The Global Allocation of Extractive Windfalls*

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Abstract

Which countries benefit from oil, gas and mining commodity price shocks? We study the geographic allocation of extractive MNEs profits generated by price changes - usually called *windfall profits*. We combine new administrative data on the worldwide activity of these firms with exhaustive extraction data at the firm level. We identify the allocation of windfall profits by leveraging differences in (i) the product specialization of extractive firms and (ii) commodity price changes, in a shift-share design. Firms consolidated profit strongly correlate with the price of their main commodity, driven by extractive affiliates. But windfall profits tends to be overbooked in low-tax countries: for a $1 increase in consolidated windfall profits, we observe a $0.2 increase in tax havens, $0.8 in extractive affiliates, and no increase in the rest of the group.

JEL Codes: H25, H26, F63

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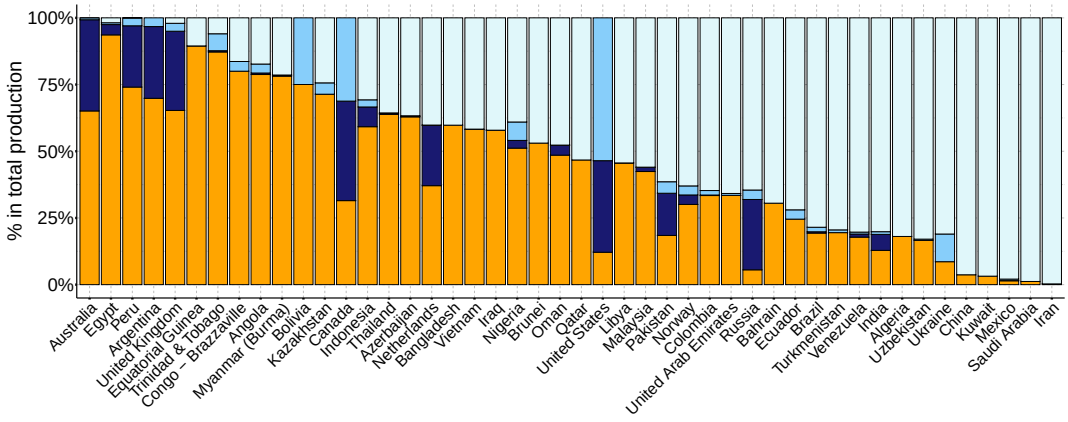
1 Introduction

The extraction of oil, gas, and minerals generates large economic rents whose division between host countries and foreign firms is a first-order determinant of GDP and fiscal revenue in much of the world: 15% of fiscal revenues in Mexico (IMF), 28% in Zambia, 45% in Nigeria and in the DRC (EITI). As Figure 1 illustrates, foreign multinational enterprises (MNEs) undertake the majority of extraction in most resource-rich countries, from Sub-Saharan Africa to South-east Asia, providing the required capital and technology. The fiscal conditions of rent sharing between these firms and host governments has been studied extensively by the literature, as royalty design, production sharing agreements, and corporate income taxation. But this approach has focused on the economic and fiscal windfalls of a single host country. In practice, extractive MNEs are global organizations whose affiliates span the entire commodity value chain across many territories: upstream extraction in resource-rich countries, downstream operations in the economies that refine or consume these commodities, and financial, insurance or distribution entities in low-tax jurisdictions. The effective distribution of windfalls depends not only on the extractive country, but on the firm's productive and tax structure across all territories. Where windfall profits ultimately end up across this global network has remained an open question, in part due to limitations on comprehensive view of how these firms allocate profits across all the countries in which they operates.

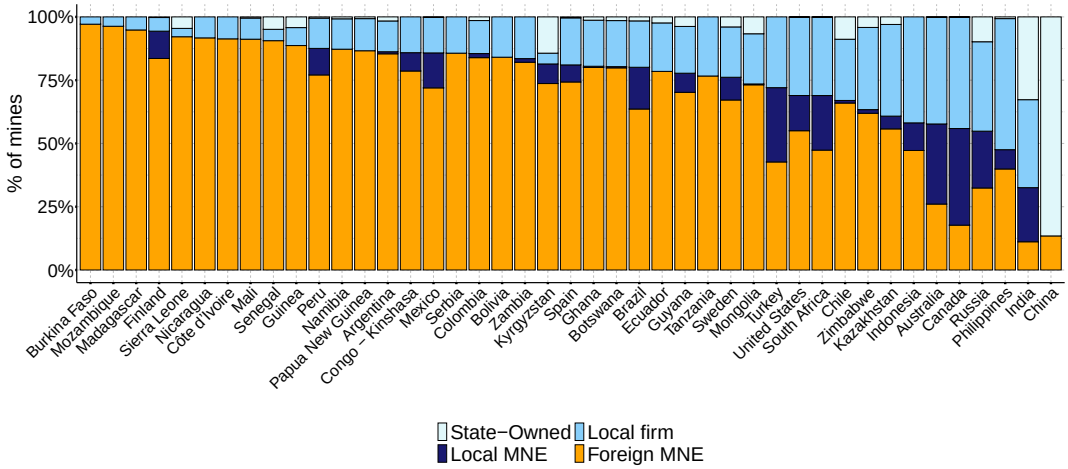
In this paper, we ask two questions. First, how are the profits of extractive MNEs allocated across countries: in extraction sites, consuming economies, and low-tax jurisdictions? Second, and more importantly, how does this allocation respond to commodity price shocks? The second question is the one that matters most for policy. During commodity booms, extractive profits can increase drastically. Whether these windfalls benefit primarily to resource-rich host countries, to the economies where commodities are processed and consumed, or to tax havens determines the extent to which different parts of the world benefit from the price shocks. It also determines whether windfall profit taxes, such as those adopted by the United Kingdom and the European Union in response to the energy price surge triggered by Russia's invasion of Ukraine in 2022, can effectively capture the rents they target.

Figure 1: Ownership of production by country

(a) Oil & gas



(b) Mining



Sources: Rystad Upstream (Figure 1a) & S&P Metals and Mining (Figure 1b).
Lecture: Between 2012 and 2022, 62% of oil and gas production was made by foreign MNEs in Thailand, and close to 100% of mines located in Burkina Faso were owned by foreign MNEs.
Sample of countries: Figure 1a: Countries producing more than 500M barrels per year. Figure 1b: Countries with at least 50 mines on their soil.

Notes: National oil companies are defined as companies held at more than 50% by the state, directly or indirectly. For simplicity reasons, we consider that all Chinese mining firms are state-owned.

To answer these questions, we leverage a unique empirical setting that allows us to trace large profitability shocks across firm's entire global affiliate network. We assemble a novel dataset that combines two sources of information not previously linked. The first is Country-by-Country Reports (CbCRs), introduced under the OECD/G20 BEPS framework, which record the worldwide profits, revenues, taxes, employees, and assets of large MNEs at the country-year level. We access these reports through confidential administrative files covering the universe of MNEs with

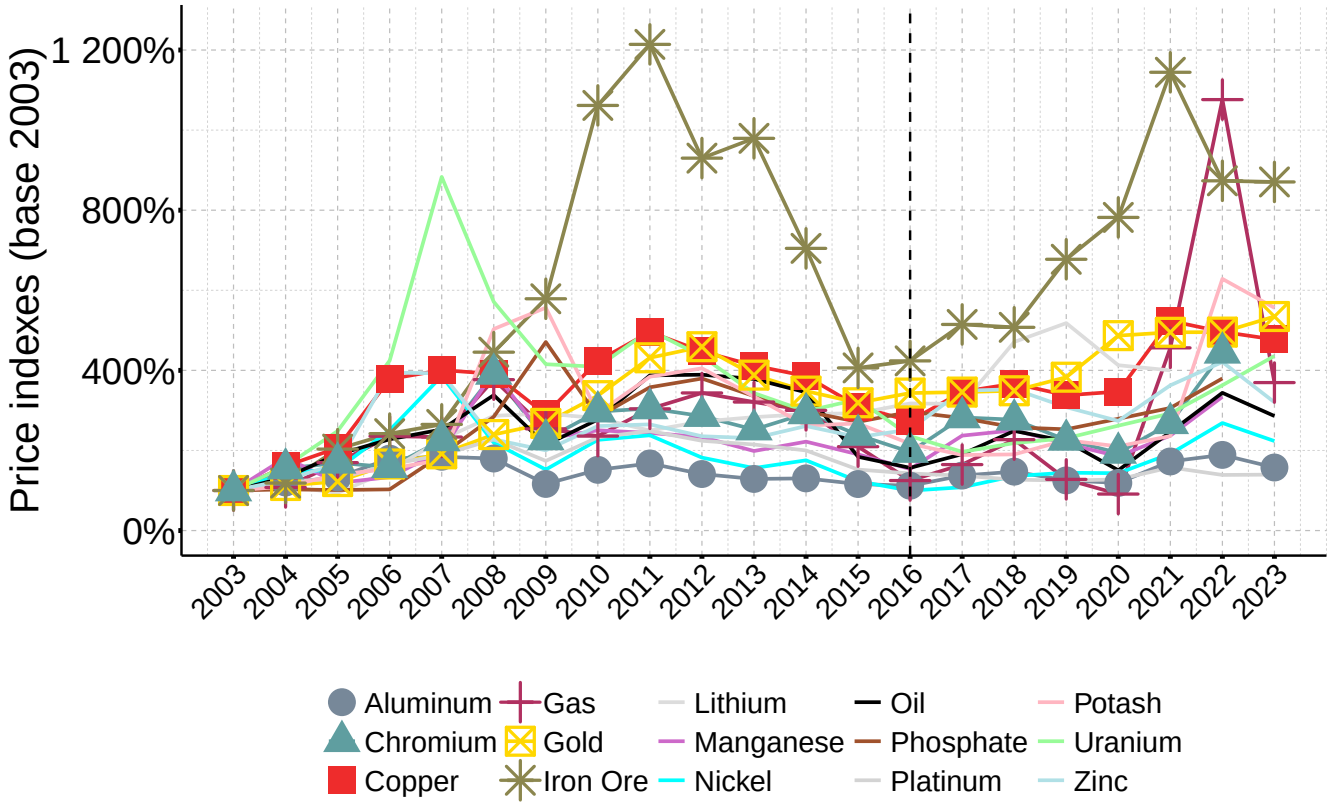
a French presence (including non-French MNEs), supplemented by publicly disclosed CbCRs. Unlike commercial databases such as Orbis, which suffer from severe coverage gaps in developing countries and tax havens (Torslov et al., 2023; Fuest et al., 2025), CbCRs provide universal coverage for all jurisdictions where a firm operates, including Switzerland, Singapore, and the British Virgin Islands.[1] Since our data is aggregated at the country × MNE level, we use the terms "affiliate" to denote the consolidated operations of a firm within a single country. The second source consists of micro-level proprietary databases on physical commodity production: Rystad Upstream and S&P Metals and Mining. Matching these production records to the CbCR data allows us to identify each MNE's commodity specialization and the precise location of its extraction activities, central to our empirical strategy. Our final sample comprises 71 MNEs active in 198 countries, representing approximately 30% of global mining production, 37% of MNE oil and gas output, and one-third of worldwide listed extractive profits over 2016–2023.

Using this newly assembled data, we first document novel stylized facts on the global extractive sector. We find that while declaring 77% of their profits where they conduct extraction, extractive MNEs book a substantial share of their global profits in jurisdictions where they conduct no extraction activity, half of which are booked in tax havens. Across jurisdictions, we document a U-shaped relationship between affiliate profitability and effective tax rates. Profit per employee is high in tax havens, low in high-tax non-resource countries, and high again in resource-rich countries with steep extractive fiscal regimes. The global distribution of extractive rents is shaped by two poles: the fiscal regimes of source countries, which capture a large share of upstream profits, and the tax optimization strategies of MNEs, which redirect a portion of those rents to low-tax jurisdictions. Finally, we show that the global profits of extractive MNEs strongly correlates with the price of the main commodity they extract: for a 1% change in the main commodity price, the consolidate profit of extractive firms change by 1.46%.

We examine how the allocation of profits within MNEs responds to these commodity price shocks. Our identification strategy exploits the fact that commodity prices are volatile and that their movements differ across products, as displayed in Figure 2. We implement a shift-share

[1]We clean CbCR data from double counting of intra-group dividends included in the reports by some of the firms in our sample (Chiocchetti et al., 2025; Blouin and Robinson, 2025). To our knowledge, this paper is among the first to utilize these global CbCR data (see Fuest et al. 2025) and the first to explicitly exploit its time variation.

Figure 2: Commodity Prices Fluctuations



Sources: United States Geological Survey, IMF, Rystad Upstream.
Notes: This graph shows the evolution of the prices of the commodities in which MNEs present in CbCR data specialize. Prices are normalized by their 2003 levels. The vertical dashed line marks the start of our CbCR panel in 2016.

(Bartik) design, constructing firm-specific profitability shocks by interacting global commodity price changes (the shifts) with each MNE's pre-determined commodity specialization (the shares). We interpret this design through the framework of Goldsmith-Pinkham et al. (2020), where identification relies on the exogeneity of the shares rather than the shocks. To causaly identify windfall profit shifting, we further compare, within each MNE, the differential change of tax havens profits, compared to the non-extractive profits in the rest of the group. The identifying assumption is that a firm's initial specialization is uncorrelated with trends in its profit allocation absent differential price movements.[2] Our framework accommodates this, requiring only that the choice to specialize in, say, copper rather than gold is orthogonal to unobserved trends in tax haven utilization. We validate this assumption by showing that our results are

[2]This is important in our setting because the extractive sector is oligopolistic: large producers may influence global prices through their supply decisions, making the shocks potentially endogenous.

robust to leave-one- commodity-out tests.

First, we show that extractive affiliates display strong co-movement with price changes, similar to the consolidated elasticity, by refining and other downstream affiliates do not. Second, A 10% increase in commodity prices generates a 5.5 percentage point larger increase in profits booked in tax havens compared to non-extractive, non-haven affiliates within the same MNE. Using a complementary instrumental variable approach, we estimate that for every additional dollar of consolidated windfall profit, approximately 20 cents are booked in tax haven affiliates and 80 cents in extractive affiliates, with no statistically significant increase in the rest of the group—including affiliates in consuming economies. The marginal allocation to havens—\$0.20 per dollar—substantially exceeds the average allocation of \$0.12, indicating that the reallocation of profits to low-tax jurisdictions intensifies during booms. Third, and most importantly, we show that profit shifting is non-homothetic. When consolidated group profits increase by 10%, the share of global positive profits booked in tax-havens rises by approximately 1 percentage point. MNEs do not divert a fixed fraction of their rents to low-tax jurisdictions—they divert a larger fraction when rents are large. This finding contradicts canonical models of profit shifting with convex concealment costs (Hines Jr and Rice, 1994; Grubert and Slemrod, 1998), which predict that the shifted share should be constant or declining in the pre-tax base. It implies that the marginal resource rent captured by host countries is smaller than the average rent—so that the countries that stand to gain the most from a commodity boom are also the ones that lose the most to profit shifting.

Finally, we document that this reallocation is asymmetric. Tax haven affiliates the upside of commodity booms—their reported profits respond elastically to price increases—but they do not absorb corresponding losses during downturns. Neither the probability of reporting a loss nor the magnitude of losses in havens responds to negative price shocks. Haven affiliates thus enjoy upside exposure without bearing downside risk, consistent with the strategic allocation of risk to low-tax jurisdictions (Becker et al., 2020a).

Related Literature and Contributions. First, we contribute to a large literature on extractive windfalls and commodity booms. Since Sachs and Warner (2001), the puzzling disconnection

between resource endowment and local growth has been explored, showing that countries are adversely exposed to commodity price volatility (Van der Ploeg and Poelhekke, 2009) and that windfall management is challenging (Venables, 2016; Van der Ploeg and Venables, 2012; Arezki and Brückner, 2012; Beck and Poelhekke, 2023). Our paper demonstrates that a crucial stake in the management of windfalls also goes through the capacity of states to tax them and the distribution of taxing rights. We show that tax administration should be particularly concerned with the probability of profit shifting in times of commodity price booms. A strand of this literature shows that extractive booms are linked to illicit financial flows (Andersen et al., 2017; Hsieh and Moretti, 2006; Marcolongo and Zambiasi, 2022; Johannesen and Larsen, 2016; Bertinelli et al., 2022). In particular, Andersen et al. (2017) show that extractive commodity price booms lead to an increase in bank deposits held by source countries in tax havens, which they interpret as resource rent appropriated by ruling elites. These transfers are motivated by opacity, while we focus on the use of tax havens by firms to reduce their tax burden. Though the motivation of both flows is very different, both phenomena contribute to shifting windfalls from extractive countries to tax havens and to reducing states windfalls. We show that if countries rely on multinational firms for commodity extraction, they are exposed to profit shifting risks. The cost of profit shifting should be compared to the cost of other capital flight potentially taking place with alternative extraction systems.

Second, it directly contributes to the literature on profit shifting, which converges towards large estimates of the share of foreign multinational profits shifted in tax havens (around 36% of foreign profits according to Tørsløv et al., 2023 and Guvenen et al., 2022). Against this backdrop, a new reflection has emerged on how to tax residual profits, or profits that exceed a normal rate of return (Beer et al., 2023). Some works have shown that developing countries were particularly harmed by these practices because of a lack of resources to enforce their tax system and low institutional quality (Johannesen et al., 2020; Laudage Teles et al., 2024; Bachas and Soto, 2021). However, up to now, only Dharmapala and Riedel (2013) and Becker et al. (2020b) have studied the role of tax havens in the allocation of profit within a multinational group after profitability booms in a dynamic setting. In our case, focusing on a single sector with a profitability that is

strongly linked to commodity prices allows us to use a more relevant income shock and to design a credible strategy based on group specialization. Our access to World Country-by-Country reports also significantly enhances the strength of our results because of the exhaustibility of the information we have on the activity of MNEs in every country, including tax havens not covered by Orbis.

Third, we contribute to the literature on the transmission of shocks within multinational firms. Cravino and Levchenko (2017) shows that firms contribute to the transmission of shocks across countries through parent-subsidiaries co-movements in productivity. Other papers (Budd et al., 2005; Boehm et al., 2019) show that parents and subsidiaries profitability are strongly correlated. We contribute to this literature by emphasizing the role of tax optimization practices in the allocation of revenues within multinational firms.

The rest of this paper is organized as follows. Section 2 describes the data source used, and new stylized facts on the links between commodity prices, fiscal windfalls, and extractive groups profits. Section 3 details our empirical strategy to identify the distribution of extractive windfalls. Section 4 shows the results. Section 5 concludes.

2 Data & Descriptive Evidence

2.1 Data

2.1.1 Country-by-Country Reports.

Our primary data source is Country-by-Country Reporting (CbCR). Introduced under Action 13 of the OECD/G20 BEPS Project, CbCR aims to provide tax administrations with the transparency required to assess transfer pricing and profit shifting risks. Reporting is mandatory for multinational enterprises (MNEs) with consolidated worldwide revenues exceeding €750 million. These reports are submitted to the ultimate parent entity's tax authority and exchanged confidentially with other jurisdictions; they are not currently subject to mandatory public disclosure.

The data are defined at the MNE $\times$ country $\times$ year level. Key variables include revenues

(split between related and unrelated parties), profit before tax, income tax paid and accrued, stated capital, accumulated earnings, number of employees, and tangible assets.[3] MNEs also report qualitative information on their business activities in each jurisdiction and provide a complete list of subsidiaries.

We construct our dataset by combining three sources of CbCR data: (i) The universe of French MNEs (2016-2022), accessed via confidential administrative files; (ii) Foreign MNEs with at least one subsidiary in France (2016-2019), also accessed confidentially; and (iii) Publicly available CbCRs voluntarily disclosed by 24 extractive MNEs (2016-2023).[4] The resulting dataset forms an unbalanced panel spanning 2016 to 2023.

To define our sample of extractive firms, we first match the CbCR dataset to external oil and mining production data to identify relevant MNEs. We then explicitly exclude banks, investment funds, and conglomerates that may have passive interests in extractive projects but are not primary operators. Second, we exclude state-owned enterprises (SOEs) that predominantly produce within their headquarters country, as their profit-shifting incentives differ from those of private multinationals.

We correct for the double counting of intra-group dividends, which is a source of upward bias in reported profits for some firms in CbCR. Following the procedure detailed in Appendix Section D, we benchmark our aggregated data against MNEs' consolidated accounts to identify excess profits. We then eliminate these discrepancies by reducing the reported profits of subsidiaries with holding activities, allocating the correction in proportion to their reported income.[5] Appendix Table C1 reports the magnitude of these corrections by year.

Our final sample comprises 71 MNEs active in 198 countries. Summary statistics are provided in Appendix Table B1.

Table 1 assesses the representativeness of our sample. We benchmark our data against global aggregates of oil and mining production and the consolidated profits of the extractive sector. Over the 2016-2023 period, our sample captures 30% of global mining production,[6] 37% of MNE

[3] Tangible assets exclude cash and cash equivalents.
[4] Public CbCRs were collected by Aliprandi and Borders (2023) and are available via the EU Tax Observatory.
[5] See Chiocchetti et al. (2025) for a discussion on how intra-group dividends bias CbCR data.
[6] Excluding coal production.

Table 1: Coverage of Global Extractive Activity

	Oil Production			Mining Production			Global Profits		
	Sample ($bn)	World ($bn)	Share (%)	Sample ($bn)	World ($bn)	Share (%)	Sample ($bn)	World ($bn)	Share (%)
2016	261.3	586.9	44.5	74.0	329.6	22.5	35.7	68.9	51.8
2017	364.5	717.6	50.8	109.3	375.4	29.1	134.7	343.0	39.3
2018	429.8	911.1	47.2	118.1	396.6	29.8	195.0	482.3	40.4
2019	338.8	845.3	40.1	138.3	364.2	38.0	97.3	281.5	34.6
2020	151.8	542.2	28.0	110.2	392.8	28.1	-39.0	-154.8	25.2
2021	266.6	952.2	28.0	177.0	520.7	34.0	212.3	733.7	28.9
2022	401.5	1,379.0	29.1	148.3	473.5	31.3	322.1	1,067.1	30.2
2023	275.2	1,059.3	26.0	128.6	432.7	29.7	188.8	752.4	25.1
2016-2023	**311.2**	**874.2**	**36.7**	**125.5**	**410.7**	**30.3**	**143.4**	**446.8**	**34.4**

Notes: This table shows the share of MNEs present in our final sample in worldwide oil production (columns 2-4), mining production (columns 5-7) and global profits of extractive firms (columns 8-10). Our benchmark only includes production and profits made by non-state-owned multinational corporations. The last line shows the average over the period.

oil and gas production, and approximately one-third of the global profits of listed extractive firms.[7] Coverage is higher in the early part of the panel (2016–2019), where we capture over 40% of mining production and 41% of global profits. As detailed in Appendix Table B2, the geographic distribution of activity in our sample is heavily concentrated in resource-rich jurisdiction.

2.1.2 Extractive Production Data

To measure multinational extractive activity at the country level, we rely on two comprehensive proprietary databases.[8] First, the Rystad Upstream database covers global oil and gas production from the late 20th century to 2023. For each asset, it reports production volumes, revenues, and cash costs at the year-product level. Second, we use S&P Global Market Intelligence (formerly SNL Metals & Mining) for the mining sector. This database details ownership structures, commodities extracted, and asset locations for mining companies globally, along with production volumes for a large subset of mines.

We use these production data for two purposes. First, matching CbCR data with production of each commodity allows us to precisely define the commodity specialization of each MNE. Second, these data allow us to identify the specific jurisdictions where each MNE conducts ex-

[7] Defined as publicly listed firms (excluding SOEs) with NAICS codes 211 or 212.
[8] Both sources are widely used in the literature (Berman et al., 2017; Coulomb et al., 2021).

tractive operations. This distinction is central to our identification strategy: because the profitability of extraction subsidiaries is highly sensitive to commodity prices, we must distinguish them from downstream or service affiliates to construct an appropriate control group for our tax haven affiliates.

Figure B2 in Appendix maps the location of the mines and oil fields owned by the reported MNEs. While our analysis operates at the country-year level, the map highlights the extensive spatial coverage of the underlying assets. As shown in Appendix Table B2, our sample covers nearly all major extractive jurisdictions, with the notable exception of China, where our coverage of oil fields is limited and mining assets are virtually absent.

2.1.3 Other datasets

Commodity Prices. We compile annual global reference prices for the 2016-2023 period. We rely on time series from the IMF Primary Commodity Prices, the World Bank Pink Sheet, USGS Historical Statistics, and Rystad Upstream for oil and gas. Our price data cover 20 major commodities, including oil, gas, and key minerals such as copper, gold, and iron ore.[9] To ensure consistency across data sources, we standardize all prices to US dollars per metric ton. Figure 2 plots the price evolution for the commodities included in our CbCR sample.

Country-level data. We use a common list of tax havens in the international public finance literature, provided by Tørsløv et al. (2023).[10] This list identify countries and jurisdictions with preferential tax treatment and financial secrecy. As a robustness check, we use an alternative list of countries with effective tax rates below 10%.

Consolidated data. We use consolidated financial data from Compustat (both Global and North America) to clean CbCR data from double-counting (as detailed in Appendix D). It also

[9] The full set of priced commodities includes: oil, gas, aluminum, chromium, cobalt, copper, gold, iron, manganese, molybdenum, nickel, niobium, palladium, silver, tin, titanium, tungsten, uranium, vanadium, and zinc.

[10] Five OECD countries (Belgium, Ireland, Luxembourg, Netherlands, and Switzerland) and 36 non-OECD countries (Andorra, Anguilla, Antigua and Barbuda, Aruba, The Bahamas, Bahrain, Barbados, Belize, Bermuda, the British Virgin Islands, the Cayman Islands, Curaçao, Cyprus, Gibraltar, Grenada, Guernsey, Hong Kong, the Isle of Man, Jersey, Lebanon, Liechtenstein, Macau, Malta, Marshall Islands, Mauritius, Monaco, Panama, Puerto Rico, Samoa, Seychelles, Singapore, St. Kitts and Nevis, St. Lucia, St. Marteen, St. Vincent & Grenadines, Turks and Caicos, Vanuatu).

enables us to validate the sensitivity of consolidated profits to commodity prices using a much broader sample of firms, ensuring that the results obtained from our restricted CbCR sample are representative of the wider extractive sector.

2.2 Descriptive Evidence

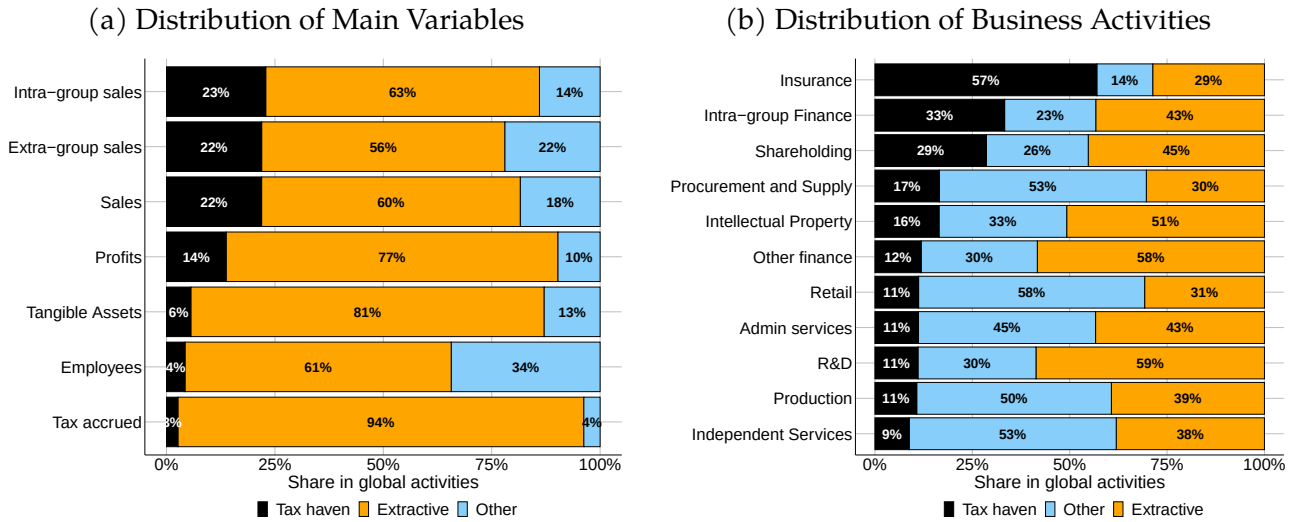
Geography of Extractive MNEs. We leverage the granularity of the CbCR data to characterize the global distribution of extractive MNE activity. Figure 3a reports the distribution of key variables across three mutually exclusive groups of countries: (i) extractive affiliates, (ii) tax havens, and (iii) other countries.

We define extractive affiliates at the MNE-level, as any country in which the MNE carries out an extractive activity. Tax havens are defined following the list in Tørsløv et al. (2023). To generate a conservative estimate of tax haven activity, we classify as extractive jurisdictions MNE×countries that are both tax havens and hosts to extractive projects.

Two key patterns emerge. First, the global activity of these firms is heavily concentrated in the upstream sector. Extractive jurisdictions account for over 60% of total employees, unrelated-party revenues, profits, and tangible assets. Because CbCR data are aggregated at the country level, we cannot separate extractive operations from other business lines within the same jurisdiction; these estimates should therefore be interpreted as upper bounds for the strictly upstream share of activity. Second, we document a misalignment between the location of profits and real economic activity. While tax havens capture 14% of global profits, they host a negligible share of factors of production (4% of employees and 6% of tangible assets).

Using the information provided in CbCRs on the specialization of each subsidiary of the MNEs in our sample, we look at where each type of activity is carried out. Figure 3b shows the share of subsidiaries in each business activity that are located in tax havens, extractive affiliates, and other MNE × countries observations. The majority of subsidiaries specialized in insurance, and a third of subsidiaries specialized in intra-group financing are located in a tax haven. Since the category "Production" includes both upstream (extraction) and midstream (refining) activities, it is balanced between extractive affiliates and other observations.

Figure 3: Geography of extractive MNEs



Lecture: 61 % of employees of extractive multinationals are employed in a country where the group conducts an extractive activity (Figure 3a). 57% of subsidiaries specialized in insurance are located in a tax haven (Figure 3b).

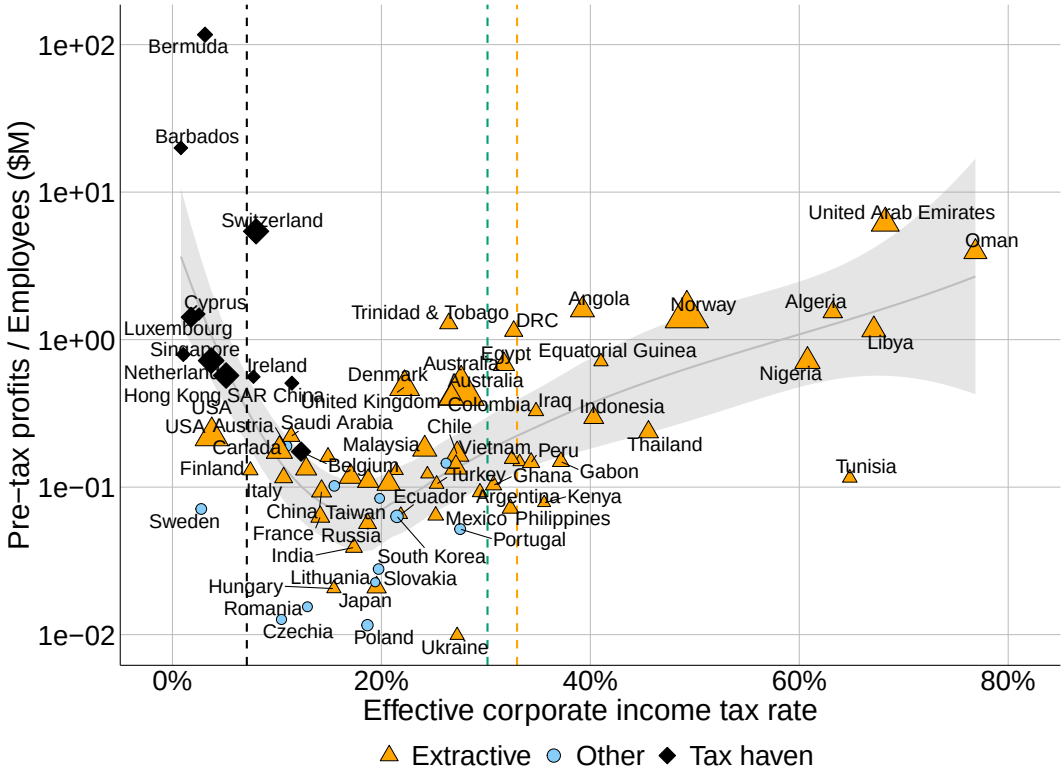
Notes: This figure shows the distribution of our main variables and business activities along our three groups of MNE×country pairs: tax havens, extractive and non-extractive non-TH. When an affiliate is both located in a tax haven and extractive, we place it in the extractive category. The share in profits only includes positive profits.

ETR and Profitability. Figure 4 explores the relationship between profitability (measured as the profit-to-employee ratio) and Effective Tax Rates across jurisdictions. It shows a U-shaped relationship: at the lower end of the tax distribution, we observe high profitability, consistent with profit shifting into low-tax jurisdictions. Conversely, profitability also rises with the tax rate at the upper end of the distribution. This positive correlation in high-tax jurisdictions—where extractive affiliates are predominantly located—is consistent with governments designing fiscal regimes to capture resource rents from highly profitable projects, and shows that large amounts of profits are booked in extractive countries.

Figure B4 documents the effective tax rates specifically for extractive affiliates by country. We observe substantial heterogeneity even among resource-rich jurisdictions. ETRs range from less than 5% in the United States to over 75% in Oman. The low effective rate in the US is notable given its statutory rate, reflecting generous sector-specific tax incentives.[11]

[11]Specifically, US extractive firms benefit from the immediate deduction of Intangible Drilling Costs (IDCs), which allows for the expensing of a significant portion of capital expenditures.

Figure 4: Profitability and Effective Tax Rates by country



Notes: The Y axis is the log-scaled pretax profit-to-number of employees ratio, in millions $US. The size of the points is a function of the amount of total profits in the country. The black vertical dashed line indicates the average effective tax rate of tax haven countries, the orange vertical line indicates the average effective tax rate in extractive countries, and the green vertical line indicates the global effective tax rate. Effective tax rates are computed as the ratio between positive tax paid and positive profits booked across the whole period (2016-2023). Countries are broken down by extractive and non-extractive countries. A country is defined as extractive when at least one MNE has an extractive activity in the country. We only included observations with positive profits and tax accrued, as well as countries in which at least five companies are operating.

3 Empirical Strategy

3.1 Commodity Specialization and Global Profitability Shocks

Commodity Specialization. To characterize the exposure of each MNE to specific commodity market prices, we define an MNE's primary commodity as the single commodity generating the largest cumulative revenue for the group during the 2010-2015 period.

We determine this specialization using a six-year window prior to our estimation sample (2016-2023) for two reasons. First, aggregating over a longe horizon smooths out temporary idiosyncratic supply shocks. Second, fixing specialization *ex ante* mitigates endogeneity concerns, ensuring that our measure is not driven by the firm's endogenous decision to expand production

Table 2: Commodities Specialization

Commodity	Nb MNEs	Nb Obs	Profits ($bn)
Oil	24	656.1	741.3
Gas	11	122.5	48.4
Uranium, Nickel & Zinc	8	60.1	6.5
Iron	6	126.6	140.5
Manganese, Phosphate & Potash	6	91.8	30.8
Copper	6	58.6	28.7
Gold & Platinum	5	67.8	41.2
Aluminum, Chromium & Lithium	5	91.0	9.9
All	**71**	**1,274.5**	**1,047.3**

Notes: This table shows the primary commodity extracted by the MNEs in our sample. Primary commodities are defined as the commodity that make up the largest share in total production value between 2010 and 2015. The third column gives the number of observations in each categories, while the last column give the total value of profits over the period in billion $.

in commodities that experience high price growth during the treatment period. We rank commodities by value (revenue) rather than volume to ensure comparability across heterogeneous resources (for instance gold and iron ore).

As detailed in Table 2, our sample exhibits significant heterogeneity: 35 MNEs specialize in hydrocarbons (oil, gas) while 36 specialize in mining.

In Appendix Table B8, we demonstrate the robustness of our results to an alternative, continuous measure of exposure: a shift-share index that weights price changes by the share of each commodity in the MNE's pre-period production portfolio.

Price Shocks and Consolidated Outcomes. Before analyzing subgroup outcomes, we validate the relevance of our instrument by documenting the pass-through of global commodity prices to consolidated group-level results. We estimate the following specification:

$$\log(Y_{gt}) = \alpha + \beta \log(P_{p(g)t}) + \Gamma X_{gt} + \mu_g + \lambda_t + \varepsilon_{gt} \tag{1}$$

where Y_{gt} represents the worldwide consolidated profits, revenues, or corporate income tax accrued of MNE g in year t. $P_{p(g)t}$ denotes the global price of the MNE's primary commodity $p(g)$. We include MNE fixed effects (μ_g) to capture time-invariant heterogeneity and year fixed effects (λ_t) to absorb common global shocks. The vector $\mathbf{X}_{gt}$ controls for time-varying scale

effects, including the log of total assets and the log of the number of employees.

The coefficient of interest, β, estimates the elasticity of consolidated outcomes with respect to the primary commodity price. In a perfectly competitive market, global prices would be exogenous to individual firm decisions. However, Table 3 illustrates the oligopolistic structure of the sector: while the majority of firms are small producers, a subset of firms concentrate a global market share exceeding 10%. Given this concentration, we cannot rule out the possibility that supply shocks from these large producers influence global price movements (reverse causality). We therefore interpret β as a descriptive measure of the sensitivity of the group's financial position to price fluctuations, rather than a strictly causal estimate derived from exogenous price windfalls. It is also important to emphasize that this coefficient represents a total elasticity: it incorporates not only the direct price shock but also the firm's change of production volumes.

Table 3: Distribution of Firms by Global Production Share

Global Market Share	**Number of Firms**	**Average Share of World Production**
Less than 5%	54	1.0%
5% - 10%	4	7.7%
More than 10%	5	15.3%

Note: This table classifies firms in the sample based on their share of total worldwide production for their primary commodity. Comprehensive production data was not available for part of our sample, which explains the lower overall number of MNEs in this table. Worldwide production is taken from USGS data.

Table 4 presents the results. We find that consolidated profits, sales, and tax payments are strongly sensitive to commodity price fluctuations. Focusing on the specifications with controls, we estimate that a 1% increase in commodity prices is associated with a 1.32% increase in consolidated profits, a 1.56% increase in taxes paid, and a 0.46% increase in consolidated sales.

The lower elasticity of sales relative to profits is consistent with the high operating leverage of the extractive sector. Because production costs such as capital depreciation and extraction expenses are largely fixed in the short run, a moderate increase in marginal revenue translates into a more than proportional surge in profits.

We also observe that the elasticity of tax payments (1.56) exceeds the elasticity of consolidated profits (1.32). This higher elasticity likely reflects the fact that commodity booms accelerate the exhaustion of tax loss carry-forwards accumulated during exploration phases. As these losses carry forward are depleted, firms transition from a zero effective tax rate to the full statu-

tory rate, causing tax payments to surge disproportionately relative to pre-tax profits. It might also reflect some specific tax schemes such as excess profit taxes.

Overall, commodity price variations explain a substantial share of the variance in MNE profitability (7.7% for profits and 15% for taxes), confirming the relevance of our instrument.

Table B3 confirms that these patterns hold in the broader universe of extractive firms present in Compustat, using the same methodology to define commodity specialization.

Table 4: Effects of Commodity Price Changes on Worldwide Activity

	Profits (log)		Taxes (log)		Sales (log)	
	(1)	(2)	(3)	(4)	(5)	(6)
$P_{g(p)t}$ (log)	1.46***	1.32**	1.60***	1.56***	0.476***	0.457***
	(0.512)	(0.536)	(0.281)	(0.286)	(0.112)	(0.096)
Employees (log)		-0.008		-0.042		0.065
		(0.114)		(0.082)		(0.066)
Tang Assets (log)		0.086		0.078		0.055
		(0.099)		(0.104)		(0.101)
Observations	196	171	213	190	218	216
R^2	0.89302	0.89674	0.93333	0.93938	0.97399	0.97413
Within R^2	0.06503	0.07688	0.12521	0.15279	0.04365	0.07935
MNE fixed effects	✓	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓	✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on worldwide profits, taxes paid, and total revenues. The outcome variables are log-transformed. Standard errors are clustered at the MNE level.

3.2 Empirical Strategy

To isolate variation in group-wide profitability, we exploit differential MNE-level exposure to commodity price cycles. Our identification strategy employs a shift-share (Bartik) design (Goldsmith-Pinkham et al., 2020), interacting time-varying global commodity prices (the shocks) with predetermined firm-level production weights (the shares).

We adopt the framework of Goldsmith-Pinkham et al. (2020), where identification relies on the exogeneity of the shares rather than the shocks. This distinction is critical in our setting. As documented in Table 3, the extractive sector is characterized by large firms with potential market power. Consequently, aggregate commodity prices may be endogenous to the strategic supply decisions of the firms in our sample (reverse causality).

By relying on the exogeneity of shares, our strategy remains valid even if price shocks are endogenous, provided that a firm's initial specialization pattern is orthogonal to unobserved trends in tax haven utilization. In other words, the identifying assumption is that firms specializing in different commodities (copper vs. gold for instance) would have followed parallel trends in profit shifting in the absence of differential price shocks.

As established in Section 3.1, this Bartik instrument is strongly predictive of consolidated group profits.

We implement this strategy in two complementary steps. First, we estimate a reduced-form specification to document the differential elasticity of affiliate profits to group-level shocks across jurisdictions (tax havens and high-tax countries) with respect to commodity prices. Second, we employ an Instrumental Variable (IV) approach to estimate the effect of total group profitability on the share of global profits booked in tax havens, allowing us to test for non-linearities in profit shifting.

3.2.1 Allocation of Windfalls

First, we employ a triple-difference strategy to test whether price shocks drive a differential increase in profits booked in tax havens compared to other affiliates within the same group. We estimate the following affiliate-level specification:

$$\begin{aligned}\log(Y_{git}) = \alpha + \beta_M \log(P_{p(g)t}) + \beta_H \left(\log(P_{p(g)t}) \times \text{Haven}_i\right) + \beta_E \left(\log(P_{p(g)t}) \times \text{Extract}_{gi}\right) \\ + X'_{git}\theta + \mu_{gi} + \delta_t + \varepsilon_{git}\end{aligned} \tag{2}$$

The outcome Y_{git} is the financial variable of interest for MNE g in country i at time t. The variable $P_{p(g)t}$ denotes the price of the primary commodity for MNE g. Haven_i is a dummy equal to one if country i is a tax haven. The term β_M captures the baseline pass-through of commodity price shocks to the average affiliate in the group. Crucially, we distinguish between two types of treated affiliates by including the interaction with Extract_{gi} (which equals one if the MNE has physical extraction activity in country i). Extractive affiliates face first-order effects

of price changes and are thus much more sensitive to the shock. By explicitly controlling for this interaction (β_E), we ensure that our control group consists of non-extractive, non-haven affiliates (for instance service centers in high-tax countries) that only receive indirect spillovers.

The coefficient of interest, β_H, measures the excess sensitivity of tax haven affiliates to the group-level shock compared to this control group. If $\beta_H > 0$, it implies that profits in tax havens rise disproportionately during a boom, consistent with profit shifting.

We include MNE $\times$ Country fixed effects (μ_{gi}) to control for time-invariant characteristics and unobserved heterogeneity. Year fixed effects (δ_t) are included to absorb global macroeconomic shocks and common trends in commodity markets. We alternatively include MNE $\times$ Year fixed effects in our preferred specification to absorb all time-varying group-level shocks (including $\beta_M \ln P_{p(g)t}$), isolating purely the within-group, cross-affiliate variation in profit allocation. To control for scale effects, we control for total assets and employees, to which we apply the Inverse Hyperbolic Sine (IHS) transformation to account for potential zero values. Standard errors are clustered at the MNE level to account for correlation in shocks across affiliates within the same group.

This setup identifies β_H through a triple-difference mechanism. We exploit variation along three dimensions: (1) the time-series variation in global commodity prices, (2) the cross-sectional heterogeneity in firm-level exposure to these shocks, and (3) the within-firm difference between tax haven and non-haven affiliates.

Note that because the logarithmic transformation is undefined for non-positive values, these estimates capture responses conditional on positive profitability. We separately investigate responses in cases of losses in Section 4.2.1.

3.2.2 Instrumental Variable Estimation

To identify the causal effect of profitability shocks on the global allocation of profits, we employ a two-stage least squares strategy. We use this framework to estimate two complementary parameters: (i) the marginal propensity to allocate profits to specific jurisdictions (using profit in levels), and (ii) the semi-elasticity of tax havens share in positive profits.

First Stage. In both specifications, the endogenous variable is the consolidated profitability of the multinational group. We instrument group profits with the group-specific commodity price index. The first-stage equation isolates the variation in group profits driven purely by exogenous terms-of-trade shocks:

$$\Pi_{gt} = \gamma log(P_{p(g)t}) + \mu_g + \tau_t + \epsilon_{gt} \tag{3}$$

where Π_{gt} represents consolidated group profits (expressed either in levels or logs depending on the second-stage specification) and P_{gt} is the commodity price instrument.

Allocation of the Marginal Dollar. To quantify how the marginal dollar of windfall profit is distributed, we regress the level of profits booked by MNE g in country i (y_{git}) on the instrumented level of consolidated group profits ($\widehat{\Pi}_{gt}$):

$$y_{git} = \beta_i \cdot \widehat{\Pi}_{gt} + \mu_g + \tau_t + \nu_{git} \tag{4}$$

In this equation, β_i captures the marginal propensity to allocate profits to jurisdiction type i. Compared to the triple difference, this specification provides a direct accounting of the windfall allocation.

Sensitivity of the shares. Second, we test whether the intensity of profit shifting varies with the magnitude of the shock. We estimate the semi-elasticity of the tax haven share with respect to the log of MNE profits:

$$\frac{\text{Haven Profits}_{gt}}{\text{Positive Profits}_{gt}} = \lambda \cdot \widehat{\log(\Pi_{gt})} + \mu_g + \tau_t + \epsilon_{gt} \tag{5}$$

The dependent variable is the share of global positive profits booked in tax havens. The coefficient λ tests for non-homotheticity. A positive $\lambda > 0$ indicates that profit shifting is non-linear: as the tax base expands, MNEs optimize more aggressively, diverting a larger slice of the pie to low-tax jurisdictions.

3.3 Validity Assumptions

To interpret these estimates causally, our shift-share design relies on the exogeneity of the shares (initial specialization) and the relevance of the shifts (price shocks), following Goldsmith-Pinkham et al. (2020).

The key identification assumption is that an MNE's pre-determined commodity specialization is uncorrelated with unobserved trends in its profit shifting strategy. For example, firms specialized in copper should not be on a systematically different trend of tax haven usage compared to firms specialized in oil. This assumption is plausible for two reasons. First, our specialization measure is fixed *ex ante* (2010–2015), preventing endogenous switching during the sample period. Second, as we document in Appendix Figure B1, there is no systematic correlation between commodity specialization and the average reliance on tax havens.

We assume that global commodity prices affect the profitability of tax haven affiliates only through the channel of the group's extractive activity. Since the tax havens in our sample are generally resource-poor, they experience no direct real effect from commodity price booms. Any surge in profits recorded in these jurisdictions during a price boom is therefore attributable to profit shifting rather than local value creation.

Finally, we assume that the immediate response to price shocks captures the relevant variation. In Appendix Section 4.3, we relax this by including lagged price shocks to account for potential dynamic adjustments or spillovers, following Jaeger et al. (2018).

4 Results

4.1 Baseline Results

4.1.1 Allocation of Windfalls

Table 5 presents the baseline estimates for the differential allocation of windfall profits.

Column (1) reports the average pass-through of commodity price shocks to subsidiary profits, without distinguishing between affiliate types. The elasticity is positive (0.65) and statisti-

cally significant. Notably, this subsidiary-level elasticity is lower than the consolidated group-level elasticity estimated in Section 3.1. This discrepancy likely reflects composition effects: larger affiliates (which weigh more in the consolidated total) tend to react more strongly to price shocks than the average subsidiary. Additionally, the log-specification restricts this sample to profitable affiliates, excluding loss-making entities that may be included in the consolidated accounts.

In Column (2), we introduce the triple-difference interaction terms. Two key patterns emerge. First, the coefficient on extractive activity is large and highly significant, confirming that, unsurprisingly, the direct effect of price shocks is concentrated in the affiliates that physically extract the commodity. Second, and most importantly, we find a positive and statistically significant coefficient on the interaction term for tax havens (β_H). The estimate indicates that for a 1% increase in global commodity prices, profits booked in tax haven affiliates increase by 0.53% more than in the control group (non-extractive, non-haven affiliates). This differential elasticity is substantial, approximately ten times larger than comparable estimates of profit shifting in the literature (Dharmapala and Riedel, 2013), suggesting that MNEs reallocate windfalls to low-tax jurisdictions.

In contrast, the baseline coefficient for non-extractive, non-haven affiliates (the constant term in this interaction) is small (0.19) and statistically insignificant. This implies that the group-wide spillovers of the price shock are almost entirely captured by two specific types of affiliates: those that produce the oil/minerals, and those located in tax havens.

In Column (3), we verify that our result is not driven by extractive havens (such as the Netherlands) by controlling for the interaction of *Tax Haven* $\times$ *Extractive*. The coefficient is insignificant, confirming that our main effect is driven by distinct tax haven affiliates, not production entities. Finally, Columns (4) and (5) include MNE $\times$ Year fixed effects. This specification absorbs all common group-level shocks (including the main price effect). The tax haven coefficient remains robust and even increases slightly in precision, providing strong evidence that the result is driven by the within-group reallocation of profits rather than unobserved heterogeneity.

Table 5: Triple Difference Results

	Profits (log)				
	(1)	(2)	(3)	(4)	(5)
$P_{g(p)t}$ (log)	0.654***	0.187	0.179		
	(0.226)	(0.243)	(0.243)		
$Extract_{gi} \times P_{g(p)t}$ (log)		1.40***	1.42***	1.44***	1.46***
		(0.269)	(0.280)	(0.262)	(0.274)
$Haven \times P_{g(p)t}$ (log)		0.552**	0.581**	0.671***	0.706***
		(0.223)	(0.231)	(0.209)	(0.218)
$Haven \times Extract_{gi} \times P_{g(p)t}$ (log)			-0.643		-0.715
			(0.523)		(0.552)
Employees (IHS)	0.241***	0.238***	0.238***	0.248***	0.248***
	(0.068)	(0.069)	(0.069)	(0.062)	(0.062)
Tang Assets (IHS)	0.072**	0.076**	0.076**	0.050***	0.050***
	(0.032)	(0.032)	(0.032)	(0.017)	(0.017)
Observations	5,237	5,237	5,237	5,237	5,237
R^2	0.92733	0.92856	0.92857	0.94034	0.94035
MNE-Country fixed effects	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓		
MNE-Year fixed effects				✓	✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on pretax profits in different types of affiliates. The outcome variable is the log of profits at the subgroup (MNE x country level). Standard errors are clustered at the MNE level.

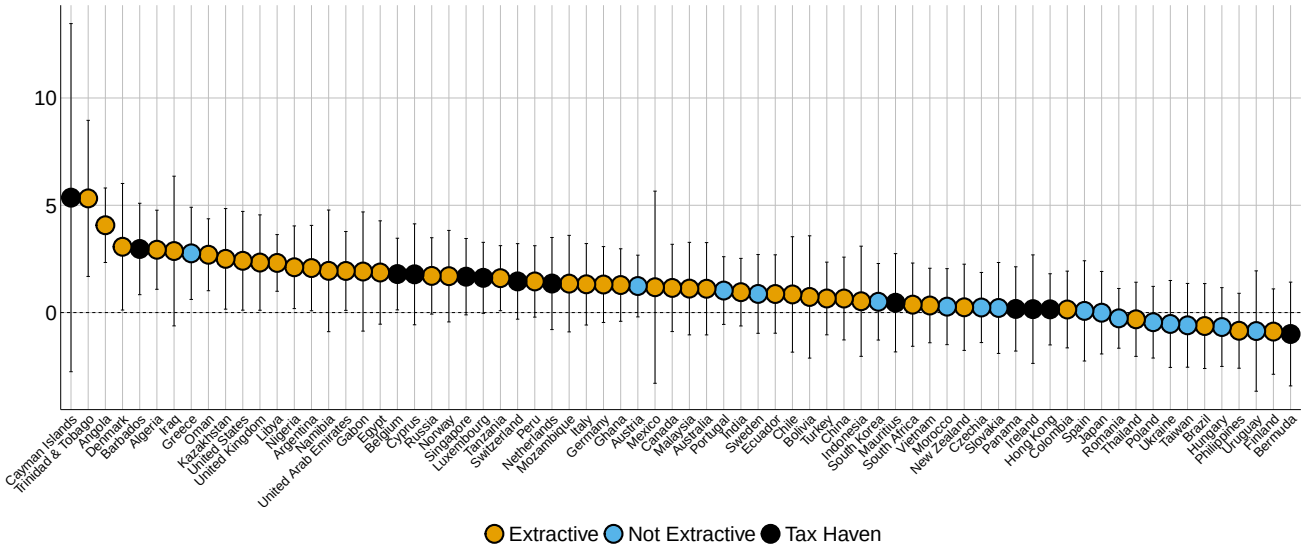
To visualize heterogeneity across countries, Figure 5 plots the estimated price elasticity of profits separately for each country in our sample. The results visually confirm our econometric estimates: the jurisdictions displaying the largest profit responses are either major resource producers or tax havens. In contrast, non-resource, high-tax jurisdictions show negligible sensitivity to commodity prices.

4.1.2 Marginal allocation and non-linearities

While the baseline results establish that tax havens capture a disproportionate share of windfalls, they do not directly quantify the allocation of the marginal dollar compared to the average dollar. Table 6 presents the descriptive statistics for the baseline profit allocation. It shows that, on average, tax havens capture 12.1% of positive profits, while extractive subsidiaries capture 75.8%.

To understand how windfalls deviate from this baseline, Table 7 estimates the sensitivity of affiliate profits to consolidated group profits using our instrumental variable strategy. The validity of the instrument is reported in Appendix Table B4 and summarized in the bottom panel

Figure 5: Result: Profit Price-Elasticity per Country



Notes: This graph plots the coefficients β_i associated with each country dummy interacted with the commodity price variable by running the following regression: $\log(y_{git}) = \alpha + \beta_i Country \times \log(P_{g(p)t}) + \theta' Controls_{git} + \mu_{gi} + \mu_{gt} + \varepsilon_{gt}$. Countries are defined as extractive if at least one MNE carries out extractive activity there. The reference country is France. The sample is restricted to countries where at least 10 MNEs are active and for which we have at least 50 observations. Whiskers represent 95% confidence intervals. Standard errors are clustered at the MNE level.

Table 6: Share of Positive Profits by Type of Affiliate

Type	**Average (%)**	**Median (%)**
Tax Haven	11.8	5.7
Extractive	65.2	78.9
Other	22.0	7.2

Note: This table presents summary statistics for the share of global positive profits booked in each type of jurisdiction. The mean shows the average share of profits in each type of affiliate.

of Tables 7 and 8. The commodity price instrument is a strong predictor of consolidated profits, with F-statistics of 12.1 and 13.0 for the level and log specifications, respectively, confirming the relevance of the shift-share design.

Columns (1) to (3) estimate the allocation of the marginal dollar in profits. We regress the level of affiliate profits on the level of consolidated group profits, instrumented by commodity prices. We find a high degree of pass-through to tax havens: for every \$1 increase in instrumented global profit, \$0.20 is booked in tax haven affiliates (Column 1).

This marginal allocation of \$0.20 is higher than the average allocation of \$0.12 reported in Table 6, which indicates that profit shifting is particularly aggressive during commodity booms.

$0.89 is allocated to extractive affiliates (Column 2). The coefficient for other affiliates (Column 3) is not statistically significant from zero.

In Table 8, we test the assumption of constant profit shifting intensity. Here, we regress the share of global positive profits booked in a jurisdiction on the log of consolidated profits. If the propensity to shift were constant, the share of profits in havens should be independent of the scale of the rent.

The results in Column (1) reject this hypothesis. We estimate a positive and significant semi-elasticity of 0.101 for tax havens. Economically, this implies that a 10% increase in group profitability is associated with a 1 percentage point increase in the share of global profits booked in havens. This increase is even larger when removing extractive affiliates from the denominator (Column (4)).

This result provides causal evidence that profit shifting is non-linear: as the tax base expands, MNEs do not shift a constant proportion of profits.

Table 7: Instrumental Variable Results - Amounts of Profits

	Profits		
	Tax Havens	Extractive	Other
	(1)	(2)	(3)
Consolidated Profits	0.196**	0.886***	-0.053
	(0.075)	(0.076)	(0.051)
F-test (1st stage), Consolidated Profits	12.087	12.087	12.087
Observations	248	248	248
MNE fixed effects	✓	✓	✓
Year fixed effects	✓	✓	✓

Notes: This table summarizes our estimates of the effects of an increase in consolidated profits instrumented by commodity prices on the level of profits in tax havens (column 1), extractive (column 2) and other subgroups (column 3). It is the result of an instrumental variable regression where the first stage is a regression of the amounts of consolidated profits on the log of the price of the commodity in which the MNE specializes in. Standard errors are clustered at the MNE level.

4.2 Additional Results

4.2.1 Location of Losses in Tax Havens

Commodity price volatility generates large windfalls but also entails significant downside risk. In our final sample, approximately one-third of observations record negative profits. Since our

Table 8: Instrumental Variable Results - Share of Profits

	Share in Positive Profits			
	Tax Havens	Extractive	Other	Tax Havens in Non Extractives
	(1)	(2)	(3)	(4)
Consolidated Profits (log)	0.101**	-0.035	-0.071	0.304*
	(0.048)	(0.055)	(0.054)	(0.159)
F-test (1st stage), Consolidated Profits (log)	13.007	13.007	13.007	14.403
Observations	196	196	196	184
MNE fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

Notes: This table summarizes our estimates of the effects of an increase in consolidated profits instrumented by commodity prices on the share of positive profits in tax havens (column 1), extractive (column 2), other subgroups (column 3), and the share of tax havens in non-extractive profits (column 4). It is the result of an instrumental variable regression where the first stage is a regression of the log of consolidated profits on the log of the price of the commodity in which the MNE specializes in. Standard errors are clustered at the MNE level.

baseline logarithmic specification restricts the sample to positive profits, we employ alternative specifications to analyze the allocation of losses.

Table B5 presents the results. Columns (1) and (2) replicate our baseline estimates for comparison. Columns (3) and (4) estimate a linear probability model where the dependent variable is a dummy equal to one if the subsidiary reports a loss. The results indicate that the probability of incurring a loss in extractive countries is decreasing with prices, while the coefficient for tax havens is statistically indistinguishable from zero. This suggests that while extractive affiliates bear the downside risk of price drops, tax haven affiliates are less affected by these shocks at the extensive margin.

Columns (5) and (6) examine the intensive margin of losses, using the logarithm of the absolute value of losses as the dependent variable. Consistent with the extensive margin results, the magnitude of losses in extractive countries reacts strongly to price shocks. However, we find no significant response in tax havens. Collectively, these findings imply an asymmetry in profit shifting: while tax havens capture the upside of price booms (as shown in the baseline), they do not absorb the corresponding downside risk during busts.

4.2.2 Symmetry Between Price Increases and Decreases

We investigate whether the sensitivity of profits to commodity prices depends on the direction of the price shock. To do so, we interact our price variable with an indicator for year-on-year price decreases. The results are displayed in Table B6 in the Appendix.

We find no evidence of asymmetry: the elasticity of reported profits to commodity prices is statistically insignificant during boom and bust. This implies that as long as profits remain positive, tax haven affiliates absorb the downside of price drops as fully as they capture the upside of price spikes. This symmetric exposure to volatility supports the results of Becker et al. (2020a), who argue that MNEs strategically allocate risk to low-tax jurisdictions. By demonstrating that haven affiliates bear significant risk, MNEs can substantiate high average returns to tax authorities under standard risk-return transfer pricing principles.

4.2.3 Business activity

Using the information on the business activities of the subsidiaries belonging to the MNEs in our sample, we investigate whether some types of activities are driving our results more than others. For each MNE $\times$ country, we define primary activity as the activity in which the MNE has the largest number of affiliate. We then regress our profit variable on the interaction of a set of dummy for each primary activity, interacted with our MNE-level price shocks. The equation estimated is the following:

$$y_{g(p)it} = \alpha + \sum_{s} \beta_s ln P_{g(p)t} \times \mathbb{1} BusinessActivity_{s,gi} + \mu_g + \mu_t + \epsilon_{git} \tag{6}$$

With $y_{g(p)it}$ the profits of MNE g at times t in country i and $BusinessActivity_{s,gi}$ an indicator variable if the main business activity of MNE g in country i is s.

Figure B5 shows the associated coefficients. Because each MNE $\times$ country can have multiple activities in each country, the identification is challenging, and our coefficients are not precisely estimated. Figure B5 however shows that MNE $\times$ country specialized more in intra-group finance seem to react the most to commodity price changes, predominantly located in tax havens

(Figure 3b).

4.3 Robustness

Weighted price index. We first account for firm-level heterogeneity in commodity specialization by constructing a weighted price index:

$$P_{g,t} = \sum_{p} \omega_{g,p} \times \log(P_{p,t}) \tag{7}$$

where $P_{p,t}$ is the USD price per ton of commodity p. The weights $\omega_{g,p}$ capture the group's exposure to commodity p during 2010-2015, measured by production volume for oil & gas firms[12] and the share of active mines for mining firms. As shown in Table B8, our main findings remain robust to accounting for these specialization patterns, despite a loss in precision.

Leave-one-out. We re-run the triple difference regression excluding one commodity at a time (Figure B6). The positive coefficient on the tax haven dummy interaction remains robust to these exclusions. We note that excluding oil companies reduces precision, reflecting the high concentration of oil-specialized MNEs in our sample.

Alternative estimator. We estimate equation (2) using the Poisson Pseudo Maximum Likelihood (PPML) estimator. This approach allows us to include observations with zero profits and addresses the inconsistency of the log-linear OLS estimator in the presence of heteroskedasticity (Silva and Tenreyro, 2006). Columns (2) to (5) of Table B10 confirm that tax havens book significantly higher profits than the non-extractive rest of the group in response to commodity price shocks. The estimated magnitudes are larger than in the OLS specification, consistent with PPML fitting the first-order condition in levels and thus placing relatively more weight on larger observations (Breinlich et al., 2024).

[12] Converted into barrel equivalents.

Alternative tax haven list. To ensure our findings are not driven by the specific selection of jurisdictions in our baseline list, we employ an alternative, data-driven definition of tax havens. We reconstruct the tax haven indicator to include all countries with an effective tax rate (ETR) below 10%. Table B11 demonstrates that our main results are robust to this reclassification: the estimated coefficients remain positive and statistically significant, confirming that our findings capture the response to low effective taxation rather than idiosyncratic features of a specific list.

Outliers and Sample Composition. To ensure our main estimates are not driven by extreme values, we re-estimate the baseline model winsorizing the dependent variable at the 1st and 99th percentiles within each year. Additionally, to rule out composition effects from firm entry and exit, we restrict the sample to a balanced panel of MNEs observed continuously between 2016 and 2019. Table B12 confirms that our results remain robust: the coefficients are quantitatively similar to the baseline and statistically significant.

Dynamic specification. Our baseline estimates focus on the contemporaneous response to commodity price shocks. We relax this restriction by explicitly including lagged price shocks to account for potential dynamic adjustments and intertemporal spillovers, following the insights of Jaeger et al. (2018). We find that our main results remain robust to this dynamic specification, suggesting that our baseline estimates are not confounded by the persistence of price shocks or delayed adjustment processes. The results are displayed in column (2) of Table B9.

Profit repatriation to headquarters. We also investigate whether the observed reallocation reflects a general centralization of profits during commodity booms rather than strategic shifting to low-tax jurisdictions. To test this, we re-estimate the model using the parent company's headquarters as the destination for profit booking. Column (3) of Table B9 shows no statistically significant increase in profits reported in headquarter countries following price shocks. This null result reinforces our main finding: the intra-group reallocation is specifically directed toward tax havens, consistent with tax-motivated profit shifting rather than operational consolidation.

5 Conclusion

Using variations in global commodity prices and a novel dataset matching world CbCRs with commodity production data, we document that the profit allocation of extractive MNEs is sensitive to changes in commodity prices. We find that for every $1 of windfall profit generated at the group level, approximately 20 cents are diverted to tax havens, and that the share of positive profits booked in tax havens increases.

These findings have direct implications for the optimal design of resource taxation. Standard public finance theory typically favors corporate income taxes over production taxes (royalties), as the latter can distort investment and extraction decisions at the margin. However, while income taxes are theoretically efficient, they are highly vulnerable to base erosion during windfalls. Following the energy price surge of 2022, many countries have introduced windfall taxes on corporate profits to capture excess rents. Our findings suggest that without robust safeguards against profit shifting, these measures risk to be unefficient. We propose two concrete policy responses to mitigate this trade-off. First, tax enforcement intensity should be designed to be increasing mechanically during price upswings. Second, our results support the adoption of price-contingent royalties, a mechanism notably implemented in Alberta, Canada. Such an instrument effectively reduces base erosion risks while remaining less distortive than a flat production tax during low-price periods.

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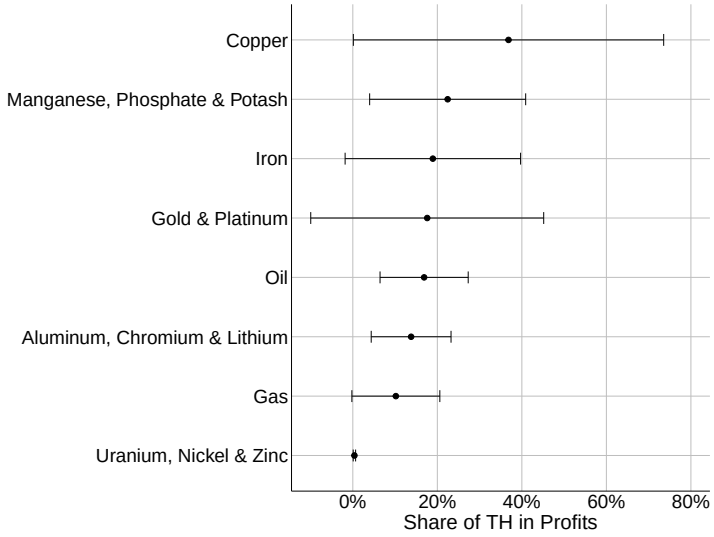
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Appendix

A Data & Descriptive Statistics

Figure B1: Average share of tax haven in non-extractive profits



Lecture: This graph shows the average share of tax havens in total profits by specialization and confidence intervals.

Notes: Some commodities are grouped for confidentiality reasons.

Table B1: Summary Statistics of CbCR

Year	MNEs (Nb)	Countries (Nb)	Subsidiaries (th)	Sales ($bn)	Profits ($bn)	Employees (th)
2016	38.0	194.0	1,735.0	1,465.1	-5.0	1,559.2
2017	45.0	198.0	1,938.0	1,882.4	145.7	2,013.2
2018	38.0	196.0	1,658.0	1,911.9	210.2	1,692.5
2019	45.0	189.0	1,779.0	1,926.8	119.1	1,718.8
2020	21.0	171.0	829.0	692.6	-39.4	755.4
2021	23.0	168.0	793.0	994.3	220.9	760.1
2022	21.0	167.0	790.0	1,253.9	286.1	714.3
2023	18.0	151.0	674.0	1,070.2	223.0	691.7
2016-2023	**31.1**	**179.2**	**1,274.5**	**1,399.7**	**145.1**	**1,238.2**

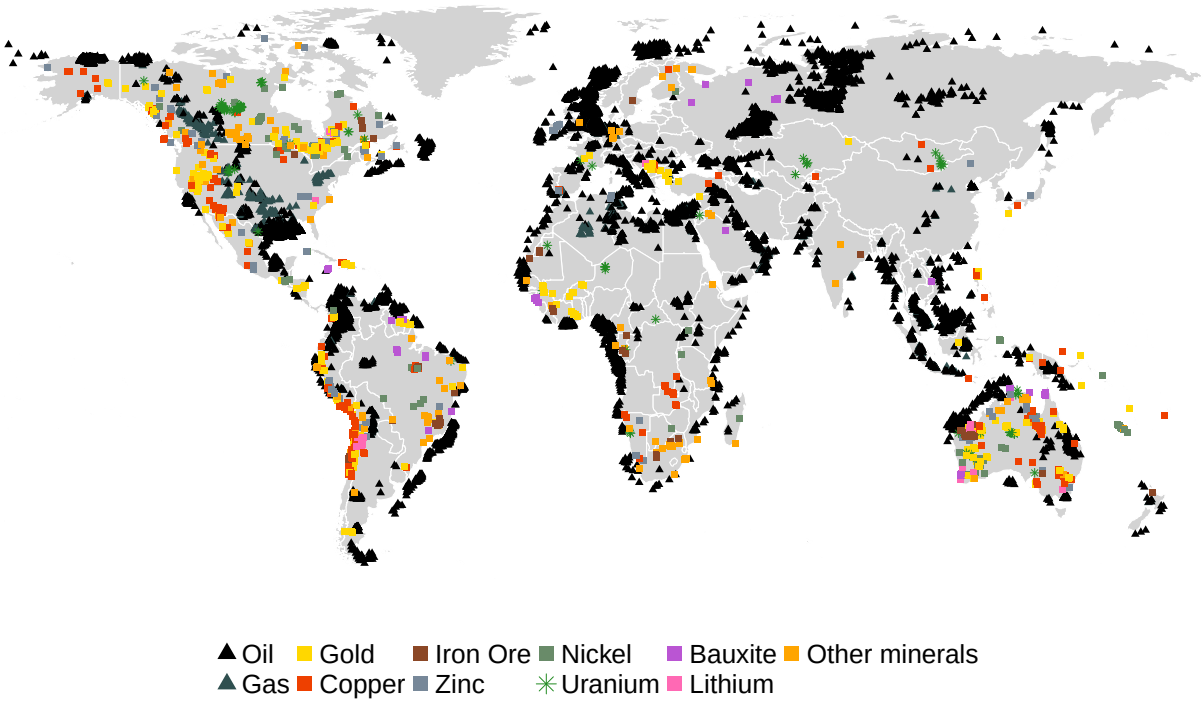
Notes: This table shows the distribution of the main variables in our CbCR sample.
Lecture: in 2016, there are 38 MNEs in our sample, present in 194 countries, generating 1,465.1 billion US$ in sales, -5 in profits, and have in total 1,559.2 employees in full-time equivalent.

Table B2: Summary Statistics by Country

	Profits		Taxes		Sales		Employees		MNEs	
	($bn)	(%)	($bn)	(%)	($bn)	(%)	(th)	(%)	(Nb)	(%)
Australia	234.5	20.6	68.4	14.7	814.6	3.5	622.6	6.5	54	2.3
Norway	205.4	18.1	103.4	22.2	610.3	2.6	157.2	1.6	35	1.5
United Arab Emirates	55.1	4.8	43.2	9.3	335.3	1.4	13.7	0.1	27	1.1
Singapore	48.5	4.3	1.8	0.4	2,306.7	10.0	93.9	1.0	51	2.1
Switzerland	46.9	4.1	3.7	0.8	1,061.4	4.6	18.2	0.2	36	1.5
Colombia	43.3	3.8	11.5	2.5	135.4	0.6	113.2	1.2	29	1.2
Chile	37.5	3.3	6.5	1.4	118.9	0.5	208.8	2.2	26	1.1
United States	36.9	3.2	-1.7	-0.4	4,599.8	19.8	1,143.0	12.0	60	2.5
Nigeria	35.8	3.2	22.8	4.9	125.9	0.5	67.6	0.7	19	0.8
South Africa	31.9	2.8	5.6	1.2	274.3	1.2	529.6	5.6	36	1.5
Libya	29.9	2.6	19.7	4.2	50.7	0.2	30.0	0.3	12	0.5
Netherlands	29.8	2.6	4.9	1.0	1,031.5	4.5	164.8	1.7	55	2.3
Angola	29.4	2.6	12.6	2.7	101.7	0.4	36.9	0.4	13	0.5
Malaysia	28.6	2.5	7.6	1.6	183.8	0.8	183.0	1.9	32	1.3
Oman	27.7	2.4	22.5	4.8	75.2	0.3	9.5	0.1	11	0.5
Spain	24.9	2.2	4.0	0.9	1,045.8	4.5	274.7	2.9	35	1.5
Kazakhstan	19.6	1.7	3.6	0.8	64.5	0.3	228.6	2.4	20	0.8
Denmark	17.6	1.6	4.5	1.0	122.6	0.5	53.5	0.6	26	1.1
Egypt	16.3	1.4	6.8	1.5	67.5	0.3	30.3	0.3	17	0.7
Thailand	14.2	1.2	5.2	1.1	124.7	0.5	60.7	0.6	26	1.1
Indonesia	12.3	1.1	5.5	1.2	58.5	0.3	64.5	0.7	35	1.5
Qatar	12.0	1.1	3.4	0.7	24.9	0.1	8.7	0.1	10	0.4
Belgium	11.7	1.0	1.6	0.4	529.5	2.3	185.6	1.9	36	1.5
China	11.1	1.0	2.0	0.4	146.7	0.6	165.3	1.7	46	1.9
Japan	10.5	0.9	2.5	0.5	343.3	1.5	538.9	5.7	40	1.7
Algeria	10.3	0.9	8.4	1.8	28.6	0.1	10.2	0.1	12	0.5
Germany	8.7	0.8	6.1	1.3	1,046.0	4.5	307.6	3.2	45	1.9
United Kingdom	8.1	0.7	20.4	4.4	2,616.4	11.3	456.0	4.8	55	2.3
Bermuda	5.7	0.5	0.2	0.0	19.1	0.1	0.2	0.0	26	1.1
World	**1,160.7**	**100.0**	**472.0**	**100.0**	**23,663.8**	**100.0**	**9,905.3**	**100.0**	**71**	**100.0**

Notes: This table shows for each country the amounts of total profits, taxes, sales, employees and MNEs in our sample for each country, as well as the share in the whole sample.
Lecture: MNEs in our sample have generated $234.6bn of profits over 2016-2023, which amounts to 23.2% of all the profits in our dataset.

Figure B2: Extractive activity of MNEs in our CbCR sample



Sources: Rystad Upstream (oil & gas) & S&P Metals and Mining.

Notes: This graph shows the location of all extractive projects majority-owned by MNEs in our CbCR sample. Mines and oil/gas fields can be at either the exploration or production stage.

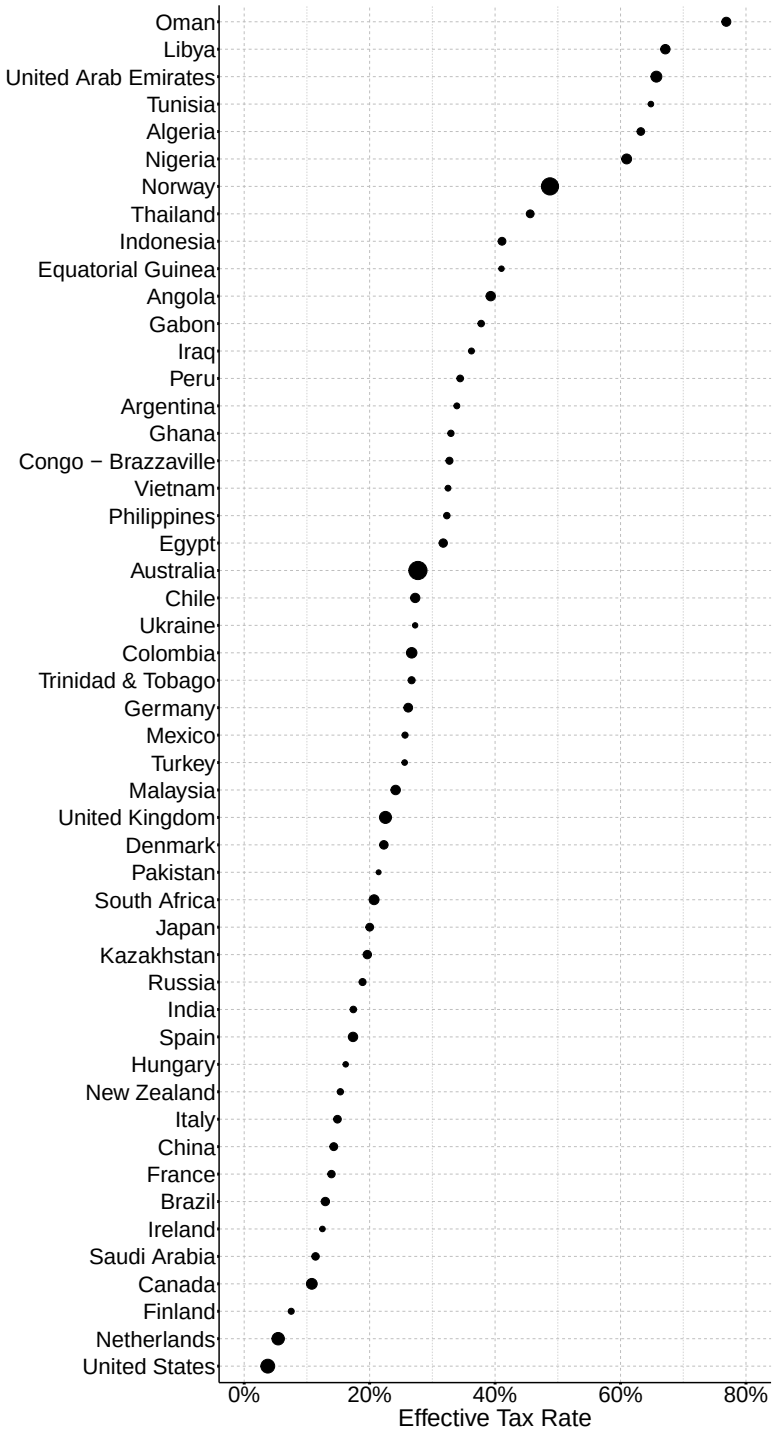
Figure B3: Average share of tax haven in non-extractive profits



Lecture: This graph shows the evolution of the share of tax havens in non-extractive positive profits of MNEs specialized in oil and the price of crude oil.

Notes: The correlation at the MNE level between the share of tax havens in positive profits and crude oil prices is 0.13.

Figure B4: Effective tax rates of extractive affiliates by country



Notes: This figure shows the effective tax rates by country for the top 50 countries in our sample in terms of aggregate profits. The effective tax rate is computed as the ratio between the sum of tax accrued and the sum of profits generated in the country in extractive affiliates only. Extractive affiliates are defined at the MNE $\times$ country level and can thus include non-extractive activity. The size of the points is proportional to the sum of profits generated in each country over the period in our dataset. It excludes observations with negative profits or negative tax accrued. We also removed countries with fewer than 5 MNEs operating due to confidentiality reasons.

B Additional Results

Table B3: Elasticity of consolidated profits to commodity prices

	Profit (log)		Sales (log)	
	(1)	(2)	(3)	(4)
$P_{g(p)t}$ (log)	1.38***	1.28***	0.488***	0.439***
	(0.143)	(0.155)	(0.101)	(0.072)
Employees (log)		0.071		0.389***
		(0.179)		(0.070)
Assets (log)		0.512***		0.571***
		(0.146)		(0.093)
Observations	2,228	1,752	3,752	2,886
R^2	0.90489	0.90797	0.95808	0.97890
Within R^2	0.06539	0.09986	0.01790	0.33303
Year fixed effects	✓	✓	✓	✓
Group fixed effects	✓	✓	✓	✓

Notes: This table summarizes our estimates of the effects of commodity prices on consolidated profits using Compustat data. The outcome variables are consolidated profits and consolidated sales in US dollars. Standard Errors are clustered at the MNE level.

Table B4: First Stage of the Instrumental Variable Regression

	Consolidated Profits (bn$)		Consolidated Profits (log)	
	(1)	(2)	(3)	(4)
$P_{g(p)t}$ (log)	12.4***	12.0***	1.46***	1.40***
	(4.60)	(4.46)	(0.512)	(0.501)
Observations	248	248	196	196
R^2	0.63102	0.63464	0.89302	0.89555
MNE fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on consolidated profits. The outcome variables are the amounts of worldwide profits in billion $ in columns (1) and (2), and the log of worldwide profits in columns (3) and (4). Standard errors are clustered at the MNE level.

C Robustness

Table B5: Effects of Commodity Prices on Gains versus Losses

	Profits (log)		Losses = 1		|Losses| (log)	
	(1)	(2)	(3)	(4)	(5)	(6)
$P_{g(p)t}$ (log)	0.179		0.050		0.097	
	(0.243)		(0.043)		(0.379)	
$Extract_{gi} \times P_{g(p)t}$ (log)	1.42***	1.46***	-0.291***	-0.286***	-0.345	-0.473*
	(0.280)	(0.274)	(0.048)	(0.052)	(0.296)	(0.264)
Haven $\times P_{g(p)t}$ (log)	0.581**	0.706***	-0.082	-0.076	0.077	0.160
	(0.231)	(0.218)	(0.066)	(0.068)	(0.543)	(0.537)
Haven $\times Extract_{gi} \times P_{g(p)t}$ (log)	-0.643	-0.715	0.090	0.073	-2.69	-2.26
	(0.523)	(0.552)	(0.351)	(0.334)	(2.66)	(2.74)
Employees (IHS)	0.238***	0.248***	-0.014**	-0.016**	0.408***	0.378***
	(0.069)	(0.062)	(0.006)	(0.007)	(0.084)	(0.076)
Tang Assets (IHS)	0.076**	0.050***	0.004**	0.003*	0.052**	0.042***
	(0.032)	(0.017)	(0.002)	(0.001)	(0.020)	(0.015)
Observations	5,237	5,237	9,293	9,293	3,439	3,439
R^2	0.92857	0.94035	0.60636	0.62047	0.88437	0.89940
MNE-Country fixed effects	✓	✓	✓	✓	✓	✓
Year fixed effects	✓		✓		✓	
Year-MNE fixed effects		✓		✓		✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on profits in each country, with a comparison between gains and losses. Standard errors are clustered at the MNE level.

Table B6: Price Increases versus Decreases

	Profits (log)			
	(1)	(2)	(3)	(4)
$P_{g(p)t}$ (log)	0.187	0.050		
	(0.243)	(0.260)		
$P_{g(p)t}$ (log) $\times$ Control $\times$ Increase		0.011		-0.009
		(0.015)		(0.012)
$Extract_{gi} \times P_{g(p)t}$ (log)	1.40***	1.42***	1.44***	1.40***
	(0.269)	(0.279)	(0.262)	(0.280)
$Extract_{gi} \times P_{g(p)t}$ (log) $\times$ Increase		0.010		
		(0.015)		
Haven $\times P_{g(p)t}$ (log)	0.552**	0.504*	0.671***	0.629**
	(0.223)	(0.271)	(0.209)	(0.246)
Haven $\times P_{g(p)t}$ (log) $\times$ Increase		0.016		0.012
		(0.019)		(0.018)
Employees (IHS)	0.238***	0.233***	0.248***	0.243***
	(0.069)	(0.070)	(0.062)	(0.062)
Tang Assets (IHS)	0.076**	0.079**	0.050***	0.053***
	(0.032)	(0.033)	(0.017)	(0.017)
Observations	5,237	5,152	5,237	5,152
R^2	0.92856	0.92831	0.94034	0.94018
MNE-Country fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓		
MNE-Year fixed effects			✓	✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on profits in each country during commodity price increases and decreases. The outcome variable is the log of pretax profits. Standard errors are clustered at the MNE level.

Table B7: Winsorized and Balanced Sample

	Wins. Profits (log)		Profits (log)	
	(1)	(2)	(3)	(4)
$P_{g(p)t}$ (log)	0.630***	0.154	0.578***	0.076
	(0.228)	(0.245)	(0.200)	(0.213)
$Extract_{gi} \times P_{g(p)t}$ (log)		1.44***		1.44***
		(0.260)		(0.261)
Haven $\times P_{g(p)t}$ (log)		0.552**		0.690***
		(0.223)		(0.194)
Employees (IHS)	0.243***	0.240***	0.325***	0.321***
	(0.068)	(0.068)	(0.069)	(0.070)
Tang Assets (IHS)	0.071**	0.075**	0.034	0.038*
	(0.032)	(0.032)	(0.022)	(0.022)
Observations	5,237	5,237	4,125	4,125
R^2	0.92717	0.92848	0.92383	0.92551
MNE-Country fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

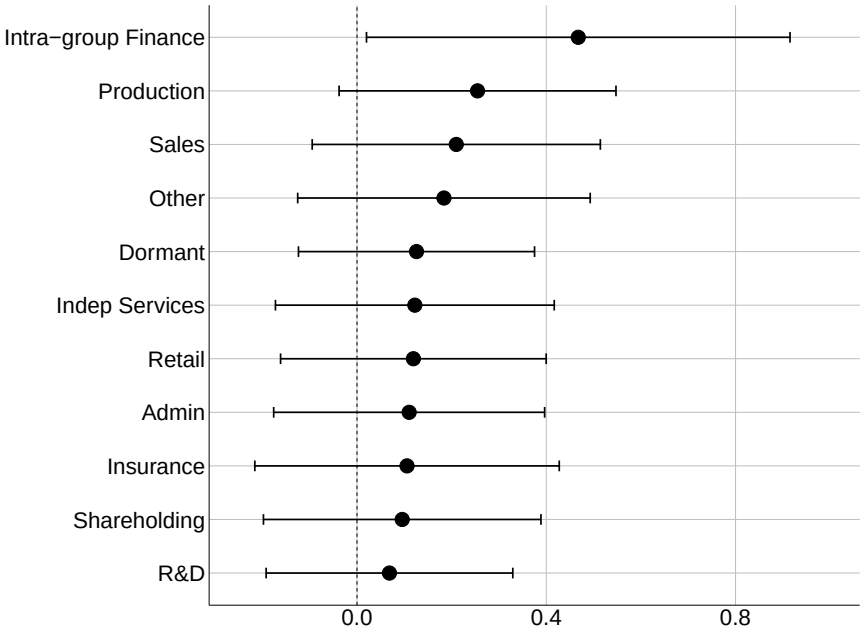
Notes: This table summarizes our estimates of the effects of an increase in commodity prices on profits at the country level. The outcome variable is the log of profits. Standard errors are clustered at the MNE level.

Table B8: Tripple Difference-in-Difference with Weighted Average Prices

	Profits (log)				
	(1)	(2)	(3)	(4)	(5)
$P'_{g,t}$	0.663***	0.225	0.213		
	(0.223)	(0.249)	(0.248)		
$Extract_{gi} \times P'_{g(p)t}$		1.42***	1.46***	1.44***	1.48***
		(0.253)	(0.261)	(0.245)	(0.255)
Haven $\times P'_{g(p)t}$		0.441*	0.494**	0.519**	0.567**
		(0.227)	(0.222)	(0.217)	(0.218)
Haven $\times Extract_{gi} \times P'_{g(p)t}$			-1.02**		-0.858*
			(0.496)		(0.497)
Employees (IHS)	0.242***	0.240***	0.240***	0.249***	0.249***
	(0.069)	(0.070)	(0.070)	(0.062)	(0.062)
Tang Assets (IHS)	0.072**	0.076**	0.076**	0.051***	0.051***
	(0.032)	(0.032)	(0.032)	(0.016)	(0.016)
Observations	5,237	5,237	5,237	5,237	5,237
R^2	0.92724	0.92854	0.92856	0.94037	0.94039
MNE-Country fixed effects	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓		
MNE-Year fixed effects				✓	✓

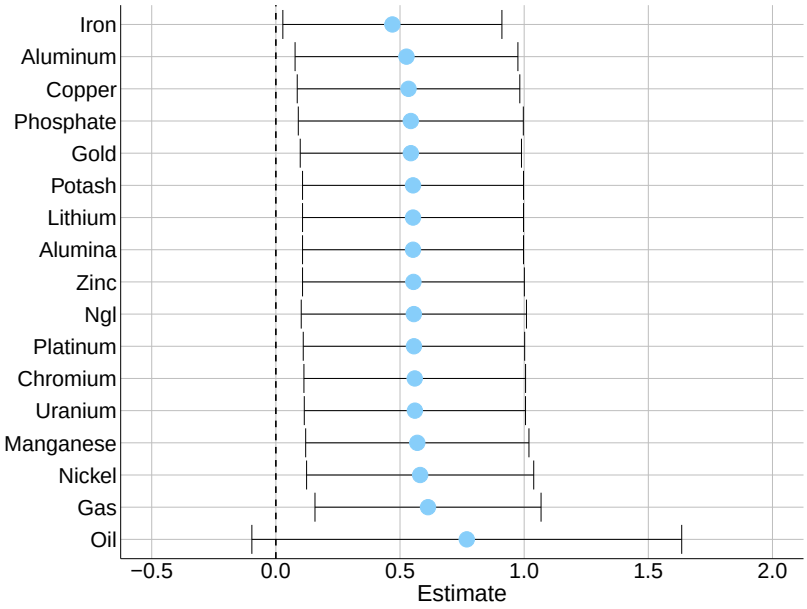
Notes: This table summarizes our estimates of the effects of an increase in commodity prices on profits at the country level. The outcome variable is the log of profits. Standard errors are clustered at the MNE level.

Figure B5: Profit Price-Elasticity by Primary Activity



Notes: Each coefficient is the coefficient associated with the interaction of the MNE-specific commodity price with a set of dummy variables indicating the primary activity of the MNE in a given country. Error bars display 95% confidence intervals. Primary activity is defined as the activity with the largest number of subsidiaries. The reference point is intellectual property leasing. Regression includes controls for the IHS of the number of employees and assets, fixed effects at the group-country and group-year level. Standard errors clustered at the group level.

Figure B6: Robustness, Leave-one-out



Notes: This graph shows our coefficient of interest (commodity prices interacted with a tax haven dummy) when removing commodities one after the other. The x-axis labels indicate which commodity is removed.

Table B9: Robustness, Lag of Price and HQ location

	Profits (log)		
	(1)	(2)	(3)
$P_{g(p)t}$ (log)	0.658***	0.174	0.187
	(0.237)	(0.260)	(0.243)
$P_{g(p)t}$ (log) × HQ = 1			0.002
			(0.065)
$Extract_{gi}$ × $P_{g(p)t}$ (log)		1.44***	1.40***
		(0.284)	(0.269)
$Extract_{gi}$ × Lag $P_{g(p)t}$ (log)		-0.065	
		(0.239)	
Haven × $P_{g(p)t}$ (log)		0.567**	0.553**
		(0.222)	(0.222)
Employees (IHS)	0.237***	0.234***	0.238***
	(0.069)	(0.070)	(0.069)
Tang Assets (IHS)	0.075**	0.079**	0.076**
	(0.033)	(0.033)	(0.032)
Lag $P_{g(p)t}$ (log)	-0.092	-0.066	
	(0.238)	(0.329)	
Haven × Lag $P_{g(p)t}$ (log)		-0.034	
		(0.313)	
Observations	5,152	5,152	5,237
R^2	0.92697	0.92824	0.92856
MNE-Country fixed effects	✓	✓	✓
Year fixed effects	✓	✓	✓

Notes: Standard errors are clustered at the MNE level.

Table B10: Tripple Difference-in-Difference, PPML

	Profits				
	(1)	(2)	(3)	(4)	(5)
$P_{g(p)t}$ (log)	0.924***	0.292	-0.071		
	(0.211)	(0.400)	(0.360)		
$Extract_{gi} \times P_{g(p)t}$ (log)		0.655**	1.03***	0.798**	1.35***
		(0.294)	(0.314)	(0.351)	(0.239)
Haven $\times P_{g(p)t}$ (log)		0.738	1.25***	0.557	1.28***
		(0.563)	(0.382)	(0.608)	(0.311)
Haven $\times Extract_{gi} \times P_{g(p)t}$ (log)			-1.89**		-2.64***
			(0.788)		(0.577)
Employees (IHS)	-0.033	-0.034	-0.036	0.032	0.031
	(0.037)	(0.038)	(0.037)	(0.082)	(0.081)
Tang Assets (IHS)	0.073**	0.074**	0.075**	0.053**	0.054**
	(0.033)	(0.033)	(0.033)	(0.023)	(0.023)
Observations	5,417	5,417	5,417	5,417	5,417
Pseudo R^2	0.93616	0.93650	0.93688	0.95854	0.95924
MNE-Country fixed effects	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓		
MNE-Year fixed effects				✓	✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on profits. The outcome variable is profits. Standard errors are clustered at the MNE level.

Table B11: Alternative List of Tax Havens

	Profits (log)				
	(1)	(2)	(3)	(4)	(5)
$P_{g(p)t}$ (log)	0.654***	0.216	0.216		
	(0.226)	(0.227)	(0.227)		
$Extract_{gi} \times P_{g(p)t}$ (log)		1.38***	1.38***	1.40***	1.40***
		(0.265)	(0.265)	(0.267)	(0.267)
Haven $\times P_{g(p)t}$ (log)		0.404*	0.404*	0.487**	0.487**
		(0.234)	(0.234)	(0.219)	(0.219)
Employees (IHS)	0.241***	0.240***	0.240***	0.250***	0.250***
	(0.068)	(0.069)	(0.069)	(0.062)	(0.062)
Tang Assets (IHS)	0.072**	0.075**	0.075**	0.050***	0.050***
	(0.032)	(0.032)	(0.032)	(0.017)	(0.017)
Observations	5,237	5,226	5,226	5,226	5,226
R^2	0.92733	0.92847	0.92847	0.94024	0.94024
Within R^2	0.06992	0.08471	0.08471	0.06695	0.06695
MNE-Country fixed effects	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓		
MNE-Year fixed effects				✓	✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on corporate income taxes paid in each country. The outcome variable is the log of taxes accrued. Standard errors are clustered at the MNE level.

Table B12: Winsorized and Balanced Sample

	Wins. Profits (log)		Profits (log)	
	(1)	(2)	(3)	(4)
$P_{g(p)t}$ (log)	0.630***	0.154	0.578***	0.076
	(0.228)	(0.245)	(0.200)	(0.213)
$Extract_{gi} \times P_{g(p)t}$ (log)		1.44***		1.44***
		(0.260)		(0.261)
Haven $\times P_{g(p)t}$ (log)		0.552**		0.690***
		(0.223)		(0.194)
Employees (IHS)	0.243***	0.240***	0.325***	0.321***
	(0.068)	(0.068)	(0.069)	(0.070)
Tang Assets (IHS)	0.071**	0.075**	0.034	0.038*
	(0.032)	(0.032)	(0.022)	(0.022)
Observations	5,237	5,237	4,125	4,125
R^2	0.92717	0.92848	0.92383	0.92551
MNE-Country fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

Notes: This table summarizes our estimates of the effects of an increase in commodity prices on profits at the country level. The outcome variable is the log of profits. Standard errors are clustered at the MNE level.

D Data Appendix

Cleaning of double counting in CbCR data

Due to the initial unclear guidance of the OECD between 2016 and 2020, intra-firm payments of dividends are not always eliminated from country-by-country reports. As an illustration, income from a subsidiary located in Germany that is distributed to a holding company in Switzerland could be counted both in the profit measures of the German and the Swiss subsidiaries. This double-counting of dividends can distort key indicators of profit shifting, artificially inflating reported profits and leading to underestimations of effective tax rates, as dividends are generally not taxed under corporate income tax. Therefore, it is crucial to correct this double-counting of equity income, which might be particularly salient for fiscal years prior to 2020 (Delpeuch et al., 2019; Horst and Curatolo, 2020; Blouin and Robinson, 2023). We correct our data by matching CbCR data to consolidated financial statements from Orbis and Compustat. The amount of double-counted profits is then defined as the difference between profits reported in CbCRs and consolidated data for each MNE. Table C1 shows the number of MNEs we correct each year and the amounts involved.

To allocate double-counting within MNEs, we use the information they disclose on the business activities of their subsidiaries. From this data, we know where MNEs locate their holding companies, and hence where dividends are susceptible to being sent. For each MNE, we select countries in which MNEs have a holding company as well as the headquarter countries, where dividends are usually repatriated, and remove a share of double-counted dividends for each MNE $\times$ country equal to the share of profits in this country in all profits of all countries having a holding company or hosting the headquarters.

Table C1: Double Counting per Year

Year	**MNEs** (Nb)	**Intra-Group Dividends** ($bn)	**Uncorrected Positive Profits** ($bn)	**Dividends/Uncorrected Profits** (%)
2016	7	35.7	156.1	22.9
2017	15	39.8	230.5	17.3
2018	11	58.6	270.9	21.6
2019	8	43.3	216.7	20

Notes: This table shows the number of firms with double-counted profits, the amounts of double counted dividends, and the level of profits they represent in .