Article 89-CRD IV, which requires EU banks to publicly disclose information about subsidiaries on a country-by-country basis, the EPD regulation requires disclosure of information disaggregated by host country, project and payment type and not by multinational's affiliates.

This fact was documented by Stausholm *et al.* (2022) who concluded that the CbCr standard for extractive industries does not allow carrying out an in-depth research on profit reporting and tax- motivated misalignments by MNCs. Therefore, our findings suggest that extractive MNCs may not fear loss of reputation or exposure to subsequent tax authorities' sanctions when complying with the EPD requirement. As a result, they have no incentive to change their behavior and continue to use tax havens to escape taxes even after the mandatory EPD adoption.

Our findings may also corroborate the Shevlin and Venkat's (2020) argument that one of the possible behavioral responses to a fiscal transparency requirement is that taxpayers may save taxes through channels unaffected by this requirement. Therefore, an in-depth analysis of the EPD reports and, if necessary, a revision of the information to be published by extractive companies on a country-by-country basis to better combat tax avoidance will be relevant.

With regard to control variables, Table 5 shows that HAVENS is significantly and negatively related to firm size (SIZE). This finding implies that larger firms are less likely to invest in tax havens jurisdictions/countries. This is consistent with Zimmerman's (1983) "political costs" hypothesis which suggests that larger firms have a greater political visibility. Therefore, they have incentives to reduce tax avoidance practices through tax haven use to avoid tax authorities and citizen groups' scrutiny (Jaafar and Thornton, 2015). In addition, Table 5 shows that profitable firms are more likely to set up tax haven subsidiaries. Finally, the coefficients on firm leverage (LEV) and inventory intensity (INVENT) are positive and significant. These findings support the view that firm use these variables as tax shields (Richardson and Lanis, 2007; Jaafar and Thornton, 2015).

5. Robustness tests

In order to ensure the stability of our baseline results, we performed two robustness checks. First, we used a narrower time-window for testing the research hypothesis. A three-year window around 2015 was chosen. This choice allows us to isolate the effect of the mandatory EPD adoption with minimal likelihood of contamination by other confounding events. The 2012-2014 and 2015-2017 periods were determined to be pre- and post-mandatory EPD adoption, respectively. The results reported in

Table 6, Column 1, confirm our baseline results indicating the absence of a significant effect of EPD on HAVENS.

Second, we used the OECD's (2006) list of tax havens as an alternative list to measure HAVENS. This list was also used by Richardson *et al.* (2020) and Eulaiwi *et al.* (2021) and Kobbi-Fakhfakh (2021). It differs from the Dyreng and Lindsey's (2009) list given that it does not include some countries classified as "big" tax havens in the prior literature such as Ireland, Luxembourg, and Switzerland. These countries are considered "legitimate" places to do business for reasons other than tax avoidance (Akamah *et al.*, 2018). Results reported in Table 6, Column 2, shows that our baseline inferences are not affected.

Table 6. Results of robustness tests

VARIABLES	Results of model estimation using narrower time-window			Results of model estimation using alternative list of tax havens		
	Coef	Z stat	P-Value	Coef	Z stat	P-Value
EPD	-0.010	-1.23	0.221	-0.002	-0.283	0.777
CONTROLS		Yes			Yes	
Intercept	0.388	11.10***	0.000	0.266	9.83***	0.000
Year FE		*Yes*			Yes	
Wald chi2					74.74	
Prob>chi2		73.21			0.0000	
Adjusted R^2 (%)		0.0000			5.59	
		5.37			566	
Observations		343				

Note. This table reports the results of regression model FGLS estimation. In the first column, HAVENS was measured using the list (List 1) from Dyreng and Lindsey (2009) with 343 firm-year observations from 2012 to 2017. In the second column, HAVENS was measured using the list (List 2) of the OECD (2006) from 2010 to 2019. The sample selection process is described in Table 1 and all variables are defined in Table 2. CONTROLS refer to the all control variables as included in table 5. All continuous variables were winsorized at the 5th and 95th percentiles. All models include year fixed effects. ***, **, and * denote significant at the 1%, 5%, and 10% levels, respectively.

6. Conclusion

The study empirically tested the effect of the mandatory EPD adoption on the intensity of tax haven use, for a sample of multinational firms operating in the extractive industries and listed on the London Stock Exchange.

For a 10-year period surrounding the mandatory EPD adoption (2010-2019), the results showed that this mandated tax transparency did not appear to significantly affect the intensity of tax havens by MNCs. This finding suggests that extractive multinationals with operations in tax havens perceive the incremental information

provided in the extraction payments reports as not informative enough to fear suspicion from tax authorities and citizen groups. Accordingly, they have no incentive to change their behavior regarding the use of tax havens to evade taxes.

While the findings of this study did not support the view that the EPD regulation deters tax avoidance through the use of tax havens, they should be of interest to policymakers and others interested in tax planning activities of multinationals operating in extractive industries. On the one hand, we cannot conclude that this mandated tax transparency i.e. EPD, did not achieve policymakers' intended effects to strengthen enforcement and curb profit shifting and tax aggressiveness. Indeed, Rauter's (2020) found an increase in extraction payments for disclosing firms after the EPD adoption. On the other hand, according to Stausholm *et al.* (2022: 1): "Extractive industry standard falls short of enabling thorough research on profit reporting and tax motivated misalignments by multinational corporations". The authors concluded that it is not enough for extractive MNCs to comply with the EPD requirement, but that the information gathered from this requirement should be informative enough for researchers, regulators, and policymakers more broadly.

Therefore, future research on the economic effects of the EPD requirement will be more relevant to properly conclude on the success or not of this requirement on curbing tax avoidance. Furthermore, an in-depth analysis of the EPD reports and, if necessary, a revision of the information to be published by extractive companies on a country-by-country basis to better combat tax avoidance will be relevant.

Finally, the findings of this study should be interpreted with caution for at least three reasons. First, the relatively small sample size does not allow the findings to be generalized. Second, the measure of the mandatory EPD adoption could confound events which differentially affect firms with respect to their tax haven use. Third, the percentage of subsidiaries established in tax havens cannot by itself reflect the degree of profit shifting to tax havens as a tax aggressiveness practice. However, due to the unavailability of information, we cannot consider the profitability of subsidiaries located in tax havens or the flows transferred to tax havens through subsidiaries as a proxy for the degree of profit shifting.

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Notes

[1] Johannesen and Larsen (2016) described the key dates in the European legislative process that led to the adoption of the EPD requirement.

[2] See Table 1 of Rauter (2020, page 10) for EPD implementation details for each adopting country.

[3] Overesch and Wolff (2021) defined exposed banks as those that should report, for the first time and under the new CbCr requirement, information about their activities in tax havens.

[4] This selection criterion allows us to construct a sample composed of a homogeneous number of firms over the entire study period. Moreover, the 66 firms whose creation date is during the study period are essentially firms created at the end of such period. These firms are assumed to be in the early stages of exploration and extraction.

[5] Some firms provide a list of their related undertakings without differentiating between subsidiaries, joint ventures and associated undertakings.

[6] An alternative list was, also, used in our study (See robustness tests section).

[7] This is a non-exhaustive list of previous studies that have used the same variable measure.

[8] In prior literature, there is no a widely accepted threshold to determine the presence of a serious multicollinearity problem among independent variables. However, the general rule of thumb is that the absolute value of the correlation coefficient should not exceed 0.8. The highest correlation in the data employed, in this study is 0.64. Therefore, we presume that all correlations are within the acceptable range.