Shift or Share? Anatomy of Profit Shifting and Distributional Effects on Workers*

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Abstract

Using new exhaustive and granular microdata on the worldwide activity of multinational firms, we estimate that large French multinational firms shift 19% of their foreign profits each year for tax reasons. We analyze how this tax avoidance affects the distribution of income between capital and labor through the specific channel of mandatory profit sharing to workers. By matching our micro-level profit shifting estimates with employer-employee data, we show that profit shifting reduces the annual amount of profit sharing received per employee each year by €1,090. Low-income workers are disproportionately affected relative to their wages: the loss amounts to 4.2% of the net wage of the bottom decile, compared to 2.1% for the top decile. Changing the profit sharing formula to account for global profitability would increase the net wage of multinational employees by 1.8% overall, and by 4.6% for workers in subsidiaries engaged in profit shifting.

JEL codes: F23, H25, H26

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1 Introduction

Tax avoidance by multinational enterprises (MNEs) poses a significant challenge for public finance, with important implications for government revenues, redistribution, and economic efficiency (Tørsløv et al., 2023b). By strategically reporting profits in low-tax jurisdictions, MNEs can substantially reduce their tax liability despite conducting real economic activity in high-tax countries. However, little is known about the heterogeneity in profit shifting behavior across firms and how profit shifting, by transferring profits away from where workers are located, shapes the distribution of income between capital and labor.

This lack of evidence stems from the absence of micro-data on profits earned abroad, with the exception of US multinationals, though existing work focuses on aggregate economic implications rather than firm-level heterogeneity and worker-level effects (Guvenen et al., 2022). Our paper attempts to fill this gap by using new exhaustive micro-data on the worldwide activity of large French multinational firms linked to French employer-employee data.

We take advantage of these novel comprehensive data to tackle three fundamental questions about profit shifting. First, what is the magnitude of profit shifting? Second, how concentrated is profit shifting across firms? Third, what are the distributional effects of profit shifting on workers?

Our main source of data comes from Country-by-Country Reports (CbCR), which provide detailed information on worldwide activities of MNEs with global revenues exceeding €750 million. MNEs report their profits, revenues, assets, and employees in each country where they have a subsidiary. This country-by-country breakdown, including tax havens, provides extremely valuable insights for investigating how MNEs allocate their profits and real activity across the world, establishing CbCR data as the new gold standard data source for studying profit shifting. These firms are economically highly relevant and account for about one-third of total private sector activity in France. We are the first to combine these reports with comprehensive administrative tax returns and matched employer-employee data to construct a unique dataset that tracks the allocation of reported profits and real economic activity across all subsidiaries of large French multinational firms. We develop a new methodology to produce micro-level measures of profit shifting from evidence of misalignment between real and reported activities.

Building on our profit shifting estimates, we investigate how profit shifting affects worker earnings. The literature suggests ambiguous effects. On the one hand, by reducing tax payments and thus capital costs, profit shifting allows firms to expand investment and employment, leading to higher wages (Souillard, 2022), particularly for high-income earners (Alstadsæter et al., 2022). On the other hand, profit shifting increases opacity around firms true profitability, enabling them to reduce labor costs in high-tax countries (Lopez Forero and Michallet, 2024), while inflating wages in low-

tax countries to substantiate high levels of profits (De Simone and Olbert, 2022). We take advantage of the French mandatory profit sharing policy to quantify the impact of profit shifting on worker compensation. Under this scheme, all firms located in France have to redistribute a predefined share of their "excess profits" to employees. The policy is highly relevant both in terms of scope and efficiency in redistributing income with minimal distortions (Nimier-David et al., 2023). Thanks to this direct link between firms' profits and workers' earnings, we provide a new measure of the loss in compensation that workers face due to profit shifting.

Our analysis yields four main findings. First, we estimate that large French multinationals shift €22 billion in profits annually, representing 19% of their foreign profits. Second, profit shifting results in substantial missing profits in high-tax countries, of around €10.3 billion per year in France, or 18% of the profits reported domestically. As a result, the 314 MNEs in our sample are responsible for an annual loss of €3.7 billion in tax revenues in France,[1] representing 7% of total corporate tax revenues.[2] Globally, the overall tax revenue losses amount to €5.4 billion. Third, we document that profit shifting is highly concentrated among the largest companies: the top 10% of MNEs subject to CbCR account for 70% of total shifted profits, but this concentration reflects profit concentration rather than more aggressive tax avoidance behavior at the top. Fourth, merging our firm-level estimation of profit shifting to employer-employee data at the subsidiary level, we find evidence of significant distributional effects associated with profit shifting, with substantial foregone income for employees of large MNEs that distribute lower after-tax profits to their employees through mandatory profit sharing mechanisms. We find that profit shifting reduces the profit sharing amount received by employees, equivalent to 2.9% of the net wage of workers in shifting subsidiaries, or around €1,090 per full-time worker annually. Low-income workers are disproportionately affected relative to their wages: this loss amounts to 4.2% of the net wage of the bottom decile, compared to 2.1% for the top decile. Taking into account the incidence that shutting down profit shifting opportunities might have on profits yields similar results, with a loss of 2.4% of net wages, equivalent to €905 lost per full-time worker annually. Changing the profit sharing formula to account for global profitability would increase the net wage of multinational employees by 1.8% overall, and by 4.6% for workers in subsidiaries engaged in profit shifting.

We contribute to the literature in four ways. First, we develop a methodological innovation for CbCR data. While CbCR data provide valuable insights into the geographic allocation of multinational activity, they suffer from a critical flaw: double-counting of intra-group dividends. This double-counting artificially inflates profits in

[1] Our profit shifting estimate is a balance between profits shifted in France (€3.1 bn) and out (€13.3 bn). Firms shifting profits in France are taxed at a very low rate in France due to special regimes, and hence, profits shifted in France are equivalent to a gain in taxes of only €70M each year. This explains why the ratio of shifted profits and tax revenue losses is not equivalent to the effective tax rate.

[2] Our sample is limited to the largest French multinational firms, which nonetheless account for a quarter of corporate tax revenues in France. However, our estimate of tax losses from profit shifting does not include smaller French MNEs or foreign MNEs.

both source and destination countries. We address this issue by developing a methodology to correct CbCR data. Our analysis reveals that on average 14% of profits reported in CbCR are double-counted and it represents up to 29% of profits in some years. Most double-counted dividends flow to French headquarters and tax haven subsidiaries that offer preferential treatment on foreign dividends. Failing to account for intra-group dividends creates two opposing biases. It inflates tax haven profits, leading to upward bias in profit shifting estimates (Blouin and Robinson, 2023). Simultaneously, it inflates reported profits in headquarter countries—high-tax jurisdictions in our study—potentially creating downward bias. While a growing number of papers use micro-level CbCR data from Italy (Bratta et al., 2021), the US (Nessa et al., 2022), Germany (Fuest et al., 2022, 2025), and Slovakia (Boukal et al., 2024), our paper is the first to propose a robust correction for double-counted profits that ensures more reliable profitability measures using CbCR data.

Second, we develop and implement a new robust method to estimate profit shifting using micro-data, combining a formulary apportionment method previously used in the literature (Guvenen et al., 2022) with a set of conditions derived from our theoretical model. Our work builds on the profit shifting literature, particularly micro estimates focusing on tax incentives (see e.g. Huizinga and Laeven 2008; Johannesen et al. 2020; Heckemeyer and Overesch 2017 for a literature review). Along with the formulary apportionment approach, we first compare the profitability of subsidiaries to the overall profitability of the MNEs they belong to, based on the idea that, absent profit shifting, a subsidiary share in the global MNE profits should be equal to the subsidiary share in the global MNE production costs. We refine this methodology by adding a set of tax conditions, that we derive from our model and implement with effective tax rates computed from our data. This allows us to go beyond profitability misalignment and produce shifting estimates that more accurately reflect actual tax incentives. We do not make any a priori assumptions about the destination of profit shifting, and do not focus on profit shifting toward tax havens. However, we find that more than half of shifted profits by large French multinational firms go to Switzerland, Singapore, the Netherlands, Hong Kong and Luxembourg.

Third, our paper provides supportive evidence that a few large firms make up most of the shifted profits, in line with Wier and Erasmus (2022), Davies et al. (2018) and Clifford et al. (2025). According to our estimates, 48% of total shifted profits originate from the 15 largest firms by global revenue, or the top 5% of the French MNEs subject to CbCR. However, profit shifting is not limited to the very largest firms. In fact, we find that nearly all multinational firms in our sample engage in profit shifting, irrespective of their size, and that they all shift on average 17% of their global profits. Nonetheless, the smallest firms contribute very little to total shifted profits, due to the strong concentration of profits among the largest firms. Overall, our results show a strong correlation between firms' contribution to total revenue and firms' contribution to total profit shifting, thereby providing support for using turnover

as a flag for potential harmful tax behavior.

Finally, our paper contributes to the emerging literature on the consequences of profit shifting, which affects the measurement of key economic outcomes like GDP or productivity (Guvenen et al., 2022; Bricongne et al., 2023) and impacts inequalities, benefiting executives and high-income earners more (Alstadsæter et al., 2022; Souillard, 2022). We complement these studies by investigating the effect of profit shifting on workers compensation through the specific policy of profit sharing (Nimier-David et al., 2023). This kind of profit sharing policy, which aims at distributing a share of after-tax profits to workers, is widespread. It exists in virtually all European countries, the US, Canada, and Mexico, among others. By linking our micro-level profit shifting estimates to matched employer-employee data, we are able to compute counterfactual amounts of profit sharing in France in the absence of profit shifting, accounting for the incidence that shutting down access to profit shifting would have on true profits. To our knowledge, this paper is the first to examine the detrimental effect of profit shifting on the amounts of profits distributed to workers. We show that profit shifting has important distributional effects as it substantially reduces the amount of profit sharing distributed to workers, in particular employees with low wages.

The paper is organized as follows. Section 2 describes the data. Section 3 provides descriptive evidence of profit shifting. Section 4 proposes a conceptual framework from which we derive the methodology to estimate profit shifting. Section 5 presents the results of our estimations. Section 6 examines the distributional effects on workers. Finally, Section 7 concludes.

2 Country-by-Country reports data

Country-by-country reporting was implemented in 2016 as part of Action 13 of the OECD/G20 BEPS Project to give tax administrations the information needed to address tax base erosion and profit shifting (BEPS) related risks. Reporting is mandatory for multinational companies with global consolidated revenues of more than €750 million (or equivalent in local currency) in the previous year. Currently, reporting does not entail public disclosure, and CbCRs are only submitted to the respective tax authority and made available to researchers on a confidential basis.[3]

Country-by-country reports are filled out by multinational firms to provide information on their activities in each tax jurisdiction in which they operate. Data is at the MNE-country-year level and includes information on related party revenues,[4] unrelated party revenues,[5] total revenues,[6] profits before income taxes, income tax paid, income tax accrued, stated capital, accumulated earnings, number of employees, and tangible

[3] Australia and the European Union have passed laws that will make some of the CbCR information publicly available at the firm-level.

[4] Revenue generated from transactions between subsidiaries of the multinational group.

[5] Revenue generated from trade with extra-group firms.

[6] Related plus unrelated party revenues.

assets other than cash and cash equivalents (see Aliprandi and von Zedlitz (2023) for a description of each variable). MNEs must also provide qualitative information on the business activities performed in each country, along with the list of constituent entities present.

The availability of exhaustive information on the activity of multinational firms sets Country-by-Country Reporting data as the new gold standard in terms of data sources for research on corporate tax avoidance. Using German country-by-country reporting data, Fuest et al. (2022) reveal that Orbis, the main alternative source of data for profit shifting research, covers only 26% of German MNEs affiliates, 50% of revenues reported in non-havens, 37% of revenues reported in European tax havens and no information on non-European tax havens. The existence of CbCR data considerably advances our understanding of multinational firms activity and allows for a deeper understanding of tax avoidance behavior, without suffering from the selection bias that Orbis introduces. While it focuses on the largest firms, we show in the rest of this Section that these firms are economically highly relevant.

2.1 French CbCR data

Our sample covers the universe of country-by-country reports submitted by French MNEs for the fiscal years 2016 to 2022. It covers 314 privately-owned French MNEs, collectively representing 63,000 subsidiaries spanning 219 countries.[7] Over 2016-2022, these firms generated a worldwide consolidated revenue of €2,140 billion each year on average, equivalent to the average of French GDP across these years (€2,246 billion).[8] They reported a total profit of approximately €174 billion each year on average, of which 65% is booked outside France. Table 1 presents the aggregated figures reported in the French CbCR dataset.

Table 1: Summary statistics

Year	Nb of MNE	Nb of countries	Nb of subsidiaries (th)		Total unrelated revenues (bn€)		Total profits (bn€)		Nb of employees (th)	
			France	Abroad	France	Abroad	France	Abroad	France	Abroad
2016	203	208	24	30	776	1,075	52	91	2,671	4,623
2017	241	212	27	34	849	1,195	61	102	2,997	5,635
2018	243	212	30	36	843	1,273	55	108	2,930	5,998
2019	249	213	31	37	912	1,345	55	120	3,022	6,116
2020	250	214	31	37	829	1,204	26	67	2,948	5,868
2021	255	213	30	38	920	1,306	87	136	2,932	5,894
2022	221	211	26	36	949	1,506	75	180	2,657	5,745
2016-2022	314	219	28	35	868	1,272	59	115	2,880	5,697

Note: Profits are corrected for the double-counting of dividends. Except for the number of MNEs and countries, the last line displays the average across all years.

Although our dataset includes only the top 314 largest French MNEs, they account for a large share of economic activity in France. Table 2 shows the share of activity they capture relative to the 21,000 MNEs operating in the country (including foreign MNEs)

[7] We excluded 10 state-owned firms, and 29 firms with no activity in France.
[8] Source: INSEE National Accounts

and to the 3 million entities (including national groups and standalone businesses), using French tax return data (presented in Section 2.3). Our sample covers more than half of all multinational activity in France and accounts for about one-third of total private sector activity. These firms contribute to a large share of corporate tax revenue: they pay 26% of total corporate income tax levied in France, or 44% of the amount paid by multinational firms.

Table 2: Coverage of the French CbCR in business activities in France

	Subsidiaries		Revenues		Employees		Profits		CIT	
	(th)	% covered	(bn€)	% covered	(th)	% covered	(bn€)	% covered	(bn€)	% covered
CbCR	26	100	1,538	100	2,600	100	57	100	14	100
French MNEs	92	28	2,369	65	5,192	50	74	77	22	64
All MNEs	127	20	3,260	47	6,925	38	98	58	32	44
All firms	3,112	1	4,778	32	12,737	20	187	30	54	26

Note: The figures of this table are computed from French corporate tax return data (BIC). Profits do not include intra-group dividends. The % covered corresponds to the share that the French CbCR data cover among the activity of all MNEs in France and all non state-owned firms (including non-MNEs). Reported Corporate Income Taxes (CIT) are taxes paid and not taxes accrued. Revenues include both related and unrelated revenues. The number of subsidiaries differ from the number in Table 1 as this table reflects the output of the match between CbCR data and tax returns data.

2.2 Correction for double-counted intra-group dividends

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, especially at the top of the ownership structure (ETBF, 2022), 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 therefore develop a methodology to correct country-by-country reports from double counting (see the Appendix B for further details on our cleaning procedures). First, we detect the inclusion of intra-group dividends in the report of an MNE by comparing CbCR data with global consolidated accounts[9] at the MNE-year level either from the Orbis database or from hand-collected information found in companies' financial statements. We consider that an MNE includes intra-group dividends in CbCR when there is a good match on the amounts of global revenue, which is not supposed to be affected by double counting, but higher global profits compared to consolidated accounts.

[9]In consolidated accounts, the multinational is treated as a single entity, and all intra-group dividends are eliminated.

We then remove intra-group dividends from reported profits at the country level in order to match the global value of consolidated profits. Since the MNEs in our sample are headquartered in France, we systematically include the French subgroup as a recipient of intra-group dividends. Additional recipient countries are identified based on excessive profitability indicators, as detailed in Appendix B. Then, we reduce reported profits in these countries proportionally to their share in total profits.

We find that, on average, 14% of reported profits in CbCR correspond to intra-group dividends (see Table B.3 in the Appendix). In some years, the amount of double counting reached 29% of total reported profits. We also observe a significant reduction in the amounts of double counting in 2022, which is explained by the clarification of OECD guidance after 2020. As expected, we correct profits mainly in France and in global financial centers and tax havens such as the Netherlands, Luxembourg, and Switzerland (see Figure B.1 in Appendix). Given the magnitude of this phenomenon, this correction is a large improvement compared to existing studies which do not properly correct CbCR data from double counting (Bratta et al., 2021; Fuest et al., 2022, 2025; Boukal et al., 2024).

2.3 Additional French administrative data

Our profit shifting estimation strategy is based on identifying discrepancies between real economic activity and reported profits. CbCR provide information on real activity by country with variables such as tangible assets and the number of employees, but not on compensation of employees. To better capture factor costs, we match our CbCR data with micro data on wages of subsidiaries located in France and abroad for all MNEs in our sample. For France, we use subsidiary-level tax return data (BIC-IS), and for other countries, we rely on the Outward Foreign Affiliates Statistics (OFATS) at the MNE-country-year level, to recover information on the total compensation to employees[10] paid by each MNE in each country. The details of our matching procedure are provided in Appendix A.2. In particular, thanks to the information that MNEs give on their affiliates (identification numbers and names), complemented with ownership data (LIFI), we were able to recover almost perfectly their activity in France.

We also use information on French employment with exhaustive administrative data at the employer-employee level (DADS) as well as detailed subsidiary-level data (BIC-IS) to estimate the consequences of profit shifting on employees compensation at the worker level.

3 Misalignment between real and reported activities

Multinational companies are subject to very different effective tax rates (ETR) around the world (see Figure C.1 in the Appendix), and therefore face strong incentives to shift their profits to low-tax jurisdictions to reduce their global tax payments.

[10] Including all social security contributions.

Excessive amounts of profits in low-tax jurisdictions, disconnected from real economic activity, are suggestive evidence of profit shifting. To detect such patterns, we examine the allocation of reported profits between countries and compare it to the distribution of real economic activity.

3.1 Excessive amounts of profit in low-tax jurisdictions

We start by examining the evidence of misalignment between real and reported activity according to countries' effective tax rates. Figure 1 shows the distribution of MNEs' foreign activities according to the ETR faced by their subgroups.[11] We divide subgroups into three categories based on the ETR they face: countries with an ETR below 15%, between 15% and 25%, and above 25%. We observe a clear misalignment between profits and real activity in low-tax jurisdictions: 26% of foreign profits are reported in subgroups with ETR below 15% while only 12% of employees and 16% of tangible assets can be found there. Also, there is a disproportionate share of related party revenue in low-taxed subgroups (31%), compared to revenue from external trade (19%), suggesting that intra-group transactions may serve as a vehicle to shift profits toward low-tax jurisdictions.

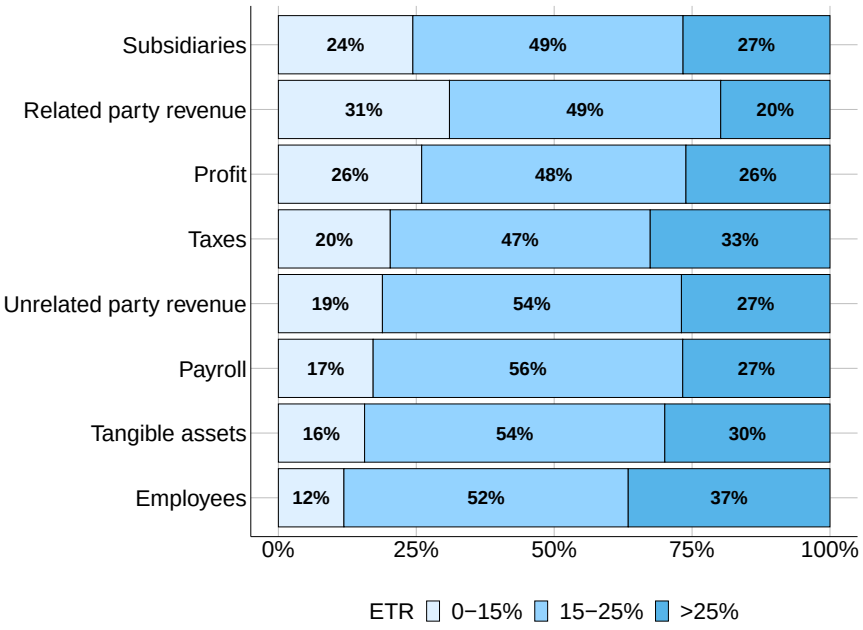
3.2 Prevalence of tax havens

We find evidence of such misalignment in tax havens where 14% of global profits are reported but only 5% of employees and 7% of tangible assets are located (Figure C.2 in the Appendix). Consistent with Tørsløv et al. (2023b), we find a gap in MNE profitability between tax havens and non-haven countries, measured as the ratio of profits to wages. Over the period, this profit-to-wage ratio fluctuates around 30% in non-haven countries, while it is more than twice higher, between 60 and 75%, in tax havens as we show on Figure 2. This gap remains even after controlling for other production factors such as tangible assets and market conditions. Nonetheless, the profitability gap of large French MNEs is less extreme than for their US counterparts. Indeed, Tørsløv et al. (2023b) find that US MNEs have a profit-to-wage ratio of 50% in non-havens, but as high as 346% in tax havens. This suggests that French MNEs may engage in less aggressive tax avoidance strategies than U.S. firms.

Therefore, we find significant misalignment between real activity and reported profits in tax havens, despite recent papers pointing toward a reduction in profit shifting towards tax havens and a reallocation of real activity toward low-tax jurisdictions following the introduction of the CbCR requirement (De Simone and Olbert, 2022; Hugger, 2024; Joshi, 2020). We also document that presence in a tax haven is a very common feature among large French multinationals, with 89% of them having at least one subsidiary in a tax haven despite apparent evidence that multinational firms reduced their presence in tax havens (De Simone and Olbert, 2022). As illustrated in Figure C.3 in

[11] In this paper, we use the term subgroup to refer to all subsidiaries of a given multinational enterprise that are located in a given country.

Figure 1: Distribution of foreign activity according to ETR



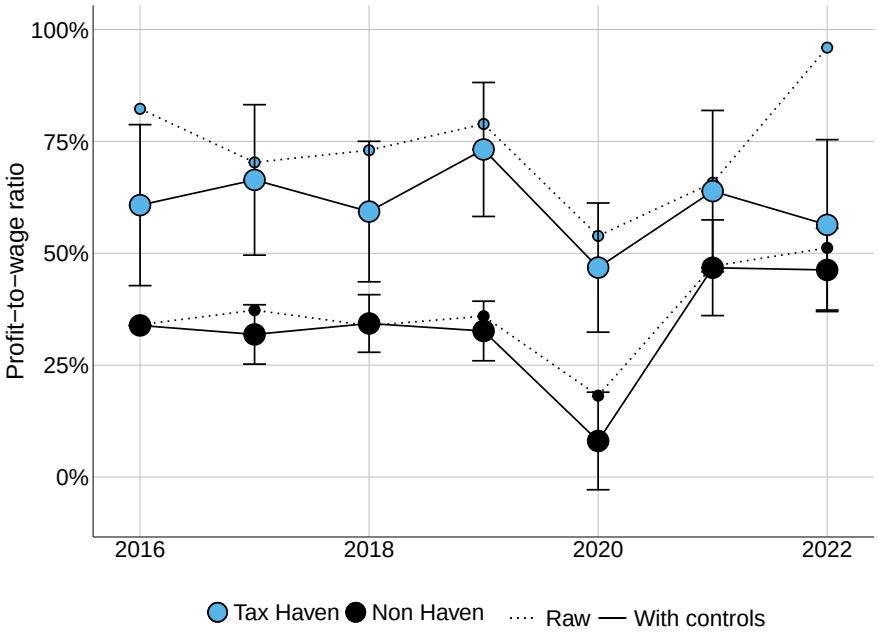
Note: This graph shows the distribution of foreign activity, grouping foreign subgroups by level of effective tax rates (ETR). ETRs are calculated at the country-year level as the ratio between tax accrued and profit before tax, computed on profitable subgroups with positive taxes lower than profits. Then, we compute the share of each ETR group in the total of foreign activities, according to different indicators. *Lecture*: 31% of total foreign related party revenues are reported in subgroups located in countries with ETR below 15%.

the Appendix, subsidiaries located in tax havens predominantly engage in activities associated with profit shifting, such as holding, financial and insurance operations. These activities are often disconnected from real economic activities, as they require minimal physical presence and are highly mobile.

3.3 Heterogeneity among large multinational firms

Finally, we document the heterogeneity among multinational firms that are subject to country-by-country reporting. By definition, all these companies have revenues exceeding the €750 million threshold, but we still find substantial differences between them. Although their global revenue is clearly concentrated towards the €750 million threshold (see Figure C.4 in the Appendix), we observe that a small number of very large MNEs account for a large share of activity in CbCR data. Indeed, the top 15 MNEs in terms of global revenues make up 47% of the foreign profits reported by the French MNEs in CbCR, a similar share of tangible assets and 30% of foreign employment (see Figure C.5 in the Appendix).

Figure 2: Profit-to-wage ratio in tax haven and non-haven countries



Note: Figure 2 shows our coefficients of interest $\beta_0 + \beta_{1t}$ and $\beta_0 + \beta_{1t} + \beta_{2t}$ of the following model:

$$\frac{\rho_{ift}}{wl_{ift}} = \beta_0 + \beta_{1t} Time_t + \beta_{2t} Time_t \times Haven_i + \beta_3 ln(K_{ift}) + \beta_4 ln(L_{ift}) + \gamma X_{it} + \mu_f + \epsilon_{ift}$$

with ρ_{ift} the reported profit of MNE f in country i at time t, $Time_t$ time dummy, $Haven_i$ haven dummy, K_{ift} the value of tangible assets, L_{ift} the payroll and X_{it} the log of population, indicator of the market conditions of the country and μ_f MNE fixed effects. We winsorize profit-to-wage ratios at the 5% level to remove outliers. Standard errors are clustered at the MNE level. We show the 95% confidence intervals.

4 Conceptual framework

In this section, we present a theoretical framework that allows us to derive our estimation method of profit shifting. We combine insights from the traditional profit shifting literature and the formula apportionment literature to obtain a model-induced formula of profit shifting. We can then bring our model to the data in the next Section, where we show that our methodology yields transparent and robust estimates of profit shifting.

4.1 Model setup

We start from the static framework of Huizinga et al. (2008) and Hines and Rice (1994), in which shifting intensifies with rate differentials but is constrained by convex avoidance costs.

Let n denote the number of jurisdictions, indexed by $i = 1, \ldots, n$. The multinational enterprise earns true pre-tax profit π_i in jurisdiction i and faces corporate income

tax rate t_i. The MNE generates a true pre-tax profit in country i defined as $\pi_i = R(y_i) - C(y_i)$, with y_i the quantity of goods produced, $R(y_i)$ the revenues generated and $C(y_i)$ the costs of production defined as $C(y_i) = w_i l_i + r_i k_i$, with $w_i l_i$ and $r_i k_i$ the costs of labor and capital respectively. It can also be written as $\pi_i = C(y_i)(\mu_i - 1)$ with $\mu_i = \dfrac{R(y_i)}{C(y_i)}$ the gross markup in country i. As Guvenen et al. (2022), we assume that the gross markup μ_i is constant for a given MNE in all the countries in which it operates, but do not assume markups to be constant across MNEs.

The true profits π_i made by the MNE in country i in a given year then represent the following share of the global pre-tax profits:

$$\frac{\pi_i}{\sum_j \pi_j} = \frac{C(y_i)(\mu_i - 1)}{\sum_j C(y_j)(\mu_j - 1)}$$

To minimize its global tax liability, the firm may reallocate a fraction $s_{ih} \in [0, 1]$ of π_i to jurisdiction h. We assume that profit shifting entails a convex cost in the shifted share, reflecting both compliance-engineering expenditures and increasing audit or reputational exposure as shifted shares grow. Specifically, the per-unit cost parameter $\gamma > 0$ governs the convex curvature in s_{ih}. In addition, firms face a sunk cost of establishing a shifting apparatus F (e.g., a specialized tax team); empirical evidence suggests that $F > 0$ since only sufficiently large firms engage in profit shifting (Davies et al., 2018). If the multinational firm does not engage in profit shifting, these costs will be zero.

We make no assumption regarding the origin or destination countries involved in profit shifting: the firm may shift profits generated in country i to any other country h, and likewise receive profits from any other country k. Consequently, after profit shifting, the firm reports in country i an amount of profit $\rho_i = \pi_i + z_i$, where z_i denotes the net profit shifting flow, defined as:

$$z_i = \underbrace{\sum_k s_{ki}\pi_k}_{\text{Inflows}} - \underbrace{\sum_h s_{ih}\pi_i}_{\text{Outflows}} \tag{1}$$

Here, the first term represents the sum of inbound flows towards country i, while the second term represents total outbound flows. If z_i is positive, the MNE shifts profits towards country i, conversely, if it is negative, it shifts profits out of the country.

Since profit shifting does not alter the global amount of profits of the MNE, we notice that $\sum_j \pi_j = \sum_j \rho_j$. Therefore, we can estimate the true pre-tax profits as the share of production costs multiplied by the global profits of the MNE:

$$\pi_i = \frac{C(y_i)}{\sum_j C(y_j)} \sum_j \rho_j = \frac{w_i l_i + r_i k_i}{\sum_j w_j l_j + r_j k_j} \sum_j \rho_j \tag{2}$$

Intangible assets are not included in our formula because they are less relevant to characterize local production, as there is evidence that the location of intangible assets

can be instrumental in profit shifting (Karkinsky and Riedel, 2012; Dischinger et al., 2014; Hebous and Johannesen, 2021).

4.2 Multinational profit shifting problem

We first express the MNE's after-tax objective to maximize the annual worldwide after-tax profit absent profit shifting:

$$\Pi^0 = \sum_{i=1}^{n} (1 - t_i)\, \pi_i$$

Allowing for profit reallocation across jurisdictions, the MNE maximizes its worldwide after-tax profit by solving:

$$\max_{\{s_{ih} \geq 0\}} \sum_{i=1}^{n} \Big[(1 - t_i)\, \pi_i + \sum_{h=1}^{n} s_{ih}\, \pi_i\, (t_i - t_h) - \tfrac{\gamma}{2}\, s_{ih}^2\, \pi_i \Big] - F\, \mathbb{1}_{\{\sum_{i,h} s_{ih} > 0\}}.$$

Here, $\mathbb{1}_{\{\sum_{i,h} s_{ih} > 0\}} = 1$ if the firm engages in any profit shifting, and zero otherwise. We assume γ is sufficiently large so that all interior solutions satisfy $\sum_h s_{ih}^* \leq 1$, avoiding corner-constraint issues.

The first-order condition for each (i, h) gives the optimal share of shifted profits:

$$s_{ih}^* = \frac{1}{\gamma} \max\{t_i - t_h,\, 0\} \tag{3}$$

Hence, the firm shifts profits from country i towards country h only when $t_i > t_h$, and the shifted share rises with the tax-rate gap but falls with the convex cost parameter. Moreover, this share is independent of the firm size, as in Kato and Haufler (2024). However, the total amount of profits shifted from country i to haven h, $s_{ih}^* \pi_i$, is then proportional to π_i, indicating that larger firms (with higher π_i) shift more in absolute terms.

The firm engages in profit shifting if the tax benefits offset the costs of engaging in tax avoidance, hence $\Pi^{PS} > \Pi^0$, which implies

$$\sum_{i=1}^{n} \pi_i \left(\sum_{h=1}^{n} \frac{(t_i - t_h)^2}{2\gamma} \right) > F$$

It follows that firms will only shift profits if net tax benefits exceed the fixed costs. This creates a minimum threshold for the tax rate differential that must be exceeded before profit shifting becomes profitable. In addition, larger firms are more likely to engage in profit shifting, as they can spread the fixed costs over a wider earnings base. This is observed in the profit shifting condition, where higher values of π_i make it easier to overcome the fixed costs.

4.3 Net profit shifting flows and tax incentive

We first characterize misalignment where reported profits ρ_i do not match the predicted true profits π_i, based on the formula shown in Equation 2. The gap between reported and real profits provides us with an MNE-country level estimate of profit misalignment. Positive amounts of misalignment could partially reflect genuine economic productivity rather than tax avoidance behavior.

To then characterize whether jurisdiction i serves as a net destination or origin of shifted profits, we can characterize the net shifting flow defined in Equation 1 by substituting the optimal shifting shares found in Equation 3:

$$z_i = \frac{1}{\gamma}\Big[\sum_{k:t_k>t_i} \pi_k\,(t_k - t_i) \;-\; \sum_{h:t_h<t_i} \pi_i\,(t_i - t_h)\Big].$$

The right-hand side reveals the dynamics of profit shifting behavior: a multinational enterprise will shift more profits into country i when it earns substantial profits π_k in high-tax jurisdictions (where $t_k > t_i$), while it will shift less profits into country i when it generates significant profits π_i there that could benefit from relocation to lower-tax countries (where $t_h < t_i$). Since profit shifting incurs positive costs γ, the MNE's tax incentives for shifting profits to country i depend on balancing total inbound against outbound profit flows. Therefore, we define the tax incentives $\mathcal{T}_i$ to assess whether or not country i is a net recipient of shifted profits:

$$\mathcal{T}_i = \sum_{k:t_k>t_i} \pi_k\,(t_k - t_i) \;-\; \sum_{h:t_h<t_i} \pi_i\,(t_i - t_h) \tag{4}$$

When $\mathcal{T}_i$ is positive, the MNE has an overall incentive to shift profits in country i, therefore we classify positive misalignment as shifted profits. Conversely, when $\mathcal{T}_i$ is negative, only negative misalignment is classified as shifted profits.[12]

This tax condition cancels out misaligned profits that do not coincide with tax incentives. However, to ensure the balance of inflows and outflows at the MNE-year level, we adjust the magnitude of profit shifting so that the total inward flows exactly offset the outward flows at the global level.[13]

[12] Formally, we apply the following tax condition to the misalignment estimates:

$$\zeta_i = \begin{cases} \rho_i - \pi_i & \text{if } \rho_i - \pi_i > 0 \text{ and } \mathcal{T}_i > 0 \\ \rho_i - \pi_i & \text{if } \rho_i - \pi_i < 0 \text{ and } \mathcal{T}_i < 0 \\ 0 & \text{otherwise} \end{cases}$$

[13] In practice, denoting $Z^+ = \sum_{j|\zeta_j>0} \zeta_j$ total inflows, and $Z^- = \sum_{j|\zeta_j<0} \zeta_j$ total outflows, our estimate of profits shifted by the MNE in country i is defined as:

$$z_i = \begin{cases} \frac{\min(Z^+,Z^-)}{Z^+}(\rho_i - \pi_i) & \text{if } \rho_i - \pi_i > 0 \text{ and } \mathcal{T}_i > 0 \\ \frac{\min(Z^+,Z^-)}{Z^-}(\rho_i - \pi_i) & \text{if } \rho_i - \pi_i < 0 \text{ and } \mathcal{T}_i < 0 \\ 0 & \text{otherwise} \end{cases}$$

5 Profit shifting estimation and implications

5.1 Methodology

Measure of allocation factors. In our apportionment formula in Equation 2, we rely on shares in production factors to estimate the true pre-tax profits. To proxy for labor costs, we use the compensation of employees, which includes all social security contributions. As compensation of employees reflects both the number of employees and the wages paid, we account for differences in economic activity and economic context across countries and industries. To proxy for capital, we use a measure of fixed tangible assets from our CbCR data, which is equivalent to net Property Plant and Equipment stocks in other datasets.[14] In CbCR data, MNEs report only the stock of tangible assets k. To recover the payments to this factor, we estimate an average cost of tangible assets for the multinational firms in our sample by computing the ratio of their investment costs in tangible assets[15] to their capital stock over the period. We find an average cost of capital for these firms of $r = 0.13$. In our main specification, we assume that rates of return do not vary from country to country or across MNEs. In Appendix E.1, we relax this assumption and use country-specific rates of return. We also test the formula with alternative production costs. Specifically, in Section E.2 we test the robustness of our results against the following specifications: (1) we only use labor as an apportionment factor, as in the preferred specification in Guvenen et al. (2022), (2) we only use tangible assets as an apportionment factor, (3) we weigh labor and capital by the labor intensity of the firm.

Estimation of profit misalignment. We compute misalignment estimates m_i at the MNE-country-year level as the difference between reported profits and our measure of true profits. Country-level aggregation of firm misalignment $M_i = \sum_{\text{all MNEs}} m_i$ mitigates firm-specific reporting noise, isolating systematic profit deviations unexplained by production factors. The global misalignment measure $M = \sum_{i|M_i>0} M_i$ aggregates positive country residuals annually, capturing cross-border reallocation patterns.

Estimation of tax-motivated profit shifting. To compute the tax condition at the MNE-country-year level, we use our measures of true pre-tax profits defined in Section 4.1, and we estimate t_k as the firm's effective tax rate in country k over the period. t_k is defined as the sum of taxes accrued by the MNE in country k over the period, divided by its total reported profits in that country, including only years when the MNE is profitable in country i and pays positive taxes that are less than the amount of reported profits.[16]

[14] According to OECD BEPS Action 13, the variable "Tangible Assets other than Cash and Cash Equivalents" is defined as the "*[. . .] sum of the net book values of tangible assets of all the Constituent Entities resident for tax purposes in the relevant tax jurisdiction*" (OECD, 2015).

[15] We collect information on French MNEs investments in tangible assets from OFATS.

[16] We divide the 2016-2022 period into sub-periods for countries where the statutory tax rate varies by more than 2pp.

We test our measure of tax incentive $\mathcal{T}_i$ by running several robustness checks in Appendix E.3, and we find consistent estimates. Specifically, we consider an alternative incentive measure computed as the difference between the effective tax rate faced by the MNE in country i and the MNE's global effective tax rate. We consider three alternative measures of the MNE's ETR in a given country as the average ETR paid by the MNE in the country over the time period (or sub-period in case of change in the statutory tax rate), the average ETR faced by all MNEs in that country in a given year or the ETR faced by the MNE in the country in the given year.

As with profit misalignment, we can aggregate these estimates at the country level across all MNEs in our sample to identify countries receiving the highest amount of shifted profits: $Z_i = \sum_{\text{all MNEs}} z_i$. Finally, we compute our global amount of profit shifting as the sum over the countries for which we find positive shifting: $Z = \sum_{i|Z_i>0} Z_i$.

5.2 Profit shifting by French MNEs

We estimate misalignment m_i and profit shifting z_i following the methodology described in Section 4.3. Table 3 presents our estimates of both misaligned profits and shifted profits of all French MNEs in our sample. We find an annual amount of €34 billion of misaligned profits for these firms, corresponding to 20% of their global profits or 30% of their foreign profits. Of these misaligned profits, €21.5 billion are shifted for tax reasons. As a result, we find that the 314 largest French multinational firms shift around 12% of their global profits, or 19% of their profits booked abroad.

More than half of the profit shifting happens in five tax havens: three European countries, Switzerland, Luxembourg, the Netherlands, and two Asian financial hubs, Singapore and Hong Kong. Figure 3 shows how profits reported by French MNEs are distorted by profit shifting. In particular, more than 75% of the profits reported by these French multinationals in Luxembourg are shifted profits. Shifted profits account for more than 50% of profits reported in Singapore, the Netherlands, Ireland and Switzerland. Below the horizontal zero line are the countries that lose from these avoidance practices.

We observe in Figure D.1 that tax havens tend to exhibit extremely high profitability and that this misalignment of profits relative to real activity is associated with low effective tax rates (Figure D.2).

We provide in Appendix D.3 the evolution of profit shifting over time. We find that shifted profits are quite stable over our sample period, at around €20 billion, while misaligned profits fluctuate between €25 and €40 billion.

5.3 Revenue implications

We now turn to estimating the tax revenue losses due to profit shifting. Table 3 shows that large French MNEs are responsible for €10.3 billion of profits shifted out of France, equivalent to 18% of their reported profits in the country. Previous estimates,

Table 3: Annual results by region

Region	Reported profits	Tax accrued	Misaligned profits		Shifted profits		Tax gains	
			(bn€)	(%)	(bn€)	(%)	(bn€)	(%)
France	58.7	15.9	-14.2	-24	-10.3	-18	-3.7	-23
United States	13.2	4	-7.1	-54	-4.7	-36	-1.1	-28
Rest of Americas	5.2	2.7	-2.6	-50	-1.5	-29	-0.6	-22
Germany	7.2	2.2	-0.4	-6	-1	-14	-0.3	-14
Italy	8.1	2.4	0.6	7	-0.9	-11	-0.4	-17
Africa	7.1	3.7	0.7	10	-0.1	-1	-0.2	-5
Switzerland	6.5	1	3.1	48	3.4	52	0.4	40
Singapore	4.1	0.4	2.6	63	2.9	71	0.2	50
Netherlands	3.4	0.8	2.3	68	2	59	0.1	12
Other tax havens	3.2	1.3	0	0	1.8	56	-0.1	-8
Hong Kong	3	0.5	1.4	47	1.7	57	0.2	40
Luxembourg	2.2	0.4	1.5	68	1.7	77	0.1	25
Rest of Europe	17.9	5.4	3.1	17	1.6	9	0	0
Rest of Asia & Oceania	23.1	8.4	6.3	27	1.4	6	-0.1	-1
Ireland	2.3	0.3	1.5	65	1.2	52	0.2	67
United Kingdom	7.7	2.1	1.2	16	0.6	8	0	0
Global	172.9	51.5	34	20	21.5	12	-5.3	-10

Note: This table presents average amounts of misaligned and shifted profits and tax revenue gains and losses for the period 2016-2022. It shows the countries with the highest amounts of shifted profits, while grouping the remaining ones by geographical regions. The countries are ranked by the largest profit shifting outflows at the top and the largest inflows at the bottom. The MNE-country-year level estimates are first aggregated at the region-year level and then averaged over the years. All amounts are expressed in billion euros, except for percentages: the shares of misaligned and shifted profits are calculated relative to reported profits, while the percentage of tax gains is measured over tax accrued. Global estimates correspond to the sum over the regions for total reported profits, tax accrued and tax gains. However, since misaligned and shifted flows sum up to zero, global estimates for these variables correspond to M and Z as defined in Section 5.1.

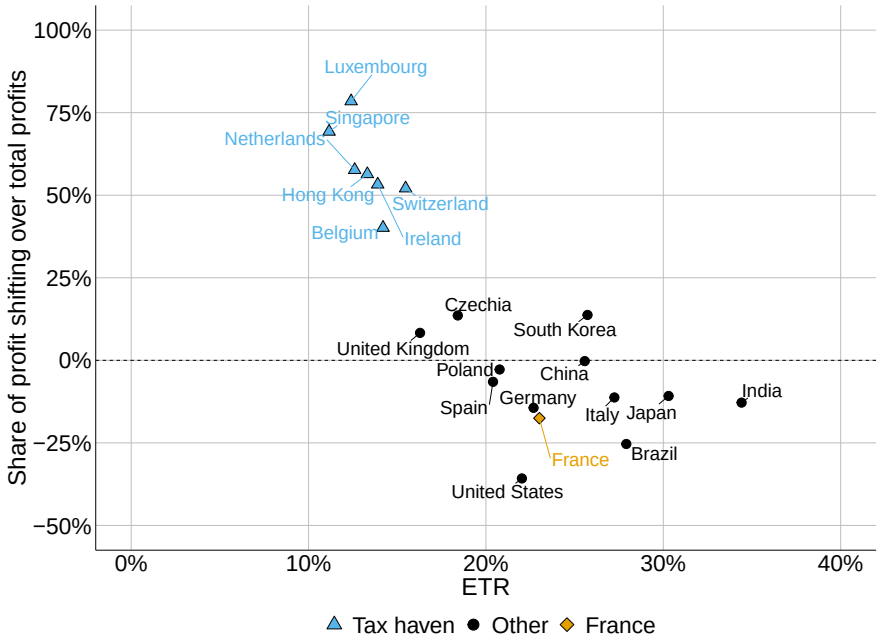
derived from macroeconomic data, suggest that profits shifted out of France amount to €29 billion[17] (Tørsløv et al., 2023b), or range between €16-32 billion (Vicard, 2022). Using these figures, we find that approximately one third of the profit shifting out of France can be attributed to large French multinational firms, with the rest stemming from smaller French firms and very likely from large foreign-owned MNEs. Given that the large French MNEs account for almost two thirds of the total profits reported in France by all MNEs (see Table 2), but only one third of the missing profits, this suggests that large French companies are relatively less aggressive in their tax avoidance practice than foreign multinationals.

To estimate the associated tax losses, we reallocate the missing profits to their country of origin and apply the effective tax rate faced by the MNE in that jurisdiction.[18] When a country receives shifted profits, we measure a tax gain rather than a loss. The underlying assumption is that the ETR would remain unchanged in the absence of profit shifting. This likely provides a lower bound for tax losses, since our ETR measure includes tax credits in the denominator (tax credits are included in the profit variable in CbCR). If firms exhaust their tax credits before shifting the remaining

[17] $32 billion in 2015.

[18] The ETR is computed at the MNE–country level over the whole period to smooth potential loss carry-forwards.

Figure 3: Share of profit shifting among reported profits



Note: This graph shows the share of shifted profits in the total amount of profits reported in each country, for the 20 countries where French MNEs report largest amounts of profits. For each country, we compute the amount of shifted profits over the period, divided by the total amount of profits reported there. The x-axis ranks the countries according to their average ETR on the period. We compute ETRs at country-year level by summing all taxes accrued reported in a given country during the year, divided by the sum of all profits reported in that country in the same year, we include in the calculation only the subsidiaries reporting positive profits and a positive tax liability that does not exceed the amount of profits. *Lecture:* 77% of profits reported in Luxembourg by the large French MNEs are shifted for tax reasons, the MNEs facing there on average an ETR of 12%.

profits to low-tax jurisdictions, the ETR applied to repatriated profits would in fact be higher, as no further tax credits could be claimed.

We find that these missing profits result in an annual loss of €3.7 billion in corporate tax revenue in France, equivalent to around 7% of total corporate tax revenues[19] (see Table 2). Our profit shifting estimate is a balance between profits shifted in France (€3.1 billion) and out (€13.3 billion). Firms shifting profits in France are taxed at a very low rate there due to special regimes, and hence, these shifted profits shifted incur a tax gain of only €70 million each year. This explains why the ratio of shifted profits and tax revenue losses is not equivalent to the effective tax rate.

It is important to note that this estimate only accounts for the 314 largest French MNEs, and therefore excludes smaller French MNEs as well as all foreign MNEs operating in France. If all other MNEs were to shift the same share of their profits, this would amount to €16.6 billion of shifted profits in total (see Table 2), and the asso-

[19] Or 9.5% of total corporate tax revenues net of tax credits.

ciated losses in corporate income taxes would amount to a total loss of €5 billion, or 9% of corporate income tax revenues.[20] This is likely a lower bound estimate because foreign MNEs may shift a larger share of their profits out of France. Indeed, we provide suggestive evidence of this fact in Figure D.5 in the Appendix as we find that US MNEs exhibit much larger gap between their worldwide profitability and their French subsidiaries' profitability, measured by the profit-to-wage ratio, than French MNEs.

Finally, we show in Figure D.6 the tax savings generated by profit shifting activities for MNEs. We find that, absent profit shifting, the global ETR of these firms would increase by about 3pp, from an average of 23% to 26% over the period.

5.4 Profit shifting and firm size

We investigate the relationship between profit shifting and firm size, to see whether the largest firms are the most aggressive in profit shifting as suggested by Wier and Erasmus (2022). We find in Figure 4a that the 314 largest French MNEs shift around 17% of their global profits to reduce their tax payments, and that this share is roughly constant among all deciles of global revenues. Nonetheless, our data include only the largest French MNEs, that might be more tax aggressive than medium-size MNEs. This result is in line with our theoretical model, according to which, once MNEs have an incentive to shift profits, they all shift the same portion of their profits, independently of their size.

However, if we examine the contribution of multinational companies to global profit shifting according to their size, we observe that the largest firms are responsible for the vast majority of profit shifting (Figure 4b). Indeed, the top 5% of multinational companies in terms of global revenues, the largest 15 MNEs, contributes to 48% of total profit shifting, and the top 10%, or about 30 MNEs, contributes to more than 70% of all shifted profits. The top 20% of MNEs accounts for almost 85% of total shifted profits, while all other deciles each accounts for less than 5%. This is not because larger MNEs shift more of their profits, but because profits are highly concentrated in the hands of a small number of firms. Our results are consistent with Clifford et al. (2025) who find that profit shifting is highly concentrated among the firms subject to the global minimum tax, who are also subject to CbCR. Our analysis goes on step further to show that even among those firms, only a handful of them truly matters for profit shifting.

These results suggest that firms' revenue is a good proxy for profit shifting. As we show in Figure C.5, the top 5% of firms in terms of revenue contribute to 45-50% of total profits. As such, we provide support for using revenue as an inclusion metrics in reforms targeted at the most harmful profit shifters.

Our paper also sheds light on the potential welfare effects of profit shifting. As most profit shifting is concentrated at the top of the distribution, anti-shifting policies should focus on these firms if the goal is to minimize compliance costs and maximize potential

[20] €3.7 billion for French MNEs plus 21.2% (the average French ETR) of €6.3 billion of shifted profits by other MNEs.

tax revenue given that anti-avoidance policies impose often non-negligible compliance and administrative costs on firms and may lead to unintended distortions (Bjørkheim and Scheuerer, 2025).

5.5 Mechanisms

We now investigate how these firms shift profits. There are three main channels through which MNEs can engage in profit shifting. Companies can use transfer pricing of intra-firm traded goods (Bernard et al., 2006; Cristea and Nguyen, 2016; Vicard, 2015; Davies et al., 2018; Wier, 2020; Liu et al., 2020), locate intangibles assets in tax havens (Karkinsky and Riedel, 2012; Dischinger et al., 2014; Hebous and Johannesen, 2021) and use intra-firm debt shifting (Huizinga et al., 2008; Fuest et al., 2011). We already have some descriptive evidence of the transfer pricing channel in Figure 1 since intra-firm revenues are disproportionately reported in low-tax jurisdictions (and in tax havens in Figure C.2 in the Appendix).

We use the information on business activities provided in CbCR data and show descriptively in Figure C.3 in the Appendix that some activities are prevalent in tax havens, such as insurance and shareholding activities, but also financial services and intellectual property holding, suggesting that these entities might be vehicles for profit shifting. We estimate the types of business activities that are the most correlated with profit shifting practices by running the following regressions for each business activity:

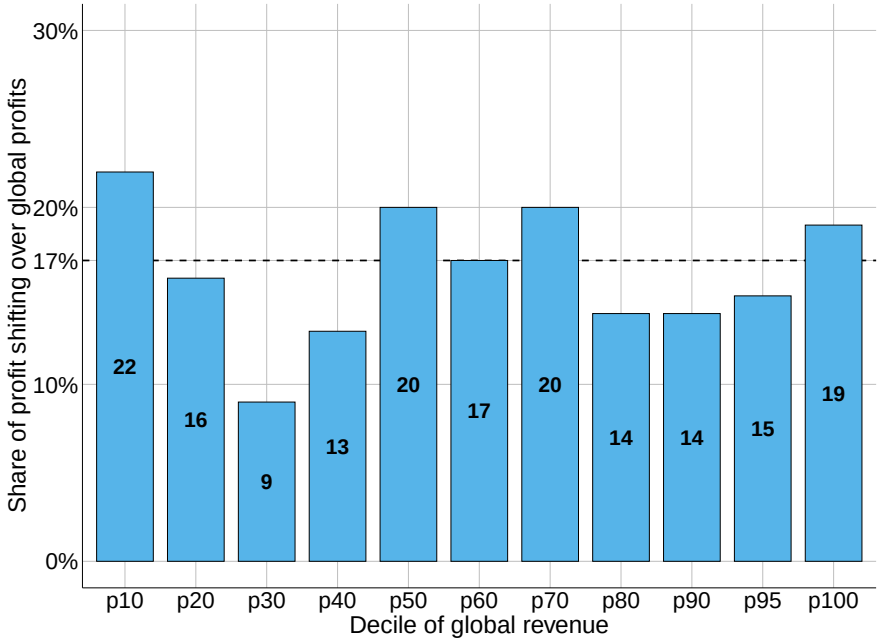
$$log(z_{ift}) = \alpha + \beta Activity_{ift} + \gamma X_{ift} + u_f + v_t + \epsilon_{ift} \tag{5}$$

with z_{ift} the positive amount of profits shifted by MNE f in country i at time t, Activity_{ift} a dummy variable indicating whether the firm f has a subsidiary engaging in this activity in country i at time t, X_{ift} a vector of control variables including logarithms of payroll and tangible assets (plus one), u_f and v_t are firm and year fixed effects respectively. Since a subsidiary can engage in multiple business activities, we include activity dummies one at a time rather than all simultaneously in the regression. Additionally, we run the same regression with country fixed effects to separate the specific effect of business activities from country characteristics.

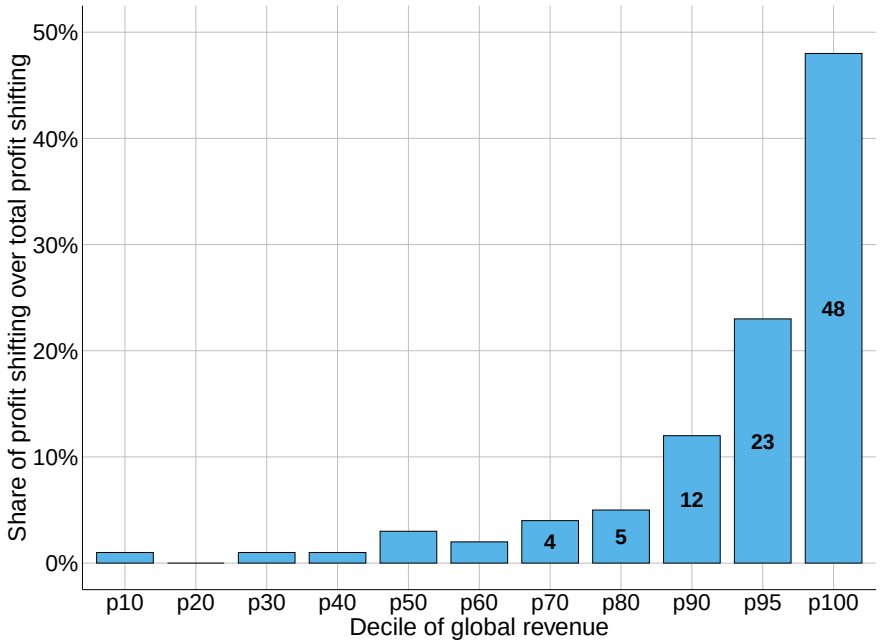
Figure 5 shows our estimates. We find that engaging in intellectual property, shareholding, and insurance activities leads to higher estimates of profit shifting. Shifted profits towards entities that perform intellectual property holding activities, shareholding or insurance activities are on average 150% higher than those estimated in other subsidiaries. Adding country fixed effects and focusing on within-country variation in reported profits by activity performed, we also find that subsidiaries performing intellectual property holding activities, shareholding, or insurance activities shift on average 75-100% more profits than other subsidiaries in the same country.

Figure 4: Profit shifting by firm size

(a) Share of profit shifting over global profits by firm size decile

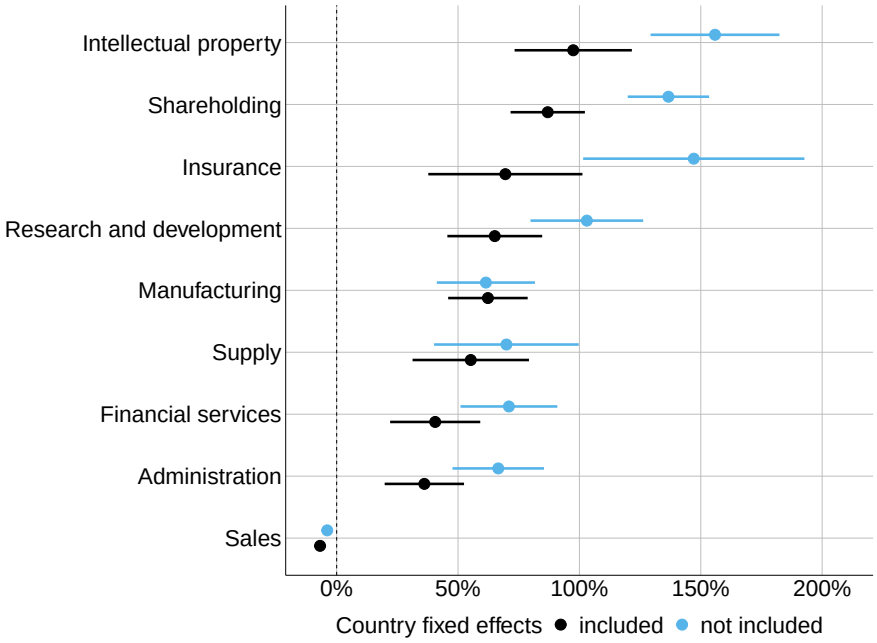


(b) Contribution by decile to total amount of profit shifting



Note: In both figures, MNEs are gathered by decile of global revenue, with the top decile split in two groups. We average the amounts over the period 2016-2022. For instance, the group 100 gathers the top 5% of MNEs in terms of average revenue over the whole period. In Figure 4a, we compute for each decile the ratio of the sum of positive shifted profits over the MNEs in the decile, divided by their global profits. In Figure 4b, we compute for each decile its contribution to total profit shifting as the sum of all positive shifted profits estimated for the MNEs in the decile, divided by the values for all MNEs in our sample.

Figure 5: Correlation between profit shifting practices and business activities



Note: This figure plots the coefficients β from equation 5 with the 95% confidence intervals. *Lecture:* Having a subsidiary that conducts research and development activities corresponds to 100% more shifted profits compared to subsidiaries operating other business activities, when we do not account for country fixed effects. Focusing on within-country variation, the magnitude is of 60% more shifted profits.

5.6 Robustness

We use alternative estimation methods to support our results, and present the results in Table E.1 in the Appendix. We first test different apportionment formulas. In our preferred specification, production costs are estimated as the sum of labor and tangible capital costs, assuming a constant capital rate of return across countries. To validate this choice, we compare the estimates with alternative apportionment formulas (Section E.2 in the Appendix). We first follow Guvenen et al. (2022) and use payroll as the only apportionment factor. We then test the complementary formula with tangible capital costs as the only factor. We also re-estimate profit shifting using a weighted apportionment formula with labor and capital. We use the labor share as a weight that applies to payroll and the capital share (or 1 less the labor share) as a weight to capital, so we can account for the labor intensity of the MNE when reallocating profits of subsidiaries. Finally, we also test the robustness of our results when we include country-specific capital rates of return from Chari and Rhee (2020) (Section E.1 in the Appendix).

Additionally, we try more straightforward tax conditions, and vary the different measures of MNEs tax liabilities (Section E.3 in the Appendix). We use different measures of incentives for an MNE to shift profits into country i, which we compute as

the difference between the ETR of the MNE in country i and the MNE's global ETR. As an alternative measure of the tax liability in country i, we first use the average ETR paid by the MNE in the country over the time period, provided the statutory tax rate remains constant. We also use the average ETR faced by all MNEs in that country in a given year, and third, we use the ETR faced by the MNE in the country in the given year.

We also estimate profit shifting using a corrected measure of wages to account for "*wage shifting*". Multinational firms have some incentives to artificially inflates the labor costs in tax havens in order to substantiate the high level of profits they report there. We indeed find evidence that wages are systematically higher in tax havens than in non-haven countries, as we show in Figure E.2 in the Appendix. We estimate that the wage premium in tax havens is equivalent to about €25,000 per employee, or 40% of the average annual wage. We correct wages in tax havens by the premium and re-estimate profit shifting. We detail the methodology in Appendix E.4. The total amount of shifted profits increases by €2 billion, to reach a global value of €23.4 billion, leading to higher missing profits in France of €11.3 billion, against €10.3 billion before.

Finally, we also run our analysis on the raw CbCR data, which are not corrected for double counting. The global estimate of misalignment is slightly lower, at €32 billion compared to €34 billion. This shows the opposing effects of including intra-group dividends in profits: they inflate reported profits in tax havens receiving large dividend flows, increasing shifted-in estimates, but also inflate reported profits in France — the headquarters country of the MNEs in our sample — thereby reducing the amount shifted out. Indeed, not accounting for double-counted intra-group dividends lowers the misaligned profits in France by 67%.

6 Distributional effects on workers

Profit shifting not only affects redistribution by generating tax revenue losses, but also has potentially large direct distributional effects on workers, which remain largely under-explored.[21] In this section, we study a specific channel of earnings effects within the framework of mandatory profit sharing.

6.1 Mandatory profit sharing

Policies favoring profit sharing between firm owners and employees are widespread across the world. For instance, 25% of Dutch and German firms and 20% of British firms implement such schemes. They also exist in virtually all European countries as well as in the US, Canada, and Mexico, among others.[22] In France, a profit sharing policy was introduced in the 1960s to ensure that employees shared the benefits of

[21] The few exceptions being Alstadsæter et al. (2022), Souillard (2022), Lopez Forero and Michallet (2024) and Davies and Scheuerer (2024).

[22] Source: French Treasury and OECD (1995).

the high levels of investment and growth of the period. Under this policy, firms with more than 50 employees[23] must distribute a share of their profits to their workers every year. This policy is highly relevant in France, since 30% of employees in the private sector receive a positive amount of profit sharing. Moreover, Nimier-David et al. (2023) provide evidence of the effectiveness of the policy in redistributing income, particularly to low-income earners, with minimal distortive effects on employment and investment.

In France, the amount of profits that must be shared among workers is set by the following formula computed at the subsidiary level:

$$\text{Profit sharing} = \frac{1}{2} \times \frac{\text{Wage bill}}{\text{Value added}} \times \Big(\text{Net income} - 5\% \text{ Book equity}\Big) \tag{6}$$

It corresponds to half of the labor share (wage bill over value-added) of the "excess profits" (after-tax profits after deducting 5% of book equity). The amount is then distributed to employees, subject to a cap at approximately €30,000 per capita.[24] Firms decide how to allocate profit sharing among employees, from equal shares to amounts proportional to wages.[25] In practice, using a survey on profit-sharing amounts received at the employee level,[26] we find that most firms adopt the middle ground between these two approaches.

Table 4 shows the main statistics of profit sharing in France. Firms with more than 50 employees distribute 9% of their pre-tax profits to their employees. It represents on average an annual amount of €969 per employee, equivalent to 3.1% of their net wage.[27] In this section, we focus on the subsidiaries of the French multinational firms subject to CbCR[28] that reach the threshold of 50 employees.[29]

Table 4: Main figures of profit sharing in France

	Firms	Employees	Profit sharing		
			Amount	Share in profits	Share in net wages
	(th)	(th)	(€ per emp.)	(%)	(%)
All firms	33.3	8,916	969	9	3.1
CbCR	3.4	1,803	1,310	7.7	3.8

Note: Only subsidiaries located in France and with more than 50 employees are included in the table. The figures are compiled from DADS and BIC-IS data. Profits correspond to pre-tax profits.

[23] The threshold applies at the entity level, not at the multinational group level.

[24] This cap is set at 75% of the *Plafond de Sécurité Sociale* that is adjusted annually in line with inflation.

[25] More specifically, firms can distribute according to the share of the employee earnings in total social security contribution tax base of the firm, which is equivalent to gross wages plus bonuses.

[26] ECMOSS, "Enquêtes sur le coût de la main d'œuvre et la structure des salaires".

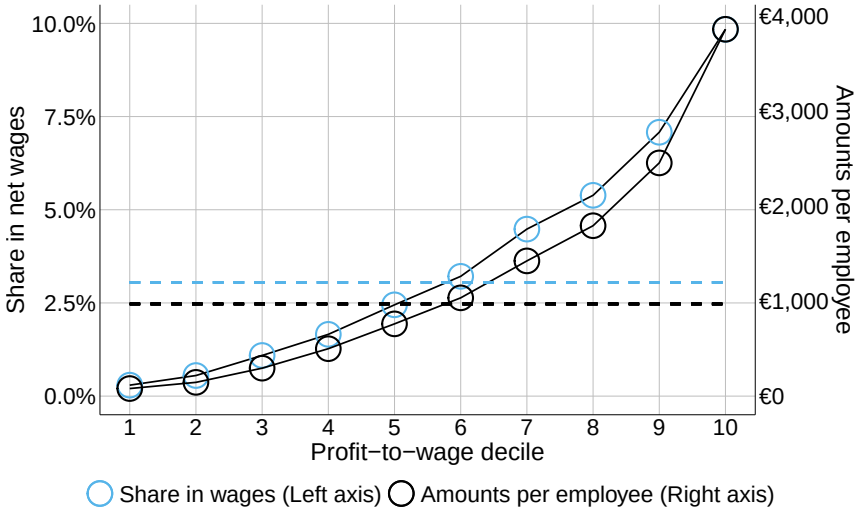
[27] Profit sharing being exempt from social security contributions, we compare it to net wages. This amount includes firms not distributing any profits.

[28] We exclude banks from our sample, since they are subject to a different definition of value-added that we cannot infer from our data.

[29] Although virtually all MNEs in our sample have more than 50 employees in France, many of their French subsidiaries have fewer employees and therefore do not fall under the profit sharing requirement. However, 96% of employees working for these MNEs belong to firms with more than 50 employees. This is due to the fact that many subsidiaries have very few employees.

The amount of mandatory profit sharing is increasing in after-tax profits,[30] as shown empirically by Figure 6. Therefore, by under-reporting the true profitability of French subsidiaries, profit shifting directly reduces the amounts that MNEs distribute to their employees in France through this channel. In the extreme case where a firm shifts all its profits out of France to a low-tax jurisdiction, employees would receive no benefit from profit sharing at all.

Figure 6: Profit sharing and profitability



Note: This graph shows the share of profit sharing in net wages depending on the level of profitability of the firm, as estimated by the profit-to-wage ratio. It includes all firms with more than 50 full-time equivalents. The dotted lines are the average share of profit sharing in net wages and the average amount of profit sharing per employee.

6.2 Estimation of profit sharing losses

We estimate the loss in profit sharing due to profit shifting by comparing the actual profit sharing amount to a counterfactual without shifting. This counterfactual is computed using the profit sharing formula after reallocating shifted profits back to their source subsidiaries.

Reallocation of shifted profits. To reallocate shifted profits to their source subsidiaries, we produce subsidiary-level shifting estimates using the same methodology as at the subgroup level[31] (defined in Section 5). Specifically, we compute misalignment estimates by comparing each subsidiary's profit-to-costs ratio to that of the global multinational firm. We collect data from corporate tax returns on tangible assets,

[30] $\frac{\partial \text{profit sharing}}{\partial \pi} = \frac{1}{2} W \frac{(\text{VA} - \pi + 5\% B)}{VA^2} \geq 0$ since $\text{VA} - \pi \geq 0$, with π equal to net profits, W equal to the wage bill, VA equal to the value added that we consider being equal to $\pi + C$ with C a value independent from π, and B equal to the book equity of the subsidiary.

[31] A subgroup consists of all subsidiaries of a given MNE located in a specific country.

wages, and profits for all the 26,000 subsidiaries of the large French MNEs that are located in France.[32] Since the apportionment formula is linear with the share of costs in global costs, all misaligned profits computed at the subsidiary level of a multinational firm sum up to profit misalignment computed at the subgroup level. Then, we deduct the amount of shifted profits by the subsidiary by multiplying the subsidiary's share in the subgroup misaligned profits by the amount of shifted profits previously computed at the subgroup level.

We find that 23% of the French subsidiaries shift profits out of France, and they account for 37% of workers employed by the large MNEs in our sample (see Figure F.2b in the Appendix).[33] In contrast, 64% of subsidiaries do not engage in profit shifting, while 14% shift profits towards France.[34]

Estimation of profit sharing losses. The loss in profit sharing corresponds to the gap between its counterfactual and actual amounts. We estimate the counterfactual value in the absence of profit shifting using the formula at the subsidiary level: we add the estimated shifted profits to both pre-tax profits and value-added. We compare our counterfactual profit sharing estimates to actual profit sharing, which we re-estimate using the formula. Thanks to the detailed administrative data, we are able to provide a good estimation of actual profit sharing based on the profit sharing formula (see Figure F.1 in the appendix).

We estimate that each employee in subsidiaries shifting profits out of France loses on average €1,089 per year in profit sharing, corresponding to 2.9% of their net wages (column "Main scenario" in Table 5). On the contrary, subsidiaries shifting profits into France experience gains in profit sharing. When we aggregate the results over all subsidiaries, including both outward and inward shifters, the overall effect of profit shifting amounts to an average annual loss of €260 per employee, or 0.7% of net wages.

Table 5: Annual loss per employee in profit sharing due to profit shifting

	Number of employees	Profit sharing amount	Loss per employee					
			Main scenario		With incidence on profits		New formula	
	(th)	(€ per employee)	(€)	(% net wage)	(€)	(% net wage)	(€)	(% net wage)
Shifter in	174	2,693	-1,057	-2.9	-1,172	-3.2	-1,364	-3.7
Shifter out	563	566	1,089	2.9	905	2.4	1,713	4.6
All	1,655	1,075	260	0.7	185	0.5	633	1.8

Note: The table includes only French-based subsidiaries of CbCR-reporting MNEs with more than 50 employees. We present the results separately for inward and outward-shifting subsidiaries. All amounts in euros are annual averages per employee. The profit sharing amounts correspond to our estimated value using reported profits in French corporate tax returns.

Accounting for real responses of shutting down access to profit shifting. Shutting down access to profit shifting opportunities mechanically increases capital

[32] We rescale subsidiary-level data that come from French corporate tax returns to match subgroup-level amounts reported in CbCR.

[33] Figure F.2a shows the allocation based on misalignment.

[34] Indeed, France offers some tax advantages in certain sectors that make it profitable for some MNEs to over-report profits in France.

costs for multinational firms in high-tax countries, potentially leading to reduced investment and ultimately lower true profits. We account for the real effects on profits, investment and employment by building on the results of Suárez Serrato (2018),[35] who studies the repeal of §936, that led to a reduction in US MNEs ability to shift profits to their affiliates in Puerto Rico, which is the closest setting to our counterfactual scenario. Following this repeal, US MNEs experienced an increase in their global effective tax rates of 3.5pp on average, which is close to what we find if French MNEs were no longer able to shift their profits (of 3pp, see Figure D.6 in the appendix).

Since after-tax profits and value-added are an essential part of the profit sharing calculation, we compute an alternative counterfactual scenario that accounts for the effects of shutting down profit shifting opportunities on true profits generated by real economic activity. As shown by Suárez Serrato (2018), the increase in the effective tax rate led to a significant decrease in investment for exposed firms, with a semi-elasticity of -1.77. We assume that an increase in investments translates to an equivalent increase in profits, and thus include this semi-elasticity in our computation to reduce the amount of true profits in the alternative counterfactual scenario of profit shifting closure. We compute the increase of ETR for MNEs in France that would emerge in case of profit shifting closure at the MNE level, by comparing the actual French ETR to the ratio of tax paid by the MNE on all true profits generated in France (reported plus shifted) divided by the amount of true profits (for more details see Appendix F.3).

Accounting for this incidence on profits, we find that employees of firms shifting profits out of France lose €905 of profit sharing every year, equivalent to 2.4% of their net wages. It corresponds to a decrease of 62% of the counterfactual amount of profit sharing. Therefore, even under strong assumptions regarding the adjustment of profits and inputs, our results show that employees still face substantial earning losses from profit shifting.

6.3 Distribution of profit sharing losses to workers

We examine the distributional impact of profit shifting by allocating the resulting loss in profit sharing across employees, based on the allocation method firms most commonly use. Firms have some leeway in how they distribute profit sharing among their employees. They can either allocate the same amount to every employee, or in proportion to wages, or choose a distribution method that combines these two options. Using an employee-level survey, we find that, in practice, most firms adopt a distribution in which half of profit sharing is distributed equally, and half is distributed according to the share of each worker in total compensation paid by the firm (see Appendix F.4 for more details). Therefore, we distribute the amount of our subsidiary-level estimates of profit sharing to their workers following this mixed allocation rule.

In this section, we focus on employees working more than half-time in a subsidiary

[35] This is, to our knowledge, the only paper estimating precisely these elasticities in a context of a tax increase caused by a closure of profit shifting opportunity.

of a French MNE subject to CbCR. They represent 1.6 million of workers, whom we group by deciles of annual net wages. One third of them work for subsidiaries that shift profits out of France, 10% in inward shifting ones, and the rest in subsidiaries that do not use such tax avoidance schemes. We also find that high-income earners tend to work slightly more for shifting firms than low-income earners (see Figure F.3 in the Appendix).

We distribute profit sharing losses to workers and then compute the average loss by decile of net wages in Figure 7. We present the results for all workers (black bars) and focus specifically on employees in subsidiaries that shift profits out of France (blue bars). Given the relatively progressive distribution method adopted by firms, lower-income workers receive a larger share of profit sharing relative to their wages compared to higher earners. As a result, employees in the bottom decile (net annual wage below €15,000) working in outward-shifting subsidiaries experience the largest relative losses of 4.2% of their net wages per year, compared to 2.1% for those in the top decile (net wage above €50,000) (Figure 7a). In absolute terms, however, losses are larger at the top: workers in the top decile lose €1,930 annually, while those in the bottom decile lose €665 (Figure 7b).

6.4 Gains of switching to a worldwide definition of profit sharing

We have shown that using subsidiary profits in the profit-sharing formula leads to losses for employees due to profit shifting. While shutting down profit shifting opportunities may be a long-term process, a more immediate and easily implementable policy to tackle negative effects on profit sharing would be to adjust the official formula. Instead of using easily manipulated subsidiary-level profitability, we propose to rely on the multinational group's global profitability. We then estimate the potential gains for French workers from this change on the profit sharing formula.

To do so, we replace net profits and value added by their values if subsidiaries were as profitable as the group, using the same definition of profitability that we use to compute our misaligned profits.[36] We find that this switch would considerably increase their amount of profit sharing. Employees of the large French MNEs would gain on average an additional €633 every year through profit sharing, equivalent to 1.8% of their net wages (column "New formula" in Table 5). For those working in outward shifting subsidiaries, they would experience an increase of 4.6% of their net wages.[37]

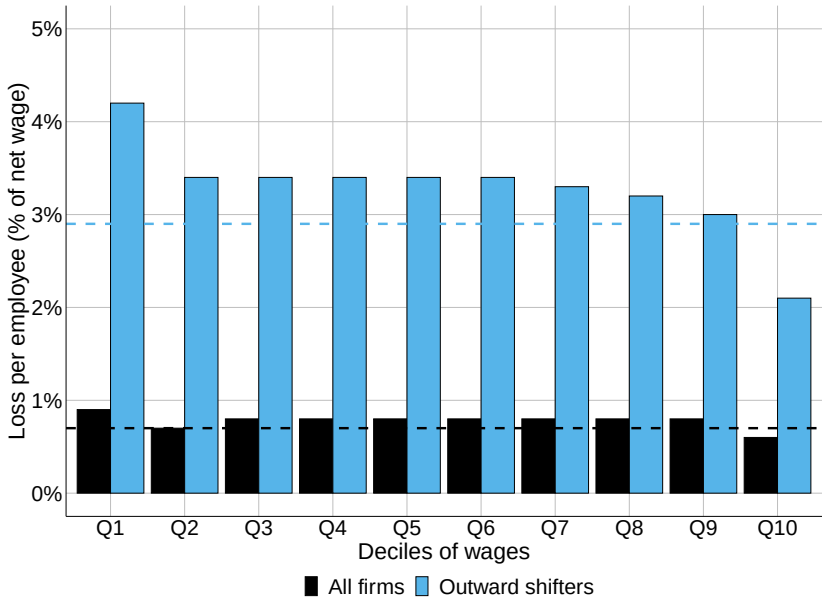
Overall, our analysis suggests that profit shifting affects workers through lower earnings in high-tax countries. We also show the distributional consequences of profit shifting: low-income workers are hit the most with profit shifting and face lower distributed earnings through profit sharing mechanisms relative to high-income workers.

[36] Profitability is defined as the ratio between profits over wages and costs of tangible assets.

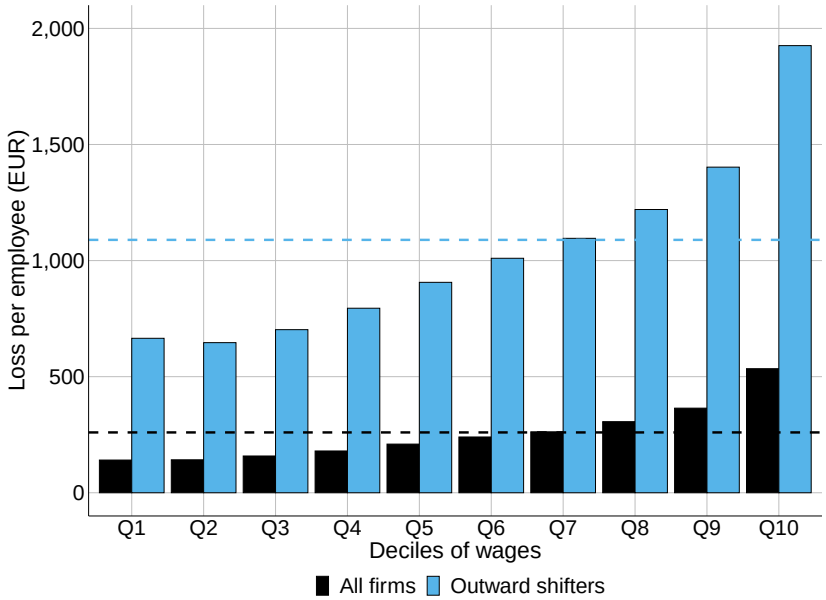
[37] We make the hypothesis that the adoption of such a policy would not affect employees wages, building on the results of Nimier-David et al. (2023) who find that the expansion of mandated profit sharing to firms between 50 and 100 workers did not have any incidence on employees wages.

Figure 7: Distribution of profit sharing losses by decile of net wages

(a) In share of net wage



(b) In amounts



Note: The graphs only include workers with working time of at least 0.5 full-time equivalent. Top graph: the vertical axis shows profit sharing losses as a share of net wages. Bottom graph: the amount is per full-time equivalent. The black bars include all subsidiaries with more than 50 employees of the French CbCR-eligible MNEs, and the blue bars focus on those shifting profits out of France. The dashed lines indicate the mean value for workers over all deciles.

7 Conclusion

This paper provides new evidence on how profit shifting affects workers of multinational firms. We use a newly available and unique micro dataset on the global activity of MNEs, along with a revised apportionment methodology, to estimate profit shifting.

We find that 19% of foreign profits of French MNEs are shifted for tax reasons. Matching our micro-level profit shifting estimates to French employer-employee data, we find that workers of subsidiaries engaging in profit shifting lose €1,089 on average per year due to the associated loss in profit sharing, harming more low-wage workers in share of their wages.

Our findings have two main policy implications. We first show that profit shifting is highly concentrated among the largest firms, reflecting the concentration of profits rather than differences in tax avoidance aggressiveness. This finding is particularly relevant for policymakers seeking to more effectively target multinational tax avoidance practices. Second, we put forward a new profit sharing formula that would take into account the worldwide profitability of the MNE instead of subsidiary-level profits. This new formula would completely offset the loss associated with profit shifting, and result in an average gain of 1.8% of net wages for all workers of MNEs, and 4.6% for workers of shifting subsidiaries.

Our investigation has uncovered one channel through which profit shifting affects the income distribution between workers and firms. More research is needed to arrive at a comprehensive understanding of how global tax competition on corporate income tax rates affects the distribution of wealth and income.

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A Data Appendix

A.1 List of tax havens

We use the list provided by Tørsløv et al. (2023b). We include five OECD countries (Belgium, Ireland, Luxembourg, Netherlands, and Switzerland) and 36 non-OECD countries or territories, namely 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, Sint Marteen, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Turks and Caicos, Vanuatu.

A.2 Matching with OFATS and French administrative data (BIC-IS)

To recover the compensation of employees paid by each group in each country, we match our CbCR data with data from Outward Foreign Affiliates Statistics (OFATS) and French administrative data (LIFI and BIC-IS).

A.2.1 French subsidiaries

To recover wages paid by French subsidiaries, we merge CBCR to French administrative data. We use the list of subsidiaries that MNEs have to provide in their CBCRs which includes a firm identifier that we can directly match to administrative data for 65% of all subsidiaries× year. We complement this match with a restrictive fuzzy match on the name of the mentioned subsidiary.[38] This brings our match to 75% of all subsidiaries. For 71% of MNE×year observations the number of subsidiaries recovered was more than 95% of the total number of subsidiaries mentioned. For companies not giving enough information on their subsidiaries, we use the firm ownership dataset LIFI. We then benchmark our two matches (with LIFI and with the list of subsidiaries) and choose the best match between the two. In the end, 83% of our MNE×year observations come from the list in CBCR, the rest comes from LIFI. Our match is close to perfect, as shown by Figure A.1. We then use information from BIC-IS on total compensation of employees, which definition corresponds to the information contained in OFATS.

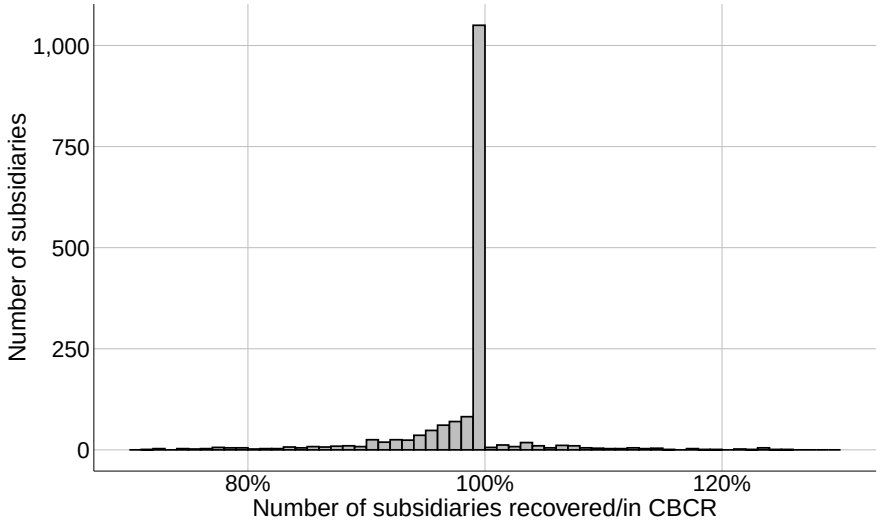
A.2.2 Foreign subsidiaries

OFATS collects information from the heads of French multinational groups about their subsidiaries abroad for firms in all sectors.[39] The OFATS sample includes an

[38] For the fuzzy match, we only remove generic suffix for companies such as "SAS", " SNC", etc.

[39] Multinational firms have to report all companies in which the group exercises control, directly or indirectly. All MNEs whose main decision-making center is located in France and controlling at least one company based outside France are surveyed. The survey is sent to the parent company or "decision center", or to the company responsible for consolidating data from subsidiaries throughout the group.

Figure A.1: Quality of the match



Note: This graph shows the distribution of the ratio between the number of subsidiaries we recover in our data and the number of subsidiaries reported in CBCR.

exhaustive stratum of groups with four or more subsidiaries (around 1,600 groups).[40] Out of the 314 MNEs in total for the years 2016-2022, we were able to match 296 with OFATS. For non-matched observations, we use the number of employees provided by CbCR, that we multiply by the median wage at the country-year level computed using OFATS on matched observations.

Moreover, 22 small countries are completely missing in OFATS (out of the 221 countries in CbCR). For 20 out of these 22 countries, only 5 MNEs are operating, and for 16 countries, only one or two MNEs are operating. In these cases, we use the average wage computed from official statistics.

A.2.3 Computation of wages

We proceed in three steps to compute wages:

- We compute the average wage per employee at the MNE×country level in OFATS and in BIC-IS merged to employer-employee data (DADS) to recover the number of employees in full-time equivalents.
- We multiply this average wage by the number of employees in Country-by-Country reports.
- Missing wage data is imputed through linear interpolation at the MNE-country level.
- For remaining missing values, we first estimate wages by multiplying the number of employees by the average wage per employee of the MNE in the country over

[40] See CNIS.

the period. If data is still missing, we use the median average wage per employee of other MNEs in the same country and year.

A.3 Consolidated financial accounts

Our analysis utilizes consolidated financial information from Moody's Orbis database for the multinational enterprises in our sample. Specifically, we extract the following key variables at the consolidated group level: total revenues, reported profits, and number of employees. We also manually supplement its coverage for select multinationals by collecting data from their published annual reports to ensure accuracy.

B Data Cleaning

B.1 General data cleaning

CbCR data is still in its early stages and several issues need to be addressed before it can be reliably used for economic analysis. As reported by the OECD,[41] common data quality issues include inconsistencies in units, currencies, naming conventions, and missing information. More specific to CbCR are inconsistencies in how companies report tax payments (i.e. with positive or negative signs) and the potential double-counting of intracompany dividends.

We develop data-cleaning techniques that address both general and CbCR-specific data quality issues, enabling the transformation of raw CbCR data into standardized formats suitable for analysis. Properly handling data issues is crucial, as inappropriate treatment could lead to misleading analytical outcomes. For example, unit errors tend to occur more frequently among large multinationals that may report figures in thousands or millions rather than base units.

The tax payment direction issue stems from unclear OECD guidance on whether taxes paid should be reported as positive or negative figures. This significantly impacts the accuracy of the reported tax variable, which is a key analytical component. Similarly, inconsistencies in the reporting of intra-company dividends can artificially inflate or deflate profit figures for certain jurisdictions, skewing subsequent effective tax rate calculations (Blouin and Robinson, 2023). As highlighted by research from different misteries (Italy, UK, Sweden, Netherlands) and Horst and Curatolo (2020); Garcia-Bernardo et al. (2022), these double-counted dividend amounts can be substantial.

The core of our cleaning methodology involves benchmarking CbCR data against companies consolidated financial accounts, which eliminates all intragroup transactions and provides a singular entity perspective. This comparison isolates companies that likely include intracompany dividends, enabling the estimation of double-counted amounts.

[41] https://www.oecd.org/tax/beps/common-errors-MNFs-cbc-reports.pdf

B.2 Cleaning of double-counting

One of the main challenges with Country-by-Country data is the presence of double-counting, meaning that certain subsidiaries report received dividends in their profits that were already included in the profits of the subsidiary sending those dividends. This issue arose due to initially unclear OECD guidelines, resulting in some of the groups we studied reporting their intra-group dividends twice.

To solve this, we compare our groups total profits in CbCR data with group-level consolidated financial data. If total profits in CbCR exceeded consolidated profits by more than 5%, we considered that the group double counted its profits, and estimated the amounts of double-counting of this group to be the difference between CbCR profits and accounting profits.

B.2.1 Match with Consolidated Accounts

To match the CbCR data with the Orbis database, we utilize the firms tax identification numbers (SIREN). First, we perform an exact match based on the SIREN. For firms where an exact match is unavailable, we apply a fuzzy matching technique using company names. Additionally, we manually supplement the dataset with publicly available information to maximize coverage.

On average, we successfully matched 84% of our observations to their consolidated accounts each year. However, for some matched firms, profit information remains unavailable. As shown in Table B.1, our dataset covers a significant portion of the main variables: 90% of unrelated party revenue, 92% of profits, and 86% of employees reported in the CbCRs.

Table B.2 presents the distribution of the ratios between CbCR and consolidated values for unrelated party revenues, profits, and employees. The mean ratio for profits (1.44) is significantly higher than that for revenues (1.13) and employees (1.11), indicating larger discrepancies between CbCR and consolidated data for profit figures, possibly due to the inclusion of dividends. In contrast, the ratios for revenues and employees demonstrate more consistency, with mean values close to 1, indicating a generally good match between the two data sources. Specifically, the revenue ratios range from the 10th percentile (0.98) to the 90th percentile (1.20), and the employee ratios range from the 10th percentile (0.91) to the 90th percentile (1.12), showing tighter distributions compared to profits. Overall, while profit figures exhibit more variability, the data for revenues and employees align more closely between CbCR and Orbis.

We rely on the comparison between the revenue reported in consolidated accounts and in CbCR to ensure the quality of the information before identifying firms with potential inclusion of dividend payments. We differentiate between high-quality and low-quality matches based on the ratio of CbCR unrelated party revenues to consolidated revenues. If the ratio between unrelated party revenues and consolidated group revenues falls between 0.7 and 1.3, we categorize the match quality as high. Firms with

Table B.1: Results of the matching with consolidated accounts

Year	Matched	N. obs. (%)	Unrelated revenue (%)	Profit (%)	Employees (%)
2016	Yes	87	86	85	82
2016	No	13	14	15	18
2017	Yes	88	90	94	86
2017	No	12	10	6	14
2018	Yes	89	90	96	87
2018	No	11	10	4	13
2019	Yes	88	93	97	89
2019	No	12	7	3	11
2020	Yes	82	90	91	88
2020	No	18	10	9	12
2021	Yes	81	91	91	87
2021	No	19	9	9	13
2022	Yes	72	88	91	83
2022	No	28	12	9	17

Note: This table presents the percentage share of multinationals matched or unmatched to consolidated accounts, showing their representation in key variables such as unrelated revenue, profit, and employees. "Yes" indicates a successful match, while "No" indicates no match was found.

Table B.2: Ratios between CbCR and consolidated accounts

	Mean	Median	Q10	Q25	Q75	Q90
Unrelated party revenue	1.10	1.05	0.98	1.00	1.10	1.20
Profit	1.41	1.03	0.50	0.92	1.53	2.47
Number of employees	1.09	1.00	0.90	0.98	1.02	1.11

Note: The table presents the distribution of the ratios between CbCR and Orbis values for revenues, profit, and number of employees at the consolidated level. A ratio larger than 1 indicates that CbCR values are larger than those found in consolidated accounts for a given multinational.

a good match on revenue represent most of our observations in terms of total revenue, profits, and employees.

B.2.2 Identifying groups with potential inclusion of intracompany dividends

To assess the potential inclusion of intracompany dividends in the profit variable and estimate their size, we classify multinationals into three distinct groups based on specific criteria. This analysis aims to provide insights into the presence and magnitude of intracompany dividends within the dataset.

The three groups are defined as follows:

1. **Dividends included**: This group consists of multinationals with a high-quality match on revenues and a ratio of CbCR profit to consolidated profit ($\frac{Profit_{CbCR}}{Profit_{conso}}$)

exceeding 1.05. In such cases, there is a high probability that intracompany dividends are included in the reported profit figure.

2. **Dividends excluded**: This group consists of multinationals with a high-quality match on revenues and a ratio of CbCR profit to consolidated profit ($\frac{Profit_{CbCR}}{Profit_{conso}}$) lower than 1.05. For these multinationals, intracompany dividends are most likely excluded from the reported profit.

3. **Other**: multinationals falling into this category are excluded from the dividends analysis due to potential matching issues between the CbCR data and the Orbis dataset.

B.2.3 Estimation of double-counting

For each multinational that potentially includes intra-group dividends, we estimate the amount of double-counted profit by calculating the difference between the aggregated values reported in the Country-by-Country Reports and the consolidated figures.

Table B.3 shows the overall amount of double-counted profits. We observe that double-counting represents 38% of total profits for MNEs in which we observe double-counting. In aggregate, considering multinationals for which we have a good match on revenues, double-counted profits account for 14% of total reported profits in CbCR. We find that the quality of CbCR data is improving over time, with 26 to 27% of MNEs double counting their profits between 2016 and 2018, down to 20% between 2019 and 2022.

We assume that the inclusion of dividends will result in observations with very high profitability and low effective tax rates (ETRs). Based on this assumption, we select problematic countries within each multinational to correct for double-counted dividends. Specifically, within each multinational we flag subsidiaries in the bottom 30th percentile of ETRs and the top 30th percentile of profitability (calculated as profit over total revenue). For these selected jurisdictions plus the ultimate parent France, we treat the double-counted dividends as distributed income, allocating amounts pro-rata based on reported profit.

The inclusion of dividends poses challenges, especially for countries serving as holding hubs that are instrumental for dividend repatriation for multinational corporations. We use below the share of holding companies in total companies as an indicator for the location of double-counted profits.

Figure B.1 shows the distribution of total profits (both potentially including and excluding intra-group dividends). It shows that the amount of profits is largely corrected for some countries, notably Netherlands, Switzerland and Luxembourg.

B.2.4 Validation of double-counting cleaning methodology

To validate our method, we first use the comments of the groups in their CbCR reports. We check that the groups indicating that they double counted their intra-

Table B.3: Estimation of Profit Double Counting

Year	Dividends	Obs.	Rev. CbCR (Bn€)	Rev. Orbis (Bn€)	Profit CbCR (Bn€)	Profit Orbis (Bn€)	Double Counted Profit (Bn€)	Double Counted Profit (%)	Double Counted Profit (in and out %)
2016	In	56	379	365	64	31	30	47	22
2016	Out	57	1042	979	76	79			
2016	No Match	95	481	161	36	9			
2017	In	66	542	508	78	39	34	44	18
2017	Out	82	1171	1081	108	126			
2017	No Match	100	387	129	19	5			
2018	In	69	577	527	89	48	35	40	19
2018	Out	84	1202	1088	97	101			
2018	No Match	95	389	138	18	3			
2019	In	64	512	486	84	44	33	40	18
2019	Out	97	1324	1242	103	107			
2019	No Match	92	469	219	28	4			
2020	In	42	293	272	42	13	27	65	29
2020	Out	112	1227	1131	50	49			
2020	No Match	100	533	204	36	9			
2021	In	62	474	466	110	65	41	38	19
2021	Out	100	1385	1280	113	126			
2021	No Match	97	388	116	44	13			
2022	In	47	731	701	123	90	24	19	10
2022	Out	67	1208	1169	125	126			
2022	No Match	110	531	174	32	6			

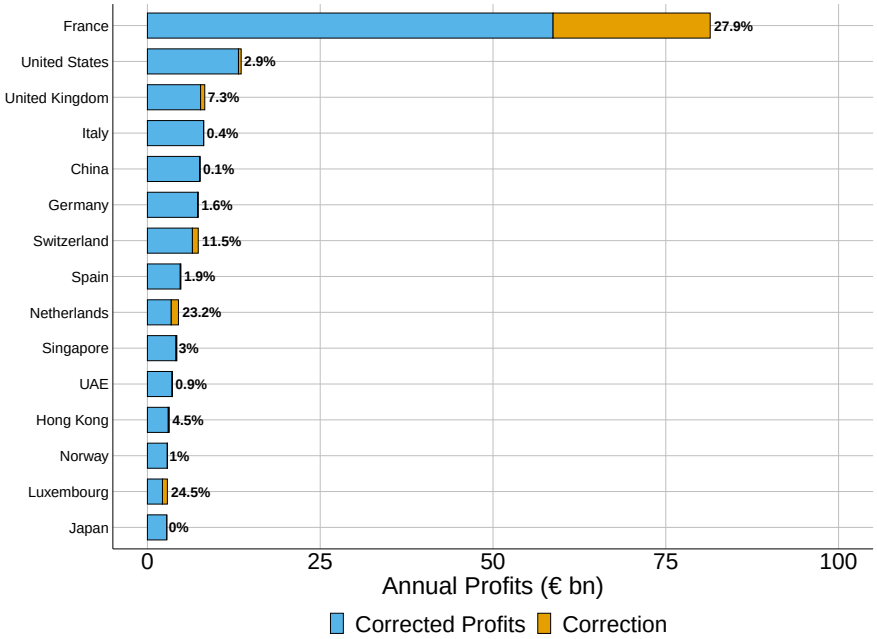
Note: Revenue and profit figures are presented in billions of euros (Bn€). Double-counted profits refer to instances where CbCR-reported profits exceed consolidated profits by at least 30%. The second last column displays the percentage of double-counted profits for companies that include dividends, while the final column shows the percentage of dividends relative to profits for companies both including and excluding dividends.

group dividends are indeed identified as such by our methodology. Out of the over 15 MNEs that reported information on whether they include intra-company dividends, our correction was correct in more than 75% of the cases. We also use the share of holding companies in total companies as an indicator of potential double-counted profits. We expect countries that have many holding activities to receive a lot of dividends. Figure B.3 shows that holding companies are very prevalent in tax havens, consistent with our top countries for which we observe a lot of double-counted profits.

We then compare the pre-tax book income we observe in the French tax returns data (BIC) to the corrected and uncorrected amounts of pre-tax profits reported in CbCR. We show this in Figure B.2. We observe that before correcting for double counting, CbCR profits in France are on average larger than the pre-tax profits reported in tax returns data.[42] Atfer implementing our methodology, we find that profits in CbCR are

[42]In France, all firms have to submit an income statement to the tax authority, which enables us to

Figure B.1: Correction of double-counting per country



Note: The graph presents the amount of double-counting correction averaged over the available years, only for companies potentially including dividends. The graph shows the top 20 in terms of profit. The sum of the yellow and blue bars shows the total profits before double-counting correction. The blue bars show the corrected amount of profits we use in our estimation of profit shifting. The black dot indicates the percentage of double-counted profit in each country.

ligned with profits reported in tax returns. Similarly, we confirm that we capture the right firms by showing that, for firms for which we do not identify double counting, the profits reported in CbCR match the profits reported in tax returns.

We then compare effective tax rates and profitability of the corrected groups with groups that did not double count their intra-group dividends. Table B.4 shows as expected that the ETR of firms for which we observe double-counting is much lower than for those without double-counting. After correction, the ETR is much closer to the ETR for observations where there is no double-counting. Table B.5 also shows that firms that include intra-company dividends have a higher profitability that other firms.

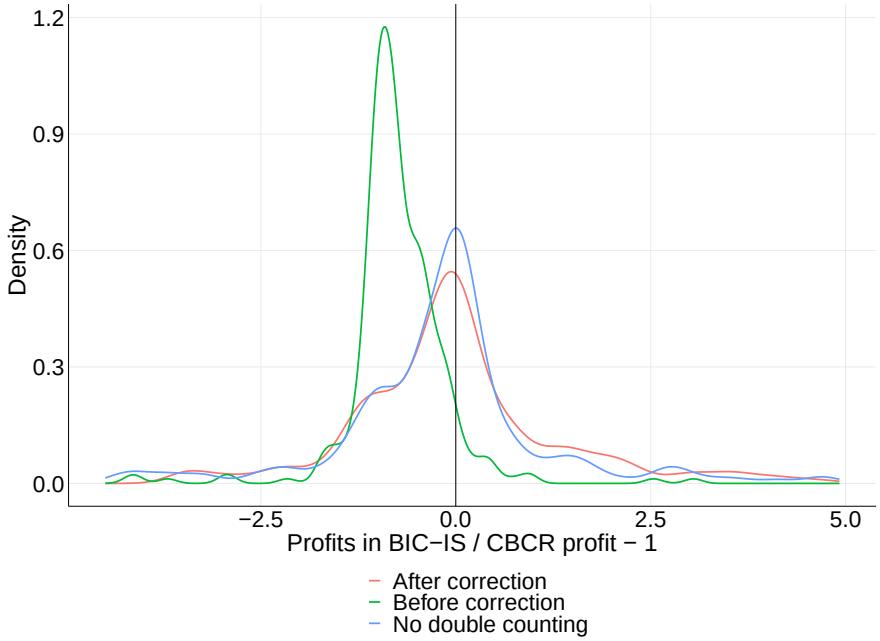
B.2.5 Comparison with existing estimates

When comparing our findings with previous estimates of double-counting, we observe variations depending on the specific dataset and jurisdiction analyzed. The following are some notable comparisons:

With aggregated data. Previous studies that utilized aggregated data have reported the following estimates of double-counting:

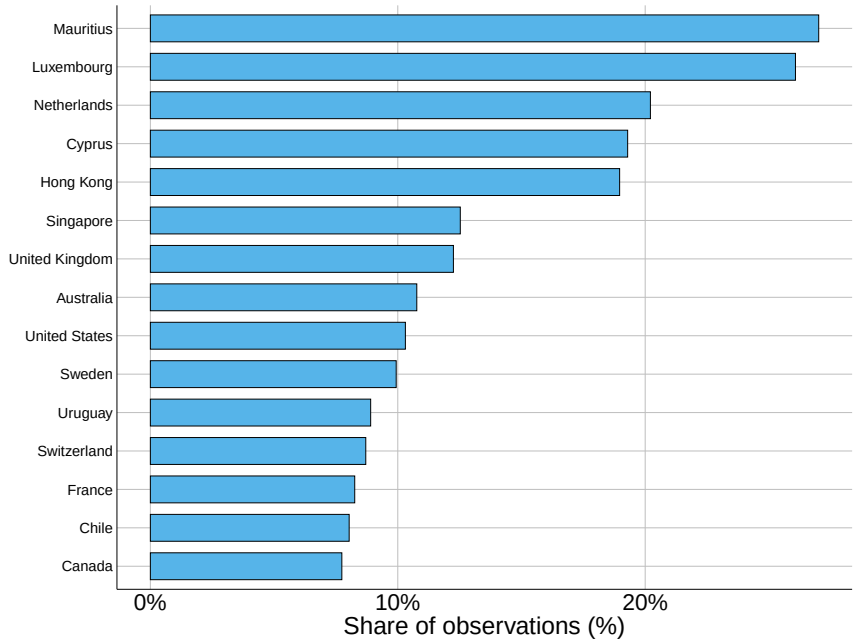
recover their pre-tax book income, which should correspond to the pre-tax profit variable in CbCR.

Figure B.2: Pre-tax profits - Validation of the double counting correction



Note: We center the distribution around 0, so that a ratio around 0 means that the profits (corrected or uncorrected) reported in CbCR equal the profits reported in BIC.

Figure B.3: Share of holding activity in total observations per country



Note: Percentage of holding activity in total observations per country. Includes countries with more than 50 multinational firms per year from 2016 to 2022.

- Horst and Curatolo (2020): Estimated a double-counting rate of 23% (including stateless entities) based on the US Country-by-Country Reporting (CbCR) data

Table B.4: Descriptive Statistics of Effective Tax Rates (Accrual Basis) - Group level

Variable	N. Obs.	Mean	Median	Q10	Q25	Q75	Q90
ETR dividends in	406	20.2	16.2	5.3	9.7	24.1	32.8
ETR dividends out	516	60.4	27.9	12.8	20.9	36.5	57.5
ETR corrected	406	40.9	24.9	10.7	18.9	33.5	55.5

Note: Descriptive statistics of the effective tax rate calculated at the MNE level using corrected and not corrected profit. "ETR dividends in" indicates MNEs that potentially include dividends, "ETR dividends out" indicates MNEs that do not include dividends, and "ETR corrected" indicates "ETR dividends in" after the correction is applied. We include all observations with positive profit for the years 2016 to 2022.

Table B.5: Descriptive statistics of profitability - Group level

Variable	N. Obs.	Mean	Median	Q10	Q25	Q75	Q90
Profitability divid. in	406	14.6	11.5	2.2	5.2	18.0	29.6
Profitability divid. Out	516	9.0	5.7	1.2	2.9	11.6	21.4
Profitability corrected	406	8.5	7.2	1.2	3.1	10.9	16.4

Note: Descriptive statistics of profitability calculated at the MNE level using corrected and not corrected profit divided by total revenues. "Profitability divid. in" indicates MNEs that potentially include dividends, "Profitability dividends out" indicates MNEs that do not include dividends, "Profitability corrected" indicates "Profitability dividends in" after the correction is applied. We include all observations for the years 2016 to 2022.

for the year 2017.

- Garcia-Bernardo et al. (2022): Found double-counting rates of 49%, 72%, and 47% for the years 2017, 2018, and 2019, respectively (including stateless entities) using US CbCR data.
- Dutch Government: Reported that dividends accounted for 16% of total profit based on the Dutch CbCR data for the year 2017.

At the parent level. Some tax authorities have provided estimates of double-counted profits at the parent jurisdiction level. These estimates are as follows:

- UK HMRC: Estimated that 49% of domestic CbCR profit reported by UK MNEs was double counted, with approximately 25% of UK-headquartered groups including dividends. The estimate was based on the UK CbCR data for the year 2017.
- Italy: Reported an average double-counting rate of 38.2% based on the Italian CbCR data for the year 2016.
- Sweden: Identified double-counting rates of 58% for the year 2016 and 52% for the year 2017 based on the Swedish CbCR data.

These comparisons highlight the varying degrees of double-counting observed across different datasets and jurisdictions. The differences in rates can be attributed to variations in data quality, matching methodologies, and specific reporting practices within each jurisdiction.

C Additional descriptive evidence

CbCR data reveal the wide range of tax rates faced by multinational companies worldwide. We compute effective tax rates (ETRs) at year and country level by summing all taxes accrued reported in a given country during the year, divided by the sum of all profits reported in that country in the same year.[43]

We observe that French multinationals face very different ETRs depending on where they book their profits (Figure C.1). In France, we observe that multinationals face a significantly lower ETR than the statutory rate. Additionally, the decline in the corporate income tax rate has led to a small reduction in the ETR. At the beginning of the period, the ETR was 24%, compared to a statutory rate of 33.3%. By 2022, the ETR had dropped to 21%. Bach et al. (2019) show that the gap between statutory and effective tax rates in France is mainly due to three factors: the deductibility of interest from the tax base (that explains 39% of the gap), the employment competitiveness tax credit (27%) and the R&D tax credit (13%). The authors also showed that these three factors mainly impact large firms, leading to a lower ETR than for smaller firms.

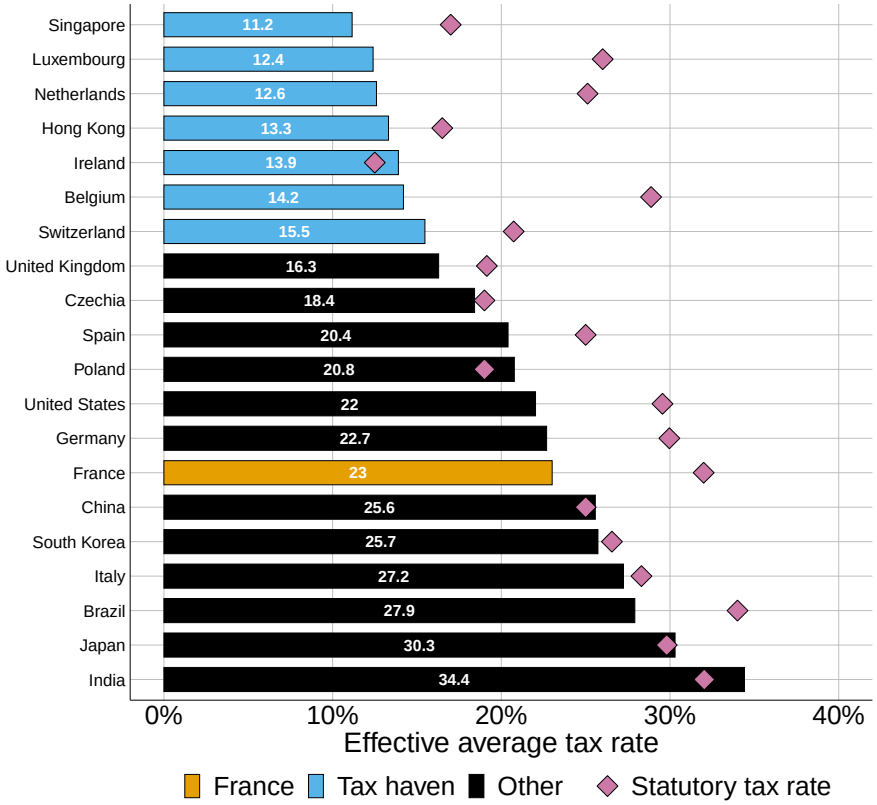
In addition, we observe that French MNEs face lower effective tax rates in tax havens such as Singapore, Luxembourg, Hong Kong and Switzerland, with ETRs well below the statutory rates. Overall, French MNEs face an average effective tax rate of 23% on their global profits. Several tax havens strike out as having relatively low effective tax rates, much lower than the statutory tax rate, such as Luxembourg or Singapore.

CbCR data provide valuable insights into the location of activities of multinational enterprises, including in tax havens. Figure C.2 shows the distribution of activities carried out by French multinationals around the world. One of the first observations is that a significant proportion of their activities are concentrated in France. On average over the period 2016-2022, 34% of employees, around 45% of payroll, tangible assets and related party revenue, and 34% of profits are located there. Moreover, 22% of foreign profits are booked in tax havens (14% of global profits) while less than 12% of foreign tangible assets are located in tax havens. This is a first suggestive evidence of a clear misalignment between profits and economic activities in tax havens. We also observe that related party revenues are over-represented in tax havens compared to production factors. This type of revenue is likely to be influenced by profit shifting, in particular by transfer pricing manipulation. More precisely, we find that around 33% of related party revenues reported outside of France are located in tax havens over the period.

In Figure C.3, we plot the distribution of the business activity of the subsidiaries by country type. We differentiate between France, tax havens and other countries. We observe that activities that tend to be more associated with profit shifting, such

[43] We only include in the calculation the subsidiaries reporting positive profits and a positive tax liability that does not exceed the amount of profits (they account for 64% of our sample, and 92% of observations with positive profits).

Figure C.1: Average Effective Tax Rate by country

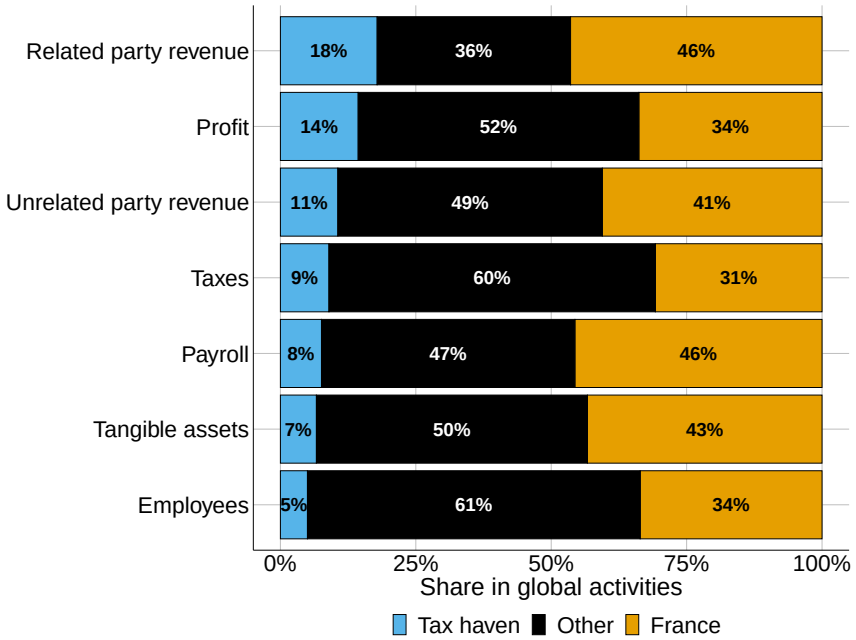


Note: This graph shows the effective tax rates and statutory tax rates of the 20 countries where the French MNEs report largest profits. The values correspond to the average over the period 2016-2022. ETRs are computed at the year and country level as the sum of tax accrued reported there, divided by the sum of profits, including only subsidiaries that report positive profits and positive accrued tax amount, and a tax amount lower than reported profit. Statutory tax rates come from Tax Foundation. *Lecture*: between 2016 and 2022, the average effective tax rate in Singapore is 9%, while the statutory tax rate is 17%.

as holding activities, financial and insurance activities, are prevalent in tax havens. These activities are likely to be decorrelated from real economic activities as they do not necessarily require much physical presence and are very mobile. In total, 25% of insurance activities are reported in tax havens, against only 7% of manufacturing.

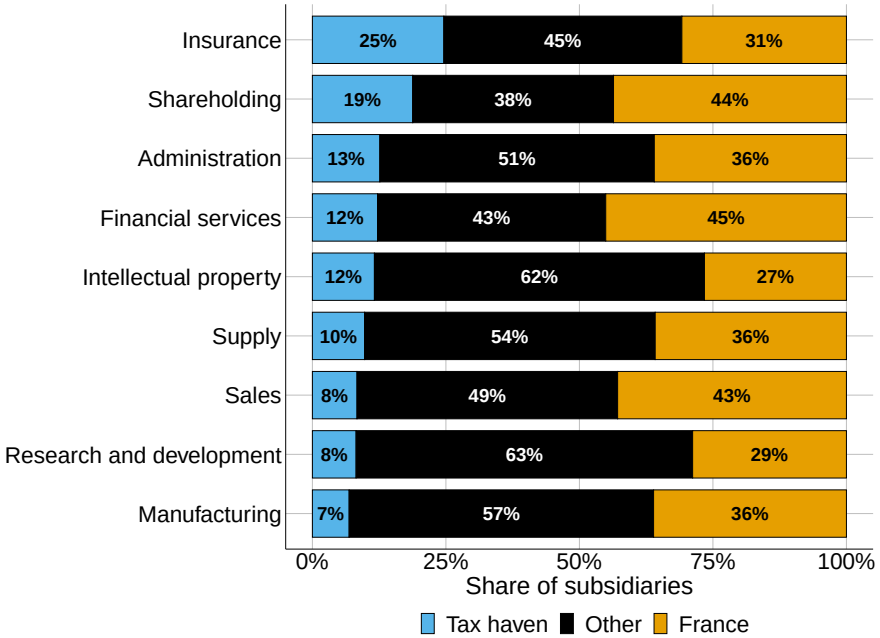
Figures C.4 show the distribution of the main variables among the MNEs.

Figure C.2: Misalignment between real and reported activities in tax havens



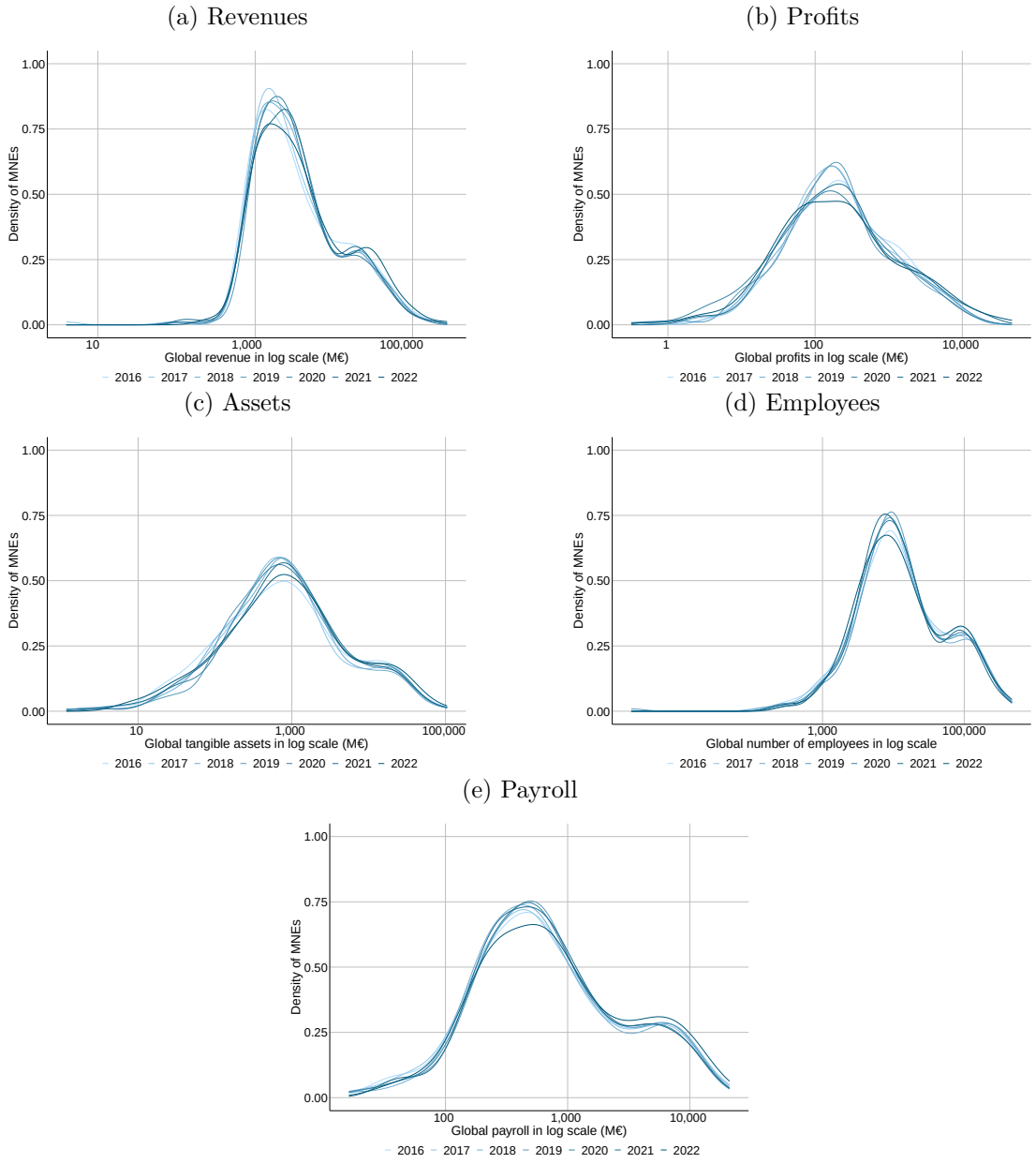
Note: This graph depicts the share of MNE activity in France, tax havens and other countries across key variables. *Lecture*: On average over the period, tax havens accounted for 18% of all related party revenues.

Figure C.3: Business activities of subsidiaries



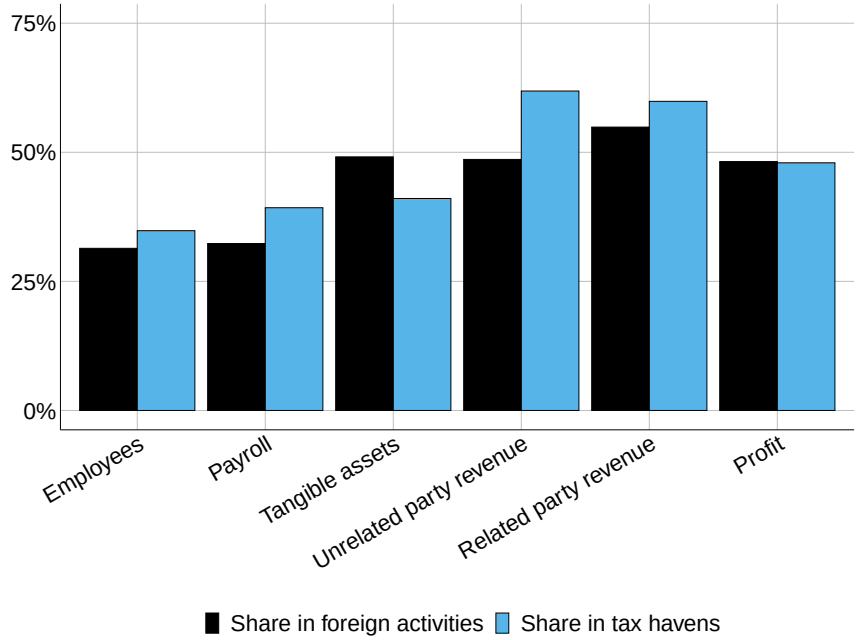
Note: This graph shows the location of subsidiaries according to their business activities. *Lecture:* 13% of subsidiaries involved in administration services are located in tax havens.

Figure C.4: Distributions of main variables



Note: These figures show the distribution of revenues, profits, assets, employees and payroll and profits in our sample, for every year of the period.

Figure C.5: Concentration among the top 15 of French multinational firms



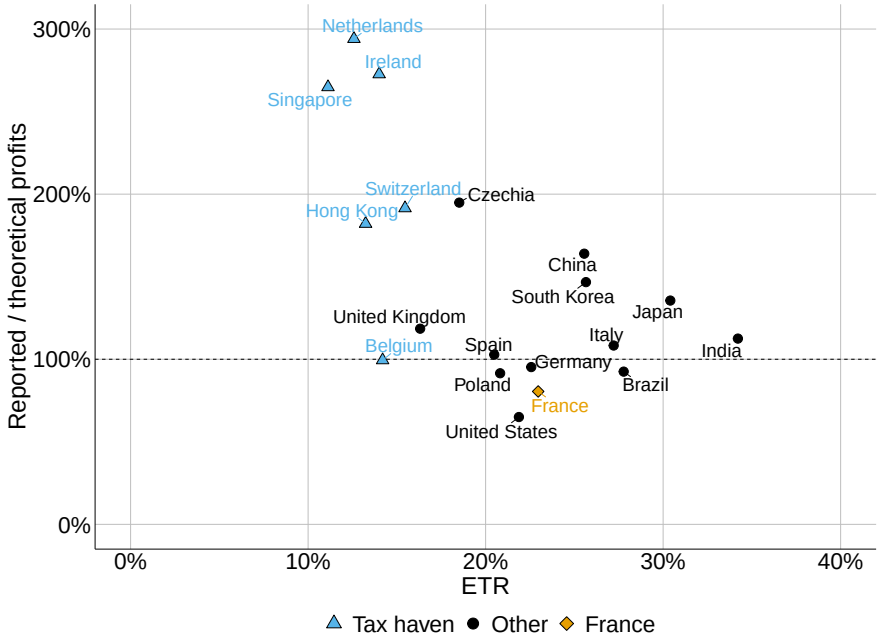
Note: We take the MNEs in the top 15 of the global revenue distribution per year and compute their share in total foreign activities in black bars, and in activities booked in tax havens in blue bars. We average all shares over 2016-2022.

D Additional results

D.1 Evidence on misalignment

We estimate the excess profitability of subsidiaries following our methodology presented above. Figure D.1 shows the ratio between total reported profits in a given country over total theoretical profits estimated from real economic activity with our apportionment formula. We find that excess profitability is particularly high in tax havens such as Luxembourg (where MNEs are almost three times more profitable than estimated), the Netherlands, Singapore, Hong Kong and Switzerland.

Figure D.1: Excess Profitability in Tax Havens



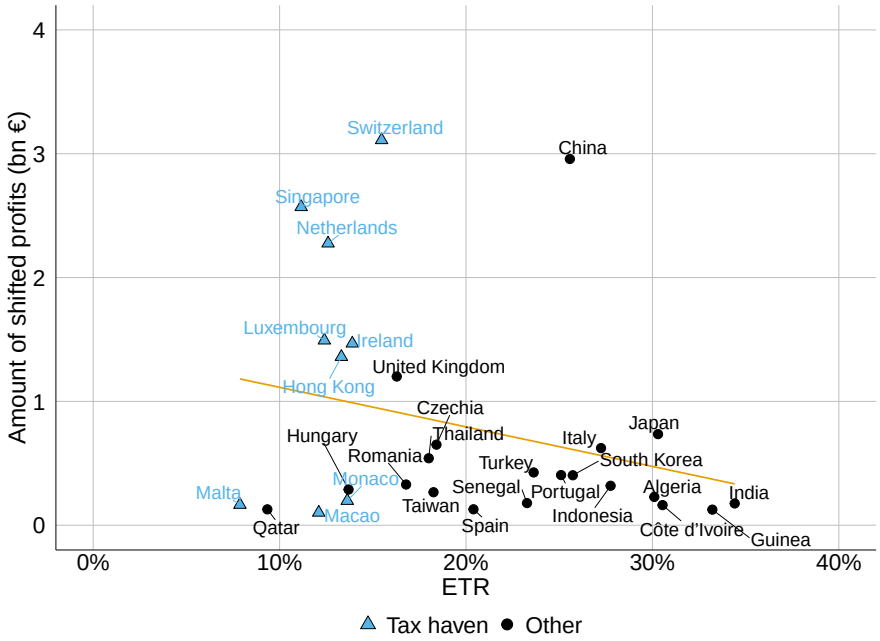
Note: This graph shows on the y-axis the ratio between total profits over the period 2016-2022 reported in a given country and total estimated theoretical profits in that country. The x-axis ranks countries according to the ETR faced by the MNEs there, averaged over the period. Computation of ETRs by country is presented in Figure 3. The graph includes the top 20 countries in terms of profits reported by French MNEs. *Lecture:* over the period, reported profits in France represent only 87% of the counterfactual profits, and the average ETR faced by MNEs in France is 19%.

We also find that the countries attracting the highest amounts of misaligned profits have the lowest effective tax rates. Figure D.2 shows our estimate of the annual amount of misaligned profits in the main destination countries, and highlights the negative correlation with tax rates. The five tax havens mentioned above are the main recipients of profit misalignment by French multinationals.[44] This hints at a potential tax-related

[44]There are some outliers such as China, where we find over €3 billion in misaligned profits. This is consistent with the findings of Garcia-Bernardo and Janský (2024), and might be indicative of other incentives related to special economic zones that we can not document with our data.

justification of such high amount of reported profits.

Figure D.2: Profit Misalignment and Effective Tax Rate



Note: This graph shows the correlation between profit misalignment and ETR. The amounts of misaligned profits are computed by country without the tax condition, as the sum of all profit differentials (positive and negative) of the French MNEs in the country in a given year, and then the figures are averaged over the period 2016-2022. Computation of ETRs by country is presented in Figure 3. Only countries with an average annual amount of misaligned profits larger than €100 million are represented in the graph. *Lecture:* over the period, €3.3 billion of profits are shifted by French MNEs in Switzerland, where they face an average ETR of 13%.

Although we find a strong negative correlation between profit misalignment and corporate tax rates, a substantial proportion of misaligned profits is allocated in countries that are not tax havens and are not necessarily characterized by tax avoidance practices. Such excess profits can simply be due to over-reporting of profits due to miscomputed transfer prices (Tørsløv et al., 2023a).[45] We can also expect that a part of these excess profits is simply driven by inherent profitability differences or specific (one-off) transactions firms undertake, such as mergers, acquisitions or restructuring, which affect their apparent profitability in a given year.

D.2 Geographical concentration of profit shifting

To better understand where French multinationals shift their profits, Figure D.3 shows the annual amount of misaligned and shifted profits for the eight countries that receive highest amount of misalignment. Two third of profit shifting is concentrated in

[45] As shown by Tørsløv et al. (2023a), 10.7% of mutual agreement procedures initiated by high-tax EU countries involve an EU tax haven, while close to 90% involve EU high-tax countries.

seven major financial centers: Switzerland, Singapore, the Netherlands, Luxembourg, Hong Kong, Luxembourg, Ireland and the UK. The inclusion of the UK in this ranking is explained by the high volume of profits reported by French MNEs operating there and the country's ability to attract businesses. Factors contributing to this appeal include its status as a financial hub, geographical proximity to France, and its lower statutory corporate tax rate of 19%, which contrasts sharply with France's 33.3% rate at the beginning of the period. Additionally, the UK offers an extensive range of tax incentives, further encouraging profit shifting of French MNEs.

China and Japan also rank as important destinations for misaligned profits. However, when tax incentives are taken into account, the estimated amounts of shifted profits in these countries become negligible or even negative (indicating that profits are shifted out of the country). In contrast, the inclusion of tax incentives has minimal impact on our estimates for the six financial hubs previously mentioned, as they display low effective corporate tax rates. In some cases, the estimated amount of shifted profits even exceeds the misaligned profits because the tax-incentive condition we impose leads to discarding some negative misalignment that offsets the positive tax-related misalignment in our upper bound estimate. Collectively, these six financial centers receive €13.5 billion of profits shifted by large French MNEs, representing about 63% of the balance of profits shifted by these companies worldwide.

D.3 Evolution of profit shifting practices

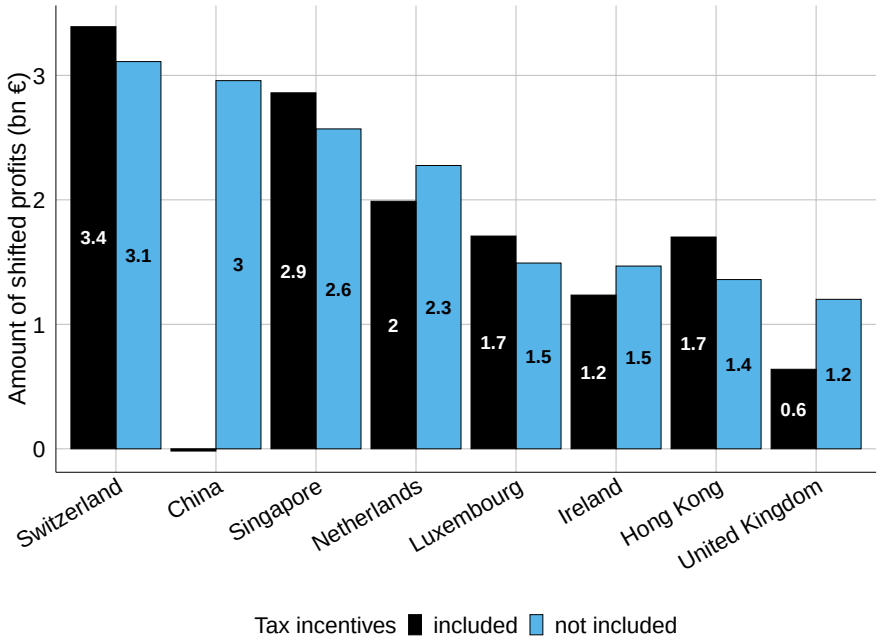
We observe in Figure D.4 a slight decline in the amount of misaligned profits in 2020, attributed to the economic impact of the COVID-19 pandemic. This reduction is driven by a decrease in firm profitability during that year rather than a reduction in profit shifting practices, as the share of misaligned profits in foreign profits remains unchanged. In contrast, 2022 exhibits an increase in misaligned profits, primarily driven by a significant rise in profitability within the oil sector.[46] This trend also reflects fluctuations in sector-specific profitability rather than an intensification of profit shifting practices. Moreover, profit shifting estimates are more stable over the 2016-2022 period, indicating no change in tax avoidance practices conducted by the French MNEs.

D.4 Tax savings implications for the French MNEs

We estimate the effect of profit shifting on taxes paid by MNEs and show the result on Figure D.6. We consider their effective tax rates with and without profit misalignment and compute a counterfactual ETR assuming that profits align with real economic activity and apply the actual country-level EATR to these reallocated profits. We find that in the absence of profit shifting, and behavioral responses, the global ETR would increase on average by around 3pp each year on average, which corresponds to a 13.3% increase.

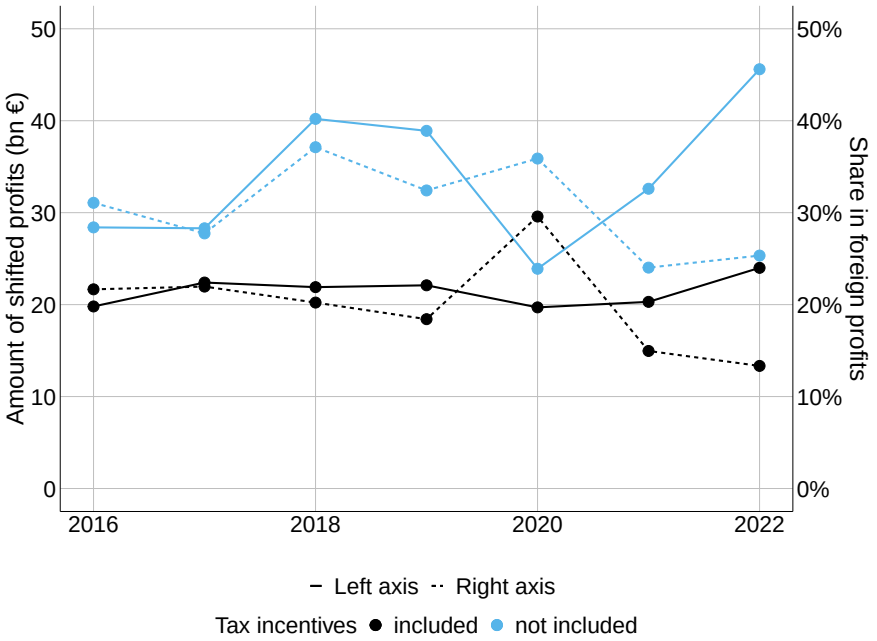
[46] As mentioned in Reuters and Energy Profits.

Figure D.3: Amounts of shifted profits in the top 8 destination countries



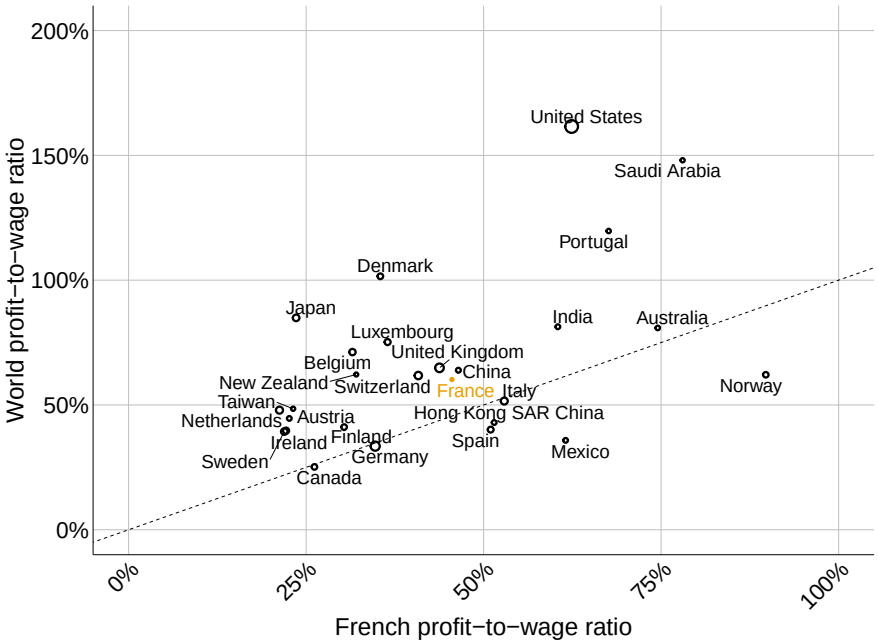
Note: This graph shows the average annual amounts of shifted profits in the top 8 destination countries, according to our two main estimation methods. In black, we represent estimates that include tax incentives, and in blue estimates computed directly from the apportionment formula. These results are the balance computed by country between positive shifting (when reported profits exceed theoretical profits) and negative shifting (when reported profits are lower than theoretical profits). *Lecture:* on average over the period, €2.2 billion of profits are shifted to Netherlands every year; when we restrict to tax-induced shifting, the amount is €2 billion.

Figure D.4: Global amounts of shifted profits by French MNEs



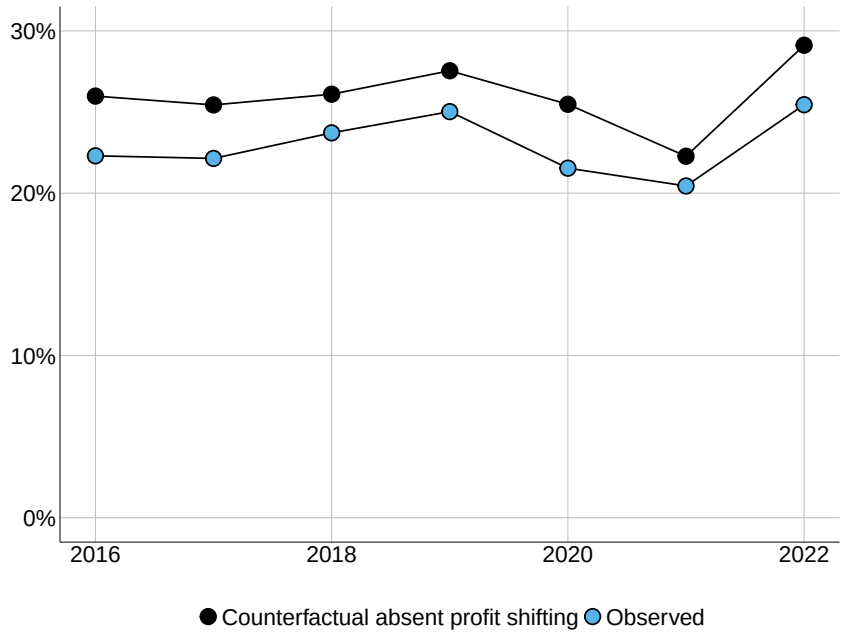
Note: This graph shows the annual amounts of shifted profits by French MNEs in the world, according to our two main estimation methods. In black, we represent estimates that include tax incentives, and in blue estimates computed directly from the apportionment formula. The full lines represent the global amounts of shifted profits in euros (left axis). The dashed lines represent the share of shifted profits over foreign profits (right axis). *Lecture:* in 2018, the French MNEs shifted a total amount of €25 billion of profits, that correspond to 14% of global profits, according to our most conservative estimate.

Figure D.5: Profitability in France and worldwide



Note: This graph shows the profit-to-wage ratios of French and foreign MNEs in France and at the consolidated level by headquarter country. The size of the point is proportional to the amounts of profits in France except for French multinational firms. It is the result of a match between consolidated-level data and French administrative data at the MNE level between 2016 and 2022. We only select companies with positive profits in France and positive profits worldwide.

Figure D.6: Evolution of global ETR with and without profit shifting



Note: This graph shows the global effective tax rate absent any profit shifting according to the tax-motivated misalignment method. ETR are computed as the sum of global taxes divided by the sum of taxes paid.

E Details on robustness checks

We use alternative estimation methods to support our results. In this Appendix, we propose several methods for estimating the share of subsidiaries' costs in their group and defining the tax condition. Table E.1 shows the global results for each method that we present in more detail below.

In our preferred specification, we estimate the production costs as the sum of labor costs and tangible capital costs. This apportionment formula is the result of a trade-off between accuracy and simplicity. To ensure that our choice is appropriate, we compare our results with those of other specifications that calculate the share of costs differently. First, we check the robustness of our results to the assumption of constant capital rate of return among countries. Then, we try simpler apportionment formulas, one based solely on labor costs and another solely on tangible capital costs, and then different mixtures of the two estimates.

In addition, we test an alternative version of the tax condition, based on more intuitive interpretation of tax incentives. We then explore different measures of MNEs' tax liabilities across countries. Rather than using the ETR at the MNE-country level averaged over the time period, as in our preferred specification, we first adopt a more robust but less specific measure at the country-year level. Conversely, we also test a more granular MNE-country-year level measure, which is more sensitive to data quality variations.

We also provide the results using the amounts of reported profits before our correction for double-counted intra-group dividends. Finally, we provide an estimation of profit shifting after for corrected for inflated wages in tax havens.

Table E.1: Global results of alternative methods (in billion €)

	Apportionment formula					Tax incentives				Data correction	
	Main	Country ROR	Payroll	Assets	Weight	Main	Subgroup	Country-time	Subgroup-time	Uncorrected	Wage shifting
France	-14.2	-14.9	-16.5	-14.1	-13.9	-10.3	-7.3	-10.6	-7.4	-4.7	-11.3
United States	-7.1	-7	-8.9	-1.3	-4.3	-4.7	-3.4	-4.4	-4.3	-9.9	-5.1
Rest of Americas	-2.6	-2.5	-1.8	-3.2	-3	-1.5	-2.8	-3.4	-2.6	-3.5	-1.7
Germany	-0.4	-0.4	-1.1	0.8	0.3	-1	-0.4	-0.9	0	-1.4	-1.1
Italy	0.6	0.8	0.9	0.3	0.4	-0.9	-0.2	-0.5	0.2	-0.5	-1
Africa	0.7	0.8	2.6	-1	-0.5	-0.1	-0.6	0	-0.3	0.3	-0.2
Switzerland	3.1	3.1	3.1	2.6	3.1	3.4	3.8	3.9	3.9	3.8	3.6
Singapore	2.6	2.5	2.5	2.6	2.6	2.9	2.9	2.3	2.9	2.1	3.1
Netherlands	2.3	2.2	2.2	2.1	2.2	2	2.6	2.1	2.8	2.8	2.7
Other tax havens	0	-0.5	-0.4	0	0.3	1.8	1.6	2.1	1.5	-0.2	2.6
Hong Kong	1.4	1.3	1.2	2	1.7	1.7	1.8	1.5	1.7	1.3	1.9
Luxembourg	1.5	1.5	1.5	1.4	1.4	1.7	1.7	1.7	1.8	2.1	1.8
Rest of Europe	3.1	3.1	4	1	1.9	1.6	1	2.7	1.7	1.5	1.4
Rest of Asia & Oceania	6.3	7.2	7.7	5.2	5.6	1.4	0.9	2.7	1.5	4.6	1.2
Ireland	1.5	1.5	1.6	1	1.2	1.2	1.3	1.3	1.5	1.6	1.4
United Kingdom	1.2	1.4	1.2	0.9	1.1	0.6	2.4	2.6	2.5	0.7	0.5
Global	34	34.2	36.7	32.1	32.6	21.5	26.6	29.9	29.2	32	23.4

Note: This table shows the amounts of shifted profits by large French MNEs, detailed by country, aggregated region and also at the global level. These results report the net balance between positive m_i (when reported profits exceed theoretical profits) and negative m_i (when reported profits are lower than theoretical profits). Our main apportionment formula is the one presented in Section D.1. "Country ROR" refers to the method including country-specific costs of capital. "Payroll" means that we only use the cost of labor as an apportionment factor. "Assets" only takes into account tangible assets in the formula. "Weight" means that we compute the weighted average of payroll and assets estimates. Our main methodology with tax incentives is described in Section 5. The "Subgroup" tax condition means that we only consider misalignment when the effective tax rate faced by the MNE in a given country is lower than the its global effective tax rate. "Country-time" also imposes a tax condition but uses the ETR in the country averaged over all MNEs in the country, and on the contrary "Subgroup-time" uses the MNE-country-year level ETR. "Uncorrected profits" relies on the same formula as the baseline, but using raw profits, before correcting for intra-firm dividends. And finally, "Wage shifting" is the main method including tax incentives after having wages corrected for the wage premium in tax havens.

E.1 Testing country-specific costs of tangible capital

Instead of assuming a constant cost of tangible capital among the MNEs across the world, we use in this robustness check country-specific rates of return. Chari and Rhee (2020) calculated the rate of return on capital at the firm level in a large number of countries, and we use their country estimates in this method. We calculate theoretical profits as follows:

$$\text{Country RoR: } \hat{\pi}_i = \frac{w_i l_i + r_i k_i}{\sum_j w_j l_j + r_j k_j} \sum_j \rho_j$$

Results are presented in Table E.1. They are very similar with our baseline, suggesting that the assumption of a constant rate of returns is relevant.

E.2 Robustness tests on the apportionment formula

We follow Guvenen et al. (2022) and test an apportionment formula with only labor costs:

$$\text{Payroll: } \hat{\pi}_i = \frac{l_i w_i}{\sum_j l_j w_j} \sum_j \rho_j$$

Then, we compute the complementary formula with tangible capital costs only:

$$\text{Assets: } \hat{\pi}_i = \frac{k_i}{\sum_j k_j} \sum_j \rho_j$$

Finally, we propose an average of these two estimation methods, which we reconcile using a labor intensity weighting λ, defined at the MNE level, which captures the share of the wage bill in total production costs. The idea with this approach is to assign a weight to each factor of production: taking a non-weighted average of both the share of a subsidiary in global payroll and its share in global tangible assets does not seem satisfactory given that MNEs can operate in more or less capital-intensive sectors. In that respect, a subsidiary holding the vast majority of tangible capital of a given MNE should generate a higher share of profits in a capital-intensive MNE than if it was part of a labor-intensive MNE.

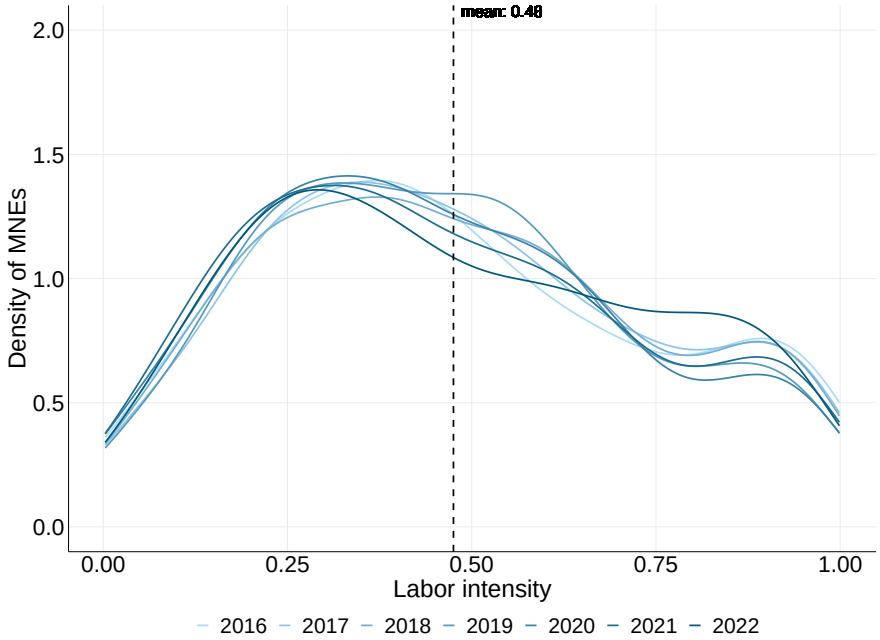
To overcome this issue, we estimate the labor intensity λ of an MNE in a given year as the global wage bill wl divided by the sum of the wage bill and the amounts of tangible assets k:

$$\lambda = \frac{\sum_j w_j l_j}{\sum_j w_j l_j + k_j}$$

MNEs with a zero weight would only have tangible assets, while MNEs with a weight of one would only have employees and no assets. Figure E.1 shows the distribution of firms along these weights and shows that they are slightly biased towards the left and not centered around 0.5, with more firms being quite capital-intensive.

Therefore, in this robustness test, we measure the MNE's profit in country i in a given year based on real economic activities with the following formula:

Figure E.1: Distribution of labor-intensity weights λ



Note: This figure shows the distributions of MNEs along their labor intensity weight λ for each year of the period. A weight of zero means that the firm only has tangible assets while a weight of one means that the firm has no tangible assets.

$$\text{Weights: } \hat{\pi}_i = \left(\lambda \frac{w_i l_i}{\sum_j w_j l_j} + (1-\lambda) \frac{k_i}{\sum_j k_j} \right) \sum_j \rho_j$$

Table E.1 shows that the results remain largely consistent, particularly for the method with labor-intensity weights. The other two specifications give a relatively narrow range for our baseline estimates, with a few exceptions such as the USA and Germany. When only tangible assets are used, the profit misalignment is not detected in these countries, whereas it is striking when wages are taken into account. This suggests that in these countries, the production of multinational firms may be more dependent on a highly skilled workforce than on expensive physical assets.

E.3 Alternative measures of tax incentives

In addition, we test other versions of the tax condition. Although our preferred tax condition is derived from the model, its interpretation is not straightforward, so we compute a more intuitive tax condition in these robustness checks. We evaluate the tax incentive for the MNE to shift profits in country i as the difference between the effective tax rate ETR_i faced by the MNE in country i, with the MNE's global effective tax rate ETR.[47] When $ETR > ETR_i$, we consider that the group has an incentive

[47] Defined as the sum of taxes accrued by the MNE worldwide divided by its global profit, over profitable subsidiaries that have an ETR between 0 and 1.

to shift its profits towards country i, then a positive amount of misaligned profits is qualified as shifted profits. Formally, the profit shifted by the MNE in country i is defined as:

$$z_i = \mathbb{1}_{\{(ETR-ETR_i)(\rho_i-\hat{\pi}_i)>0\}} \times (\rho_i - \hat{\pi}_i)$$

We try three different measures of the tax liability of an MNE in a given country:

- Subgroup: the average ETR paid by the MNE in the country over the time period, provided the statutory tax rate remains constant
- Country-time: the average ETR faced by all MNEs in that country in a given year
- Subgroup-time: the ETR faced by the MNE in the country in the given year

The results remain largely consistent with our preferred tax condition, as shown in Table E.1. If anything, using the MNE-country-time level measure of ETR introduces a little more volatility, as it is based on fewer observations, than measures based on the average ETR of all MNEs in each country. Moreover, we notice that our model-derived tax condition, although using ETR at the MNE-country level, offers smoother estimates over time.

E.4 Accounting for the wage premium in tax havens

Profit shifting tends to distorts economic outcomes such as GDP or productivity. It can also affect the labor share and the wage distribution within MNEs across countries. As firms have an increasing incentive to prove that they have some real economic activity in a country to comply with the nexus requirements introduced by OECD BEPS Actions 1 and 7, they may have an incentive to not only shift their profits to tax havens but also report some real costs, such as a high wage bill. Firms may also have an incentive to set up specific employment contract for some of their executives in tax havens, so they can also lower the tax burden through lower personal income taxes.[48] Descriptively, we find evidence that wages in tax havens are much higher than in non-haven countries in Figure E.2.

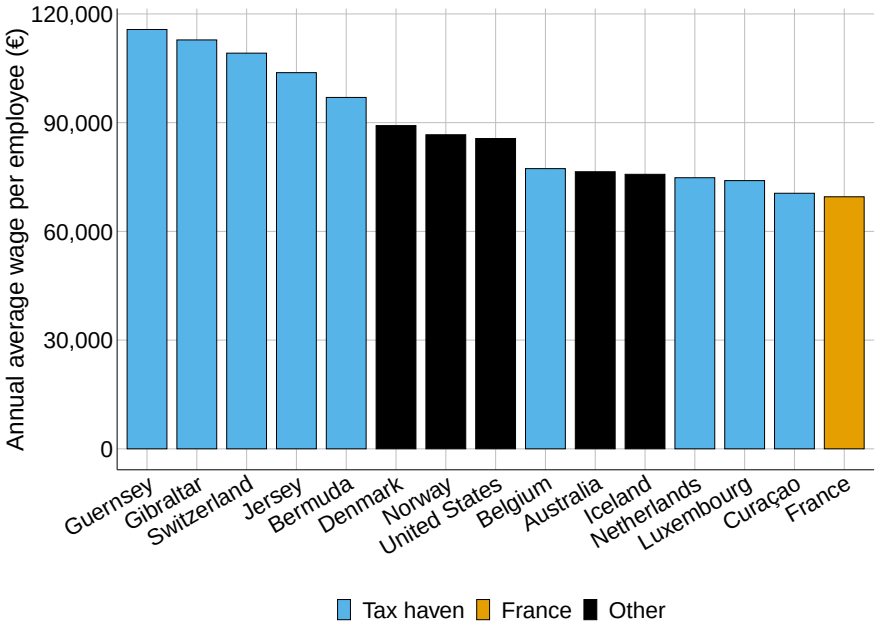
We first estimate the wage premium in a tax haven and correct our measure of production costs to re-estimate the profit shifting quantification. We run the following regression on all MNE-coutry-year observations in OECD countries in our sample:

$$w_{i,f,t} = \alpha + \beta Haven_i + \gamma X_{i,f,t} + u_f + v_t + \epsilon_{i,f,t} \tag{7}$$

where $w_{i,f,t}$ is the average wage per employee of an MNE f in country i at year t, Tax Haven$_i$ a dummy equal to 1 if country i is a tax haven, $X_{i,f,t}$ is a vector of control variables including amounts of third-party trade revenue and tangible assets. We also

[48] Anecdotal evidence of such practices published in Le Monde.

Figure E.2: Annual average wage



Note: This graph shows the average wage per employee as observed in our CbCR data.

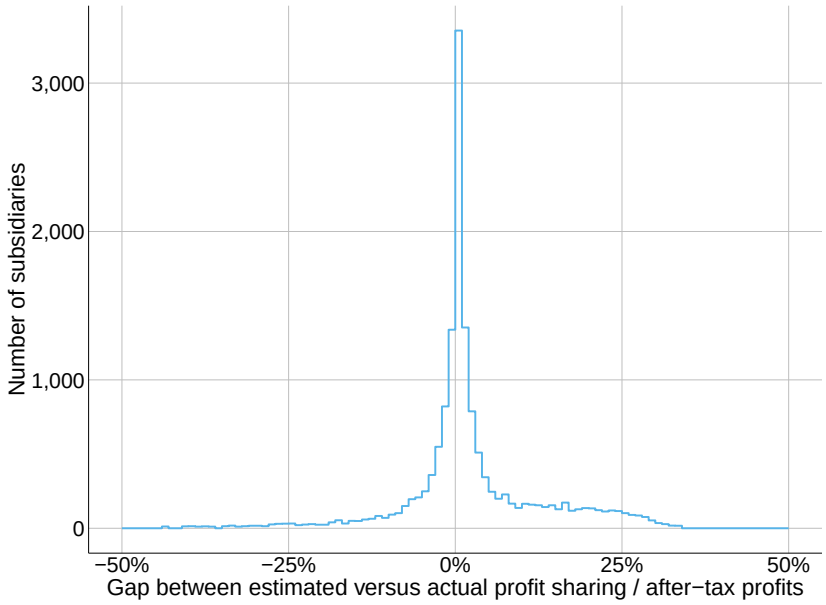
add MNE and year fixed effects. We find that the tax haven wage premium is equivalent to about €25,000 or 40% of the average annual income.

We correct wages in tax havens by the premium and re-estimate profit shifting. The global amount of shifted profits increase by about €2 billion, to reach a global value of €23.4 billion, leading to higher missing profits in France of €11.3 billion, against €10.3 billion before (see Table E.1).

F Supplementary information on distributional analysis

F.1 Estimation of profit sharing amounts

Figure F.1: Estimated to actual profit sharing amount



Note: This graph shows the distribution of difference between our estimated share of profit sharing in after-tax profits with the actual share. We include all subsidiaries of French MNEs subject to CbCR that have more than 50 employees and strictly positive after-tax profits.

F.2 Estimation of subsidiaries profit shifting

F.3 Counterfactual scenario with incidence on profits

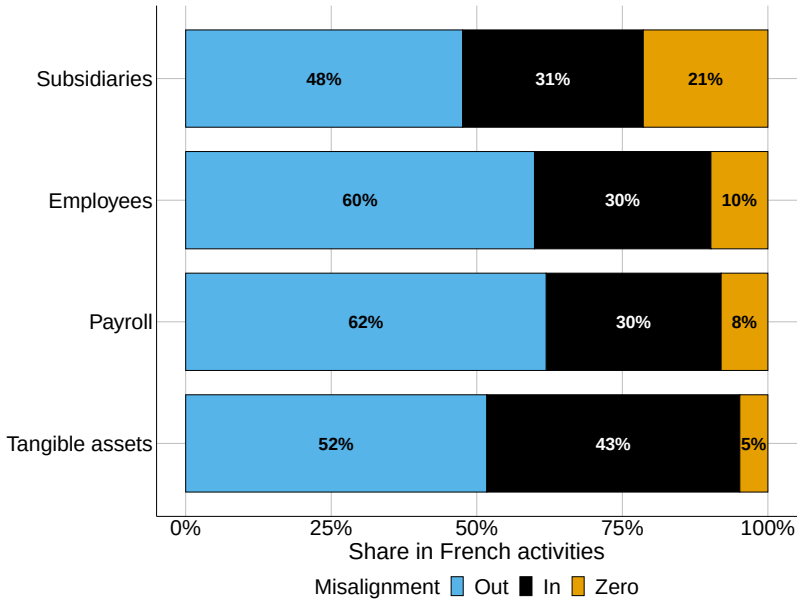
To estimate the magnitude of the incidence to shutting down profit shifting opportunities on true profits, we compute the resulting change in the ETR for the French subsidiaries. Without profit shifting, the ETR is simply the actual ETR in France. With profit shifting, the real ETR faced by French subsidiaries is determined by the taxes they pay on their true profits divided by their true profits. The taxes paid on true profits include the taxes paid in France on reported profits and the taxes paid abroad on shifted profits.

The change in ETR due to profit shifting closure is computed at the MNE-time level with the formula:

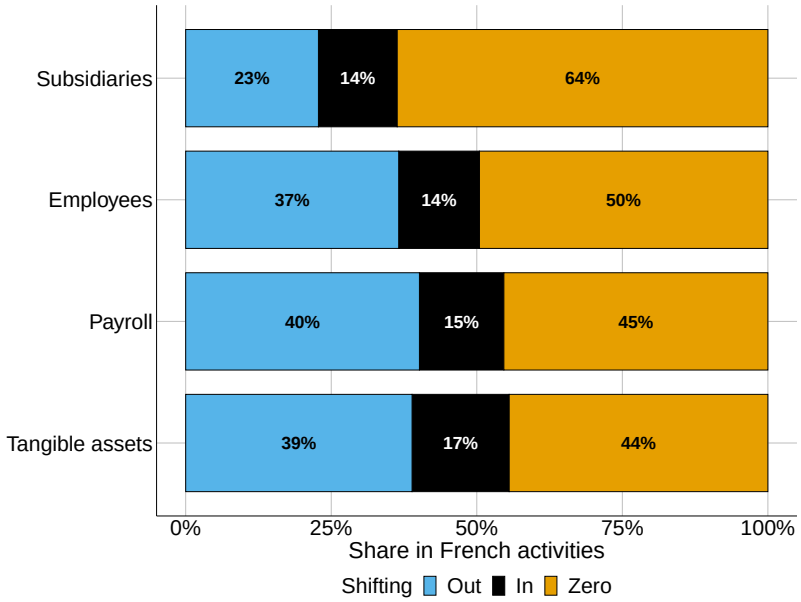
$$\Delta ETR_{FR} = \begin{cases} ETR_{FR} - \dfrac{1}{\pi_{FR}} \left(ETR_{FR} \max(\rho_{FR}, 0) + \sum_{h:z_h>0} ETR_h \dfrac{z_h}{\sum_{i:z_i>0} z_i} z_{FR} \right) & \text{if } z_{FR} < 0 \\ 0 \text{ otherwise} \end{cases}$$

Figure F.2: Tax avoidance behaviors of French subsidiaries

(a) Misalignment estimates



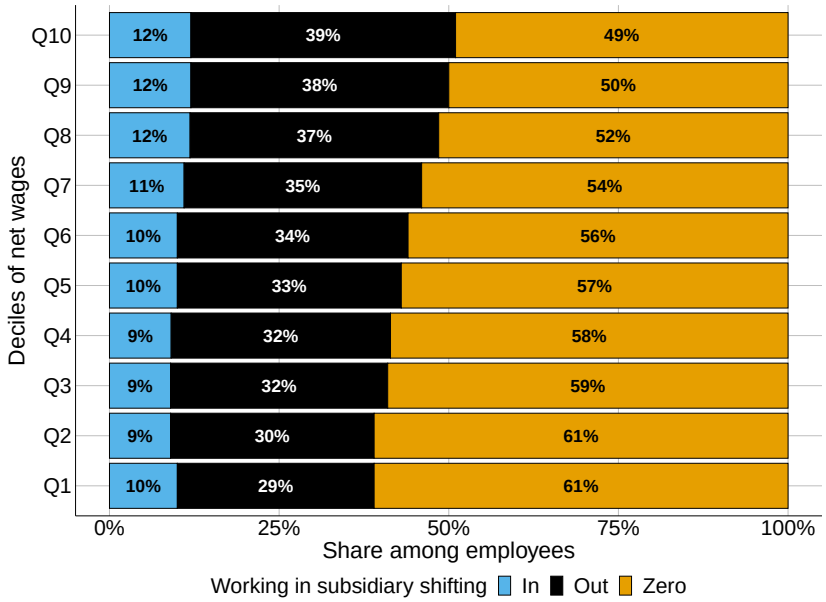
(b) Shifting estimates



Note: The graphs include all subsidiaries located in France of the large French MNEs subject to CbCR. They show the proportion of the y-axis variables that shift profits out of France, in France, or that do not engage in profit shifting.

with ρ_{FR} and π_{FR} respectively the reported and true profits of the MNE in France, z_h the amount of profit shifted by the MNE in country h, z_{FR} the amount shifted in France ($z_{FR} < 0$ implies that the MNE shift profits out of France), and ETR_h the average ETR faced by the MNE in country h over the period, following the notations in Sections 4. Here, we make the hypothesis that all subsidiaries in a multinational group would face the same ETR change in case of profit shifting closure. We find the

Figure F.3: Employees presence in shifting subsidiaries by decile of wages



Note: This graph shows the share of employees in shifting subsidiaries, by decile of their net wages. We include all subsidiaries of French MNEs subject to CbCR that have more than 50 employees and strictly positive after-tax profits.

ETR in France would increase by 3pp for subsidiaries of MNEs shifting profits abroad.

F.4 Distribution of profit sharing within firms

While we do not have exhaustive data on how profit sharing is distributed among employees, we use a survey conducted by the French statistical office each year, giving this information for a subsample of firms and employees.[49] From this survey, we see that most firms choose a combination of the two options: the share of profit sharing in wages decreases with the rank of wages within firms, going from 8% at the bottom of the income distribution to 3% for top earners in this subsample. We find that the distribution from this sample is very similar to a distribution in which half of profit sharing is distributed equally, and half is distributed depending on the share of each worker in total compensation paid by the firm. We hence adopt this distribution function.

[49] *Enquête sur le coût de la main d'œuvre et la structure des salaries* (ECMOSS). It surveys about 8,900 privately-held firms are surveyed, giving information on 96,000 employees.