Profit Shifting, Employee Pay, and Inequalities: Evidence from US-Listed Companies

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Abstract: Corporate tax avoidance has become a salient policy issue and has regularly been accused of aggravating income inequalities. However, systematic evidence on this issue remains lacking. I empirically explore in this paper the effect of profit shifting activities of multinational enterprises on employee pay. Using a rich database on executives, foreign subsidiaries, and financial statements of US-listed companies, I find that this effect substantially varies across occupations. Chief executive officers and chief financial officers receive higher compensations when their firm enters tax havens but non-executive employees, on the contrary, see their wages fall. Furthermore, the inequality-deepening effect is more pronounced in firms rewarding executives on an after-tax basis and intensive in intangible assets. These new empirical findings cast light on the distributional consequences of profit shifting, the evolution of income inequalities, and the recent outcry against globalization.

Keywords: Employee pay, multinational enterprises, profit shifting, tax havens, income inequalities.

JEL codes: F16, H26, J30, M12.

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1 Introduction

What explains the rise of inequalities? This question has been receiving growing attention in the literature (Alvaredo, Chancel, Piketty, Saez, and Zucman, 2017; Zucman, 2019; Hoffmann, Lee, and Lemieux, 2020; Saez and Zucman, 2020). Many factors have been put forward, and one of them is globalization. Globalization has many facets. It has, for example, been accompanied with the emergence and expansion of multinational enterprises (MNEs). Together with the digitalization of economic activities and the development of the offshore industry, it has also facilitated corporate tax avoidance (Argilés-Bosch, Somoza, Ravenda, and García-Blandón, 2020; Beer, de Mooij, and Liu, 2020). MNEs use legal technicalities to artificially deflate profits recorded in high-tax countries and inflate those booked in tax-friendly jurisdictions. These practices are in the public spotlight in a period marked by several tax scandals, budget deficits, and a pandemic stressing the importance of public goods. Nevertheless, although the tax-dodging methods employed by MNEs are now well-documented, their consequences are still poorly understood. In particular, little is known about the effect of profit shifting on employee pay and income inequalities.

In this paper, I empirically analyze the effect of profit shifting on both employee pay and income inequalities. Through the lens of a collective bargaining model, profit shifting induces two opposite effects on wages. On the one hand, it increases the overall surplus to be shared between the firm and its employees (positive effect). On the other hand, it gives the firm private information on profitability and the information asymmetry alters the bargaining power of employees (negative effect). In total, we expect the majority of employees to receive lower wages as the second effect should dominate (Krautheim and Schmidt-Eisenlohr, 2016). This adverse effect is however less plausible for top executives since they design firms' tax strategies. In addition, some executives are compensated on an after-tax basis to alleviate agency costs associated with moral hazard and adverse selection. Accordingly, from a theoretical point of view, profit shifting should increase the compensation of top executives and especially that of top executives paid on an after-tax basis. It should also decrease the wage of non-executive employees, thereby deepening income inequalities. All the same, no paper confronts these predictions with the data.

The present paper is a first step in this direction. It can be divided into two parts. In the

first part, I compile a database on financial statements, executives, and foreign subsidiaries of companies listed on the Standard & Poor's (S&P) 1500 index between 1993 and 2013. The data originate from three sources: Compustat, ExecuComp, and Exhibit 21 reports. Compustat provides access to balance sheets, income statements, and cash flows of US-listed firms. ExecuComp, as the name hints, contains a wide range of details about the function and compensation of executives in S&P 1500 firms. Exhibit 21 reports filled every year by US-listed firms to the Securities and Exchange Commission (SEC) allow reconstructing the worldwide network of their subsidiaries. Armed with this database, I then conduct an event study. I estimate the impact of firm entry in tax havens [1] on employee pay while separating chief executive officers (CEOs) and chief financial officers (CFOs) from non-executive employees.

The baseline results are in line with the aforementioned theoretical predictions. The compensation of CEOs and CFOs goes up when their firm enters tax havens, whether it is expressed in absolute value or as a ratio of the firm's average wage. The increase is driven by MNEs using after-tax compensation incentives. In these companies, I estimate a 8 percent increase post entry. Conversely, overall payments to non-executive employees decrease in the meantime. This reduction amounts to 3 percent and I show that it is not attributable to a drop in employment. Profit shifting therefore aggravates income inequalities within corporations. Moreover, evidence suggests that this pattern is stronger in intangible-intensive MNEs. Again, this observation is consistent with earlier work showing that intellectual property offers supplementary opportunities to route income through tax-friendly jurisdictions like tax havens (Dischinger and Riedel, 2011; Karkinsky and Riedel, 2012; Griffith, Miller, and O'Connell, 2014; Alstadsæter, Barrios, Nicodème, Skonieczna, and Vezzani, 2018).

The results are corroborated by multiple robustness checks. For example, I demonstrate

1. Other indicators have been used in the literature to quantify corporate tax avoidance, such as effective tax rates and cash effective tax rates (Hanlon and Heitzman, 2010). The problem lies in the fact that they capture not only tax avoidance, but more generally tax liability. Changes in these variables could have nothing to do with changes in tax avoidance. For instance, effective tax rates would significantly decrease in the case of tax loss carryforward even if the loss is unrelated to tax avoidance in the first place. The interpretation would then be complex since we would not know whether we are estimating a profit shifting effect or a more global tax liability effect. Yet, we are interested in profit shifting and this distinction is crucial since economic theory does not predict the same outcome in both cases (see page 5 and section 2). Although tax haven foreign direct investments do not encompass all tax avoidance strategies and firms can still shift profits toward low-tax non-haven countries, employing a conservative metric of tax avoidance and profit shifting appears as a key advantage for this particular study.

that they hold with alternative groups of tax havens. In the benchmark exercise, I follow Dyreng and Lindsey (2009) and categorize 46 foreign countries as tax havens. Adopting the classification elaborated by Hines and Rice (1994), also popular in the literature, yields the same conclusions. Along the same lines, I draw the same conclusions when I remove six tax havens, namely: Hong-Kong, Ireland, Luxembourg, Malaysia, Singapore, and Switzerland. Given that these countries are relatively large and well-connected with the rest of the world, foreign direct investments (FDIs) in these countries may be unrelated to tax avoidance. On the contrary, it is fair to assume that investments in small and remote islands in the likes of Bahamas completely fall within the scope of profit shifting. Furthermore, I show that employee pay does not depend on future profit shifting activities. This shows that there is no pre-existing trends influencing the results, implies that entry in tax havens is uncorrelated with past (executive $\times$) firm $\times$ year unobserved shocks, and alleviates reverse causality concerns. Relatedly, I go over some measurement issues and verify that negative weights are unlikely to jeopardize the average treatment effect (ATE). The new econometrics literature points out that regressions with high dimensional fixed effects estimate weighted sums of the ATE. Because some of these weights might be negative and the ATE is potentially heterogeneous across firms or periods, the coefficient of interest could be negative (positive) even if all ATE are in fact positive (negative). I build on de Chaisemartin and D'Haultfœuille (2020) to cope with this issue. They discuss this problem for models with two-way fixed effects. I find a low share of negative weights in the regressions involving two-way fixed effects, so treatment effect heterogeneity should not constitute a major threat.

These original findings carry policy implications. They shed light on the evolution of income inequalities and uncover a new mechanism whereby globalization fosters them. In a sense, the results help understand the backlash against MNEs and globalization (Helpman, 2017; Rodrik, 2018). Furthermore, the conclusions may enrich ongoing discussions about the international taxation system. Both scholars and policy makers acknowledge that the current system, inherited from the early 20th century, is outdated. It offers MNEs the opportunity to exploit loopholes, mismatches in tax rules, and other legal technicalities to shift profits to low or no-tax jurisdictions and avoid taxes. Several reforms are presently debated at the international level to tackle these issues and align the tax system with the way economic activities are carried out nowadays. Perhaps surprisingly, the proposals tend to focus on two dimensions: countries' tax revenues and attractiveness.

My paper puts the accent on a neglected dimension, income inequalities, and asserts that such reforms could be useful in curbing rising inequalities too.

Literature and contributions This paper resonates with two distinct strands of the literature. An old body of the literature tackles the effect of corporate income taxation on wages. Corporate income taxation can affect wages through two channels: a direct one, through rent-sharing (Arulampalam, Devereux, and Maffini, 2012; Azémar and Hubbard, 2015; Fuest, Peichl, and Siegloch, 2018), and an indirect one, through capital reallocation (Harberger, 1962; Clausing, 2013; Gravelle, 2013). On the one hand, corporate income taxes directly lower wages by undermining the quasi-rent over which workers and firms bargain. On the other hand, an increase in corporate income taxes results in capital outflows, which in turn decrease the capital-labor ratio, labor marginal productivity, and wages. Hence, both channels imply that the burden is passed onto workers to some extent. In the context of profit shifting, only the rent-sharing mechanism seems relevant because economic activities are not relocated and only profits are displaced. Should we interpret profit shifting as a reduction in tax rates, these models would anticipate a positive effect of profit shifting on wages. Yet, I empirically show that profit shifting is in fact detrimental for the great majority of employees. In a way, this finding suggests that we cannot analyze profit shifting as a simple tax cut in these models. Although the size of the "pie" increases, most of workers also have a weaker bargaining power and the share of the "pie" they receive diminishes. I argue that the second effect definitely needs to be taken into account since it dominates over the first one in the data.

A nascent but fast-growing line of research studies profit shifting activities of MNEs. It shows that MNEs strategically locate their intangible assets, manipulate transfer prices, record sales in low-tax countries, and proceed with intra-firm loans, treaty shopping, and corporate inversions. I refer to Beer et al. (2020) for a recent survey. The methods used by MNEs are relatively well-known, but only a few papers investigate the consequences of profit shifting. They document a positive effect on firm value (Desai and Dharmapala, 2009), firm investments (Overesch, 2009; Goldbach, Nagengast, Steinmüller, and Wamser, 2019), and industry concentration (Martin, Parenti, and Toubal, 2020). A number of companies pay top executives based on accounting financial performance to align interests and reduce operating risks. Hence, CEOs and CFOs should be rewarded when MNEs establish a presence in tax havens. Non-executive employees, for their part, have lesser

knowledge of the surplus they bargain over with the firm they work for. This informational rent for MNEs should lead to lower wages (Krautheim and Schmidt-Eisenlohr, 2016). Nonetheless, systematic evidence on this remains lacking. This paper fills this gap. I provide empirical support for these predictions and find that they are more pronounced in intangible-intensive enterprises.

The remainder of the paper is organized as follows. In section 2, I propose a simplistic model to illustrate the channels whereby profit shifting can influence employee pay and to formulate a couple of hypotheses. The two next sections explore their empirical validity. Section 3 introduces the data, while section 4 lays out the econometric approach, the results, and the robustness checks. Section 5 concludes.

2 Theory

In this section, I use the workhorse model of collective bargaining to show how profit shifting can affect employee pay. I simplify it and remove unnecessary details to ease the exposition. I then derive two hypotheses that will be tested in the ensuing sections.

2.1 Conceptual framework

Consider the case of a single firm. The firm produces a good by employing L workers, each paid w. The firm makes a post-tax profit $\pi(w,t)$, t being the effective tax rate. Naturally, assume that $\partial\pi(w,t)/\partial w < 0$ and $\partial\pi(w,t)/\partial t < 0$. Let $\bar{\pi}$ be the outside option of the firm, i.e., the maximum profit it would receive if it unilaterally withdraws from the negotiations. Symmetrically, denote $u(.)$ the utility of workers and $\bar{w}$ their outside option. The firm and its workers bargain over the wage w. The typical Nash-bargaining wage w^* solves the problem:

$$\max_{w} \quad \underbrace{(L\,(u(w)-u(\bar{w})))^{\kappa}}_{\text{workers' surplus}} \underbrace{(\pi(w,t)-\bar{\pi})}_{\text{firm's surplus}} \tag{1}$$
$$s.t. \quad w \geq \bar{w}$$
$$\pi(w,t) \geq \bar{\pi}$$

where $\kappa > 0$ symbolizes the relative bargaining power of workers. Assume that the firm always participates, i.e., $\pi(\bar{w}, t) \geq \bar{\pi}$. Using the approximation $u'(w) \approx \frac{u(w)-\bar{u}}{w-\bar{w}}$, the solution w^* verifies (first-order condition):

$$w^* = \bar{w} + \kappa \frac{(\pi(w^*, t) - \bar{\pi})}{L} \tag{2}$$

Equation (2) says that the negotiated wage is equal to the non-cooperative payoff of workers plus a share of the quasi-rent per worker. The share is increasing in the bargaining power of workers.

2.2 Testable predictions

Hypothesis 1: Profit shifting activities erode wages of non-executive employees and improve executive pay, in particular that of executives compensated on an after-tax basis.

Under full information, it follows from equation (2) that profit shifting increases wages all other things being equal because it increases the second term via a reduction in the effective tax rate t. Interestingly however, the literature predicts otherwise. According to Krautheim and Schmidt-Eisenlohr (2016), $\pi(.)$ is not the only variable directly affected by profit shifting in equation (2). There are in fact two opposite forces at play. They claim that income shifting also generates an informational rent for the firm that strengthens its bargaining power (lower κ). The (non-formal) reasoning is the following. Profits, once shifted by the firm, are not perfectly observed by workers. It becomes optimal for workers not to put the firm at risk to prevent a situation in which there is no production and no surplus, so they accept a lower share of the surplus. In total, this adverse effect dominates and wages go down. I refer to Krautheim and Schmidt-Eisenlohr (2016) for formal derivations and more details on the neutral bargaining solution.

To summarize, profit shifting triggers two different effects. The surplus becomes larger and the bargaining power of workers deteriorates. The sign of the overall effect ultimately hinges on the extent to which profit shifting weakens workers' bargaining power. In this regard, if anything, the negative effect might be moderate for top executives insofar as they define business strategies, oversee their implementation, and notably run firms'

financial operations.[2] In addition, some of them are precisely paid on an after-tax basis to align their interests to those of the firm. These top executives should presumably be rewarded when their firm shift profits for tax purposes. All in all, we expect uneven effects of profit shifting on employee pay.

Hypothesis 2: The inequality-deepening effect of profit shifting is amplified in intangible-intensive sectors.

MNEs employ various techniques to artificially move profits toward no- or low-tax countries. One consists in locating intellectual property rights in these jurisdictions and using intra-firm royalty payments (Dischinger and Riedel, 2011; Karkinsky and Riedel, 2012; Griffith et al., 2014; Alstadsæter et al., 2018). Non-financial inter-company transactions like royalty payments have been found to account for most of profit shifting (Heckemeyer and Overesch, 2017). For these reasons, I conjecture that the mechanisms emphasized in the previous paragraph are stronger in intangible-intensive corporations.

3 Data

We now turn to the empirical analysis. To conduct it, I construct a panel database on financial statements, foreign subsidiaries, and executives of S&P 1500 companies between 1993 and 2013. I hereby explain where the data are coming from and describe the final sample.

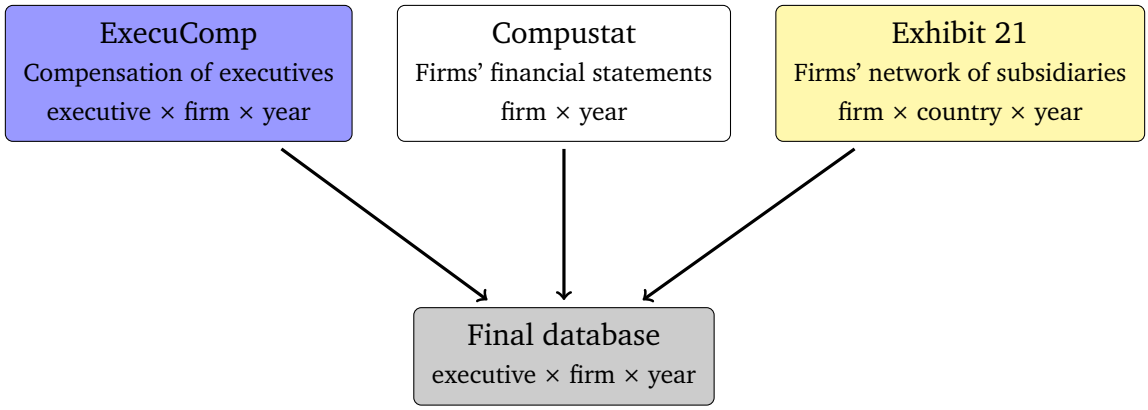
3.1 Sources

The data used for the study originate from three sources: ExecuComp, Compustat, and Exhibit 21 filings (see figure 1).

ExecuComp follows executives of S&P 1500 companies and provides extensive details on their function and compensation. Since these firms account for approximately 90 percent of US market capitalization, this dataset allows me to track executives over time and across the largest US publicly listed firms. This feature proves useful because these en-

2. As we shall see in the next section, this breakdown between executives and non-executives is based on data availability.

FIGURE 1 – Construction of the database



terprises are the most likely to engage in FDIs and profit shifting. Establishing facilities overseas is costly, and merely the largest and most productive firms find profitable to pay these costs (Helpman, Melitz, and Yeaple, 2004). The same applies to aggressive tax planning and profit shifting (Jones, Temouri, and Cobham, 2018; Bilicka, Devereux, and Guceri, 2020). Firms have to incur a significant fee to recruit tax experts because undertaking such activities requires a deep understanding of tax codes. This competence has a price that solely the largest firms can afford. For instance, anecdotal evidence suggests that Caterpillar paid PricewaterhouseCoopers nearly $55 million for developing its tax-dodging strategy (US Senate Permanent Subcommittee on Investigations, 2014).

The second source, Compustat, consists of balance sheet, income statement, and cash flow information of all publicly held corporations in North America since the 1950s. Due to the vast coverage and the richness of the information, these data are commonly used in the accounting and economics literatures. The data are consolidated at the firm level. I extract from this database S&P 1500 companies' total employment and labor expenses. I also retain their global assets, sales, and pre-tax income, all of which gauge firms' economic activities worldwide and will be used as control variables in the econometric exercise.

Finally, I merge these data with Exhibit 21 filings to have an overview of the location of S&P 1500 firms' subsidiaries. The SEC obliges US-listed corporations to divulge each year a list of their significant subsidiaries in Exhibit 21 of Form 10-K, be it inside or outside the US. A subsidiary is considered significant if its assets represent at least 10 percent of all assets or if its income exceeds 10 percent of consolidated income. Moreover, any subsidiary is deemed significant if by combining all undisclosed subsidiaries into one subsidiary, this

TABLE 1 – List of tax havens (Dyreng and Lindsey, 2009)

Andorra, Anguilla, Antigua, Aruba, Bahamas, Bahrain, Barbados, Barbuda, Belize, Bermuda, Cayman Islands, Cook Islands, Costa Rica, Cyprus, Dominica, Gibraltar, Grenada, Guernsey, Hong Kong, Ireland, Isle of Man, Jersey, Lebanon, Liberia, Liechtenstein, Luxembourg, Macau, Malaysia, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, Netherlands Antilles, Niue, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Seychelles, Singapore, Switzerland, Turks and Caicos Islands, Vanuatu.

fictive subsidiary accounts for at least 10 percent of assets or revenues. In other words, Exhibit 21 filings include subsidiaries where at least 90 percent of firms' consolidated assets and revenues are recorded. Therefore, they depict a clear picture of the worldwide network of US-listed companies' subsidiaries. [3] Corporations electronically file the reports since 1993 and the reports are publicly available on the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) platform of the SEC (see figure 2 for an example). I leverage an updated version of the database produced by Dyreng and Lindsey (2009) that spans the 1993-2013 period.

3.2 Descriptive statistics

In total, the database used for this paper contains 31,978 executives linked to 3,665 enterprises listed on the S&P 1500 between 1993 and 2013. Table 2 outlines some summary statistics about the presence of S&P 1500 firms in tax havens. 42 percent of the 3,665 firms included in the sample enter at least one tax haven for the first time at some point between 1993 and 2013. A country is defined as a tax haven if it appears on the list elaborated by Dyreng and Lindsey (2009), standard in the accounting literature. They constitute their list by simply crossing the classifications of the Organization for Economic Cooperation and Development (OECD), International Monetary Fund (IMF), the US Stop Tax Havens Abuse Act, and the Tax Research Organization (TRO) for 2008, and labeling a country as a tax haven if it appears at least once. On the whole, 46 countries are seen as tax havens (see table 1). In the same vein, around 47 percent of firms disclose no presence at all. The remaining 11 percent had at least one subsidiary in a tax haven over the entire period. These numbers are consistent with the view that profit shifting practices considerably

3. Note that companies are not obliged to uncover financial information concerning each of these subsidiaries. Besides, even though firms may have incentives to under-report the number of subsidiaries in tax havens, Dyreng, Hoopes, Langetieg, and Wilde (2020) argue that most disclosures are accurate. See their paper and Dyreng and Lindsey (2009) for more details on these data.

FIGURE 2 – List of significant subsidiaries of Johnson & Johnson in Exhibit 21 (2011, non-exhaustive)

Name of Subsidiary	Jurisdiction of Organization
U.S. Subsidiaries:	
Acclarent, Inc.	Delaware
ALZA Corporation	Delaware
Alza Development Corporation	California
Alza Land Management, Inc.	Delaware
Animas Corporation	Delaware
Biosense Webster, Inc.	California
Centocor Biologics, LLC	Pennsylvania
Centocor Research & Development, Inc.	Pennsylvania
CNA Development LLC	Delaware
Codman & Shurtleff, Inc.	New Jersey
Cordis Corporation	Florida
Cordis International Corporation	Delaware
Cordis LLC	Delaware
Cougar Biotechnology, Inc.	Delaware
Crescendo Pharmaceuticals Corporation	Delaware
Crucell Holdings Inc.	Delaware
DePuy, Inc.	Delaware
DePuy Mitek, Inc.	Massachusetts
DePuy Orthopaedics, Inc.	Indiana
International Subsidiaries:	
Apsis	France
Beijing Dabao Cosmetics Co., Ltd.	China
Berna Biotech Korea Corporation	Korea
Berna Rhein B.V.	Netherlands
Biosense Webster (Israel) Ltd.	Israel
Cilag Advanced Technologies GmbH	Switzerland
Cilag AG	Switzerland

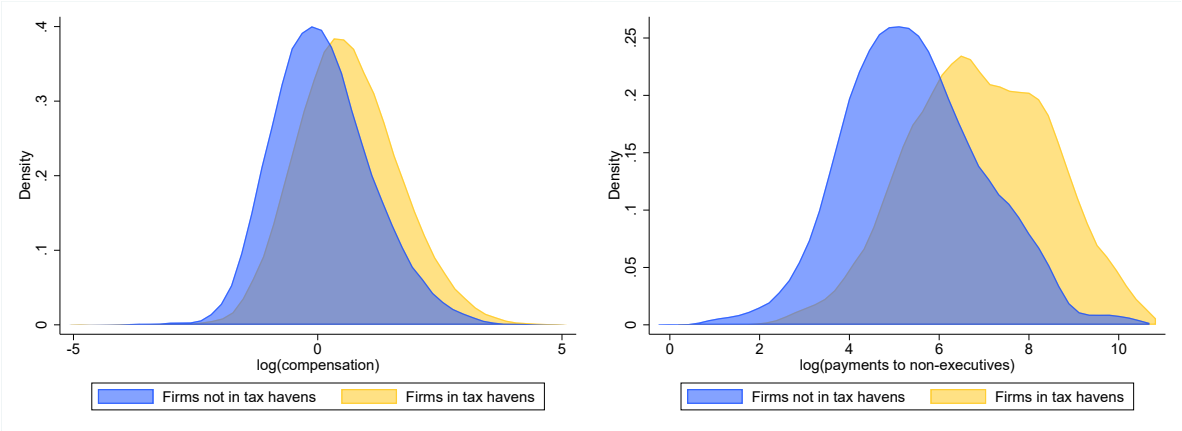
TABLE 2 – Summary statistics

Number of firms never present in a tax haven between 1993 and 2013	1,724
Number of firms entering tax havens between 1993 and 2013	1,521
Number of firms always present in tax havens between 1993 and 2013	420
Total number of firms	3,665

developed in the 1990s and 2000s. They also indicate that, beyond data availability, the 1993-2013 is convenient to analyze the impact of profit shifting on employee pay. Half of firms establish a presence in tax havens ("switchers"), making it possible to compare them with the firms never or always implanted in tax havens.

FIGURE 3 – Distribution of employee pay

(a) Compensations (b) Payments to non-executive employees



Notes: This figure plots the distribution of executive (left subfigure) and non-executive employee (right subfigure) pay. Both are in million dollars.

Figure 3 displays the distribution of compensations and total payments to non-executive employees for two types of firms: those present in tax havens and those not present in tax havens. The compensation of an executive encompasses the salary, bonuses, stock and option awards, long-term incentive plans, pensions, and all other pay.[4] Total payments to non-executive employees, for their part, are calculated as the difference between all payments to employees and compensations received by executives in the same year.[5] Together, the two graphs exhibit a positive correlation between presence in tax havens and employee pay. The correlation between profit shifting and executive compensation coincides with hypothesis 1. On the opposite, the fact that payments to the other employees are higher in firms located in tax havens is at first sight not coherent with hypothesis 1. Nonetheless, this correlation may simply stem from the existence of confounding factors: Since firms in tax havens are larger and more productive and such advantages entail a wage premium (Helpman, Itskhoki, Muendler, and Redding, 2017), the correlation may have nothing to do with profit shifting activities *per se*. Put otherwise, investigating the effect of profit shifting on employee pay requires a more systematic approach.

4. This variable corresponds to the compensation variable $TDC1$ in ExecuComp. The calculation method of the $TDC1$ variable slightly changed in 2006 so I follow the correction procedure of Gabaix, Landier, and Sauvagnat (2014).

5. Payments to employees correspond to XLR in Compustat ("staff expense - total"). Denote $compensation_{e,i,t}$ the compensation of executive e working for firm i in year t. As a result, payments to non-executive employees in firm i and year t are given by $XLR_{i,t} - \sum_e compensation_{e,i,t} = XLR_{i,t} - \sum_e TDC1_{e,i,t}$.

4 Econometric models and results

Section 4 evaluates the empirical validity of hypotheses 1 and 2. I start with hypothesis 1. I clarify the econometric exercise and identification strategy. Then, I expose and discuss the results. I finally focus on hypothesis 2 and explore the possible role of intangible assets.

4.1 Main equations

I assess the effect of profit shifting on employee pay with two distinct equations, as I differentiate between executives and non-executive employees.

4.1.1 Equation for executives

The first equation is:

$$\begin{aligned} log(compensation_{e,i,t}) &= \alpha TH_{i,t} + \beta \mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t} + \gamma \mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t} \quad (3) \\ &\quad + \lambda X_{e,i,t} + \upsilon_e + \phi_i + \psi_t + \epsilon_{e,i,t} \end{aligned}$$

The left-hand side variable $compensation_{e,i,t}$ is the compensation of executive e working for S&P 1500 company i in year t. On the right-hand side, $TH_{i,t}$ is a dummy variable equal to one if firm i has at least one subsidiary located in a tax haven in year t. $\mathbb{1}_{e,i,t}^{CEO/CFO}$ is a binary variable equal to one if executive e is the CEO or the CFO of firm i in year t. I thus allow for heterogeneous effects across executives. This is motivated by the fact that CEOs and CFOs are the highest-ranking executives setting the "tone at the top" when it comes to tax strategies (Dyreng, Hanlon, and Maydew, 2010), and the accent is placed on these C-level executives in the rest of the paper. $\mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax}$ interacts the previous variable with a dichotomous equal to one if firm i compensates its executives on a after-tax basis. As mentioned earlier, such executives might be rewarded to a higher degree as activities carried out in tax havens precisely aim at lightening the tax burden. A caveat is that this information is not directly available. Drawing on Gaertner (2014), I infer whether a firm pays its executives on an after-tax basis by analyzing the firm-specific sensitivity of executive compensation to total income tax expense conditional on pre-tax income. Firms whose sensitivities are negative and statistically significant at the 15 percent level are co-

ded as after-tax incentive firms. [6]

To mitigate endogeneity, I insert a vector of controls and a battery of fixed effects. $X_{e,i,t}$ is composed of executive- and firm-specific variables. It comprises executives' age and experience within the firm, two CEO and CFO dummies, and firms' assets, sales, pre-tax income (in logarithm) [7] and number of foreign subsidiaries in non-haven countries. The addition of the latter variable ensures that the effect is specific to entry in tax havens. Executive, firm, and year fixed effects absorb fixed characteristics of executives (e.g., education), systematic differences in compensations across companies, global trends in compensations, and macroeconomic shocks. The coefficients of interest, α, β, and γ, transcribe the change in compensations (in percentage) subsequent to firm entry in tax havens. Their estimation requires variation in $TH_{i,t}$, i.e., switching firms. The identification relies on the assumption that, absent profit shifting and all else equal, compensations of treated and non-treated executives would have evolved similarly.

4.1.2 Equation for non-executives

I investigate the impact of firm entry in tax havens on non-executive employee pay with the generalized difference-in-differences model:

$$log(payments_{i,t}) = \zeta TH_{i,t} + \lambda X_{i,t} + \phi_i + \psi_t + \epsilon_{i,t} \quad (4)$$

where $payments_{i,t}$ stands for all payments made by firm i in year t to non-executive employees. The independent variables mirror those introduced in equation (3), except that the vector $X_{i,t}$ includes only firm-specific controls this time because the analysis is performed at the firm × year level.

6. To this end, I use the variables denoted TXT and $PI-SPI$ in Compustat. Given the small number of observations for each regression, I depart from the standard 5 percent level. Selecting a smaller level considerably lowers the number of companies determining compensations based on accounting financial performance, but it does not affect the findings of this paper.

7. By construction, loss-making firms are ruled out. Nevertheless, the results are preserved if assets, sales, and pre-tax income are integrated without the logarithm transformation. Sales correspond to the variable denoted $SALE$, assets to the variable denoted AT, and pre-tax income to the variable equal to $PI-SPI$ (Compustat codes).

4.2 Results

4.2.1 Benchmark results

The estimation results of equations (3) and (4), fully reported in Appendix table AT1, are best summarized by figure 4 and lend credence to hypothesis 1. The left part of the graph outlines the effect of firm entry in tax havens on the compensation of CEOs and CFOs paid on an after-tax basis ($\hat{\alpha}+\hat{\beta}+\hat{\gamma}$, in yellow), CEOs and CFOs not receiving after-tax incentives ($\hat{\alpha}+\hat{\beta}$, in black), and the rest of executives ($\hat{\alpha}$, in blue). It indicates that the compensation of CEOs and CFOs in after-tax incentive firms grows by 8 percent as these firms establish a presence in tax havens. This surge is statistically significant at the 5 percent level. In contrast, the compensation of the other executives vary little. The other part of the graph ($\hat{\zeta}$, in gray) reveals that overall wages of non-executive employees fall by 3 percent in the meantime. In Appendix table AT2, I show that, if anything, employment rises by 2 percent. [8] Consequently, the decline in total payments to non-executive employees cannot be explained by job cuts and the average wage decreases by around 5 percent.

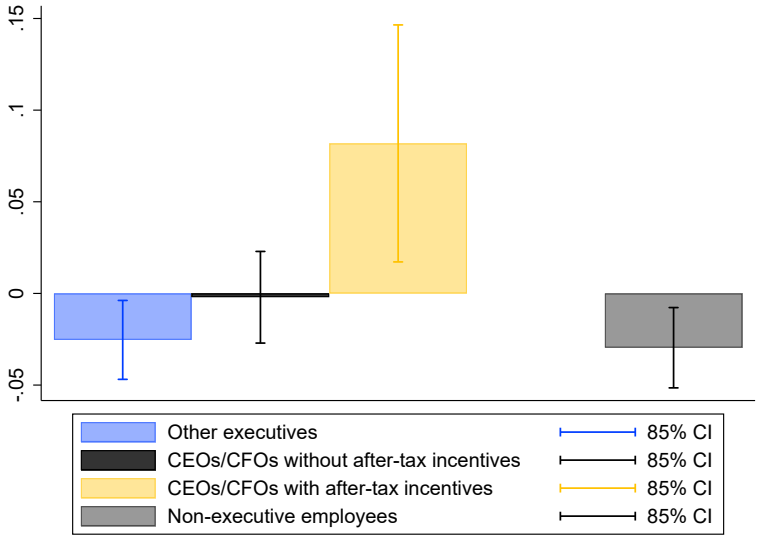
It is also worth noting that the coefficients associated with the covariates coincide with what our expectations. For instance, the results validate the existence of a compensation premium for top C-level executives. It amounts to 43 and 21 percent respectively for CEOs and CFOs. In addition, we notice a positive relationship between firms' activities worldwide broadly defined and employee pay.

4.2.2 Robustness tests

I inspect the robustness of these baseline results in various ways. First, I re-estimate equation (3) by expressing executives' earnings as a ratio of their firm's average wage. Although such an equation does not reflect the effect of firm entry in tax havens on the level of employee pay, looking at the gap between executives and other employees enables us to investigate directly the impact on within-firm pay inequality. The regression results of equations (3) and (4) would imply a 14-percent increase in the pay gap between CEOs and CFOs and non-executive employees in after-tax incentive companies. The

8. Total employment corresponds to the variable denoted EMP in Compustat.

FIGURE 4 – Benchmark results



Notes: The three bars on the left depict the regression results for $\hat{\alpha}$, $\hat{\alpha}+\hat{\beta}$, and $\hat{\alpha}+\hat{\beta}+\hat{\gamma}$ respectively, while the fourth bar depicts $\hat{\zeta}$. Standard errors are clustered at the firm level.

results of the new equation, to be found in Appendix table AT3, report an effect of similar magnitude. They show that the relative compensation of CEOs and CFOs in after-tax incentive companies increase by 18 percent post entry and that this increase is statistically significant at the 5 percent level.

Next, I tackle a probable missing data issue. The number of observations is relatively low in equation (4)/figure 4 (right bar)/Appendix table AT1 because only 16 percent of companies in the sample disclose total staff expenses. [9] To overcome this shortcoming, I calculate industry × year averages of the total labor costs to employment ratio, and I impute missing values by multiplying these averages with firm-level employment. The latter variable being well-filled, this methodology borrowed from Donangelo, Gourio, Kehrig, and Palacios (2019) allows increasing the size of the sample five fold. The regression results are visible in Appendix table AT4 and concur with the reference ones. They thereby affirm that the negative impact on firm entry in tax havens on non-executive pay cannot come from a selection problem.

9. T-tests reveal that firms reporting labor costs are somewhat larger but less internationalized and present in tax havens.

In figure 5, I verify that revising the set of tax havens delivers the same results. The tax haven definition is not consensual in the literature. In fact, several classifications coexist because having a low statutory corporate income tax rate is not a sufficient condition to be treated as a tax haven. Other criteria are determinant, such as a minimal reporting of information and a lack of transparency obligations. This is why I reproduce in figure 5a the results when adopting the classification proposed by Hines and Rice (1994). Their list is almost equivalent to the one of Dyreng and Lindsey (2009), both sharing 35 tax havens. Yet, the classification of Dyreng and Lindsey (2009) is the only one to contain Aruba, Costa Rica, Guernsey, Jersey, Malaysia, Mauritius, Nauru, Niue, Samoa, San Marino, and Seychelles. Symmetrically Dyreng and Lindsey (2009) do not incorporate the British Virgin Islands, Jordan, Maldives, Saint Martin, Channel Islands, and UK Caribbean Islands. [10] In the same spirit, I remove six tax havens in figure 5a: Hong Kong, Ireland, Luxembourg, Malaysia, Singapore, and Switzerland. These countries are quite large and well-connected to the rest of the world. Therefore, FDIs in these countries do not necessarily reflect tax-avoiding strategies. On the opposite, FDIs in small and remote islands such as the Bahamas and Jersey are more prone to be fully motivated by tax purposes. The results are displayed in figure 5 and attached in Appendix tables AT5 and AT6. They globally match the benchmark ones, both statistically and economically. Hence, the inequality-deepening effect of profit shifting on employee pay is robust across classifications.

In equations (5) and (6), I scrutinize the evolution of employee pay before firm entry in tax havens. A concern not addressed thus far is that the benchmark results could be ascribable to pre-existing trends. To check that this is not the case, I enrich equations (3) and (4) with additional terms:

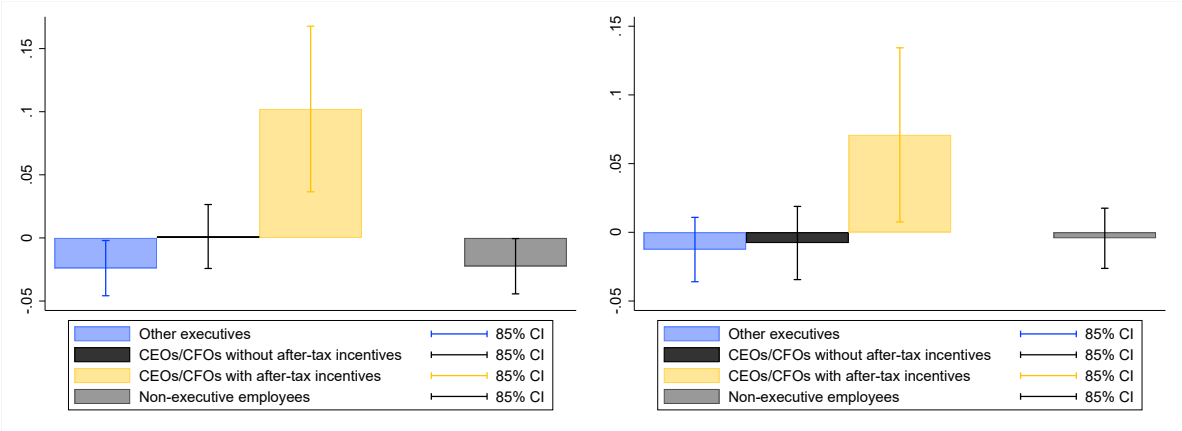
$$\begin{aligned} log(compensation_{e,i,t}) &= \sum_{k=0}^{5} \alpha_k TH_{i,t}^{t+k} + \sum_{k=0}^{5} \beta_k \mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t}^{t+k} \\ &\quad + \sum_{k=0}^{5} \gamma_k \mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t}^{t+k} + \lambda X_{e,i,t} + \upsilon_e + \phi_i + \psi_t + \epsilon_{e,i,t} \end{aligned} \tag{5}$$

$$log(payments_{i,t}) = \sum_{k=0}^{5} \zeta_k TH_{i,t}^{t+k} + \lambda X_{i,t} + \phi_i + \psi_t + \epsilon_{i,t} \tag{6}$$

10. Due to data limitations, Channel Islands and UK Caribbean Islands are however omitted in the present analysis.

FIGURE 5 – Sensitivity test: alternative sets of tax havens

(a) List of Hines and Rice (1994) (b) Exclusion of six tax havens



Notes: Standard errors are clustered at the firm level.

$TH_{i,t}^{t+k}$ ($k \in \{0,...,5\}$) is a dichotomous variable equal to one in year t if firm i has at least one subsidiary incorporated in a tax haven in year $t+k$. This collection of variables informs on the dynamics of the effect and can serve as a placebo test. The rationale is that if the coefficients associated with the $TH_{i,t}^{t+k}$ variables are not statistically different from zero, then the evolution of employee pay does not depend on future profit shifting activities. The regression results point in this direction. None of the $\{\alpha_k, \beta_k, \gamma_k, k \in \{1,...,5\}\}$ and $\{\zeta_k, k \in \{1,...,5\}\}$ coefficients is significant at the 10 percent level (see Appendix figures AF1 and AF2), and the p-values of the joint significance tests are equal to 26 and 56 percent respectively. These tests thereby substantiate that employee pay does not significantly change five years before firms establish a presence in tax havens. This finding is preserved if we expand or narrow the five-year window, backs up the parallel trends assumption, and more generally alleviates endogeneity issues.

Relatedly, I investigate whether the results for equation (4) could be driven by the existence of negative weights. Earlier work on two-way fixed effect models suggests that the coefficient of interest ζ is equal to the expectation of a weighted sum of ATE (de Chaisemartin and D'Haultfœuille, 2020). Some weights, however, could be negative. Thus, if the constant effect assumption is violated and the effect varies across firms and/or periods – which we have seen might be the case –, it is a priori possible to obtain a positive coefficient even if all ATE are negative. In accordance with the recommendations of de Chaisemartin and D'Haultfœuille (2020), I calculate the share of negative weights

in the estimation of equation (4). Given that this share does not exceed 10 percent, I conclude that this should not be a problem in this paper.

4.3 The role of intangible assets

Before concluding, I examine whether intangible assets exacerbate the impact of profit shifting on employee pay and inequalities. I interact in equations (3) and (4) the treatment variables with a variable $INTANGIBLES_{i,t}$ denoting the firm-level intangibles to total assets ratio.[11] The regression results laid out in Appendix table AT7 show that the effect of profit shifting is magnified in intangible-intensive firms. Take two firms A and B entering a tax haven at some point and paying their executives on an after-tax basis. Further assume that A is in the first quartile of the intangible intensity distribution (i.e., $INTANGIBLES_{i,t} \approx 0.01$) and that B is in the third quartile of the intangible intensity distribution (i.e., $INTANGIBLES_{i,t} \approx 0.26$). The point estimates are consistent with hypothesis 2. They reveal that total payments to non-executive employees would remain almost the same in firm A post entry, while non-executive employees in firm B would experience a 5 percent loss in terms of total payments. Likewise, the compensation of the CEO and CFO would grow by 4 percent in firm A and by 9 percent in firm B.

5 Conclusion

In the existing literature, the effect of profit shifting on employee pay has been studied merely from a theoretical perspective. The present paper bridges the gap between theory and data by means of an event study. I first outline a toy model to explain the potential mechanisms at play. On this basis, I derive two testable predictions and assess their empirical validity with a rich database on S&P 1500 firms' financial statements, foreign subsidiaries, and executives. I observe how employee pay evolves before and after firm entry in tax havens, and the results are three-fold. First, compensations of CEOs and CFOs remunerated on an after-tax basis increase when their firm establishes subsidiaries in tax havens. Second, payments to non-executive employees, on the contrary, decline in the meantime. Third, I find that the inequality-deepening effect is more pronounced in intangible-intensive firms. These findings are in line with our predictions and have in-

11. I use the variables $INTAN$ and AT in Compustat to construct this ratio. The first quartile corresponds to 1 percent, the median to 8 percent, the third quartile to 26 percent, and the maximum value is 93 percent.

teresting policy implications. By suggesting that profit shifting increases within-firm pay inequalities, they highlight a new mechanism whereby globalization fosters income inequalities. Moreover, they justify the design of anti-tax avoidance measures as a tool to reduce these income inequalities.

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Appendix

TABLE AT1 – Benchmark results

Dependent variable	(1) $log(compensation_{e,i,t})$	(2) $log(payments_{i,t})$
$TH_{i,t}$	-0.03^{c}	-0.03^{d}
	(0.01)	(0.02)
$\mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t}$	0.02	
	(0.02)	
$\mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t}$	0.08^{c}	
	(0.05)	
$log(assets_{i,t})$	0.12^{a}	0.20^{a}
	(0.02)	(0.04)
$log(sales_{i,t})$	0.08^{a}	0.74^{a}
	(0.03)	(0.05)
$log(\textit{pre-tax income}_{i,t})$	0.11^{a}	-0.03^{a}
	(6.59e-3)	(7.29e-3)
$\textit{Subsidiaries in non-haven countries}_{i,t}$	2.50e-4^{b}	6.78e-5
	(1.16e-4)	(5.59e-5)
$age_{e,t}$	1.95e-3	
	(8.03e-3)	
$experience_{e,i,t}$	3.04e-4	
	(8.41e-4)	
$CEO_{e,i,t}$	0.43^{a}	
	(0.02)	
$CFO_{e,i,t}$	0.21^{a}	
	(0.02)	
Executive FEs	Yes	No
Firm FEs	Yes	Yes
Year FEs	Yes	Yes
R-squared	0.83	0.99
Nb. of obs.	101,232	5,248

Notes: Standard errors, in parentheses, are clustered at the firm level. $^{d}p < 0.15$, $^{c}p < 0.10$, $^{b}p < 0.05$, $^{a}p < 0.01$.

TABLE AT2 – Employment effect of firm entry in tax havens

Dependent variable	(1) $log(employment_{i,t})$
$TH_{i,t}$	0.02^{b}
	(0.01)
$log(assets_{i,t})$	0.29^{a}
	(0.02)
$log(sales_{i,t})$	0.62^{a}
	(0.03)
$log(\textit{pre-tax income}_{i,t})$	-0.04^{a}
	(4.23e-3)
$\textit{Subsidiaries in non-haven countries}_{i,t}$	6.78e-5
	(1.16e-4)
Firm FEs	Yes
Year FEs	Yes
R-squared	0.98
Nb. of obs.	30,261

Notes: Standard errors, in parentheses, are clustered at the firm level. $^{d}p < 0.15$, $^{c}p < 0.10$, $^{b}p < 0.05$, $^{a}p < 0.01$.

TABLE AT3 – Effect of firm entry in tax havens on within-firm inequalities

Dependent variable	(1) $log\left(\frac{compensation_{e,i,t}}{\text{total payments to employees}_{i,t}/employment_{i,t}}\right)$
$TH_{i,t}$	-0.09^{c}
	(0.05)
$\mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t}$	0.21^{a}
	(0.03)
$\mathbb{1}_{e,i,t}^{\text{CEO/CFO, after-tax}} \times TH_{i,t}$	0.05
	(0.08)
$age_{e,t}$	-0.01
	(0.01)
$experience_{e,i,t}$	2.80e-3
	(2.01e-3)
$log(assets_{i,t})$	0.06
	(0.07)
$log(sales_{i,t})$	0.05
	(0.08)
$log(\text{pre-tax income}_{i,t})$	0.11^{a}
	(0.02)
$\text{Subsidiaries in non-haven countries}_{i,t}$	3.64e-06
	(3.06e-4)
$CEO_{e,i,t}$	0.43^{a}
	(0.04)
$CFO_{e,i,t}$	0.22^{a}
	(0.04)
Executive FEs	Yes
Firm FEs	Yes
Year FEs	Yes
R-squared	0.85
Nb. of obs.	17,700

Notes: Standard errors, in parentheses, are clustered at the firm level. $^{d}p < 0.15$, $^{c}p < 0.10$, $^{b}p < 0.05$, $^{a}p < 0.01$.

TABLE AT4 – Sensitivity test: imputed labor costs

Dependent variable	(1) $log\left(\widetilde{payments}_{i,t}\right)$
$TH_{i,t}$	-0.03^{c}
	(0.02)
$log(assets_{i,t})$	0.29^{a}
	(0.04)
$log(sales_{i,t})$	0.67^{a}
	(0.05)
$log(\textit{pre-tax income}_{i,t})$	-0.06^{a}
	(7.43e-3)
$\textit{Subsidiaries in non-haven countries}_{i,t}$	2.96e-04^{b}
	(1.54e-4)
Firm FEs	Yes
Year FEs	Yes
R-squared	0.94
Nb. of obs.	25,458

Notes: Standard errors, in parentheses, are clustered at the firm level. $^{d}p < 0.15$, $^{c}p < 0.10$, $^{b}p < 0.05$, $^{a}p < 0.01$.

TABLE AT5 – Sensitivity test: list of Hines and Rice (1994)

Dependent variable	(1) $log(compensation_{e,i,t})$	(2) $log(payments_{i,t})$
$TH_{i,t}$	-0.02^{d}	-0.02^{d}
	(0.01)	(0.02)
$\mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t}$	0.03	
	(0.02)	
$\mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t}$	0.10^{b}	
	(0.05)	
$log(assets_{i,t})$	0.12^{a}	0.20^{a}
	(0.02)	(0.04)
$log(sales_{i,t})$	0.08^{a}	0.74^{a}
	(0.03)	(0.05)
$log(pre\text{-}tax\ income_{i,t})$	0.11^{a}	-0.03^{a}
	(6.59e-3)	(7.28e-3)
$Subsidiaries\ in\ non\text{-}haven\ countries_{i,t}$	2.50e-4^{b}	6.55e-5
	(1.16e-4)	(5.39e-5)
$age_{e,t}$	1.93e-3	
	(8.01e-3)	
$experience_{e,i,t}$	6.30e-4	
	(8.68e-4)	
$CEO_{e,i,t}$	0.43^{a}	
	(0.02)	
$CFO_{e,i,t}$	0.20^{a}	
	(0.02)	
Executive FEs	Yes	No
Firm FEs	Yes	Yes
Year FEs	Yes	Yes
R-squared	0.83	0.99
Nb. of obs.	101,232	5,248

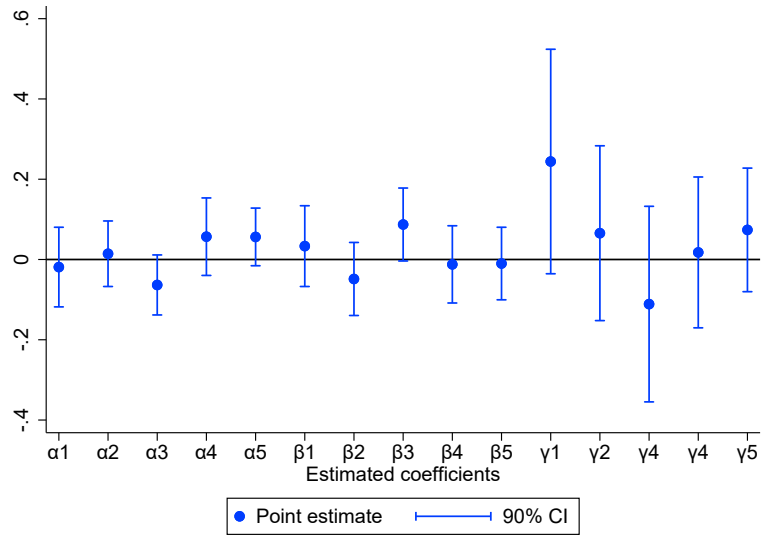
Notes: Standard errors, in parentheses, are clustered at the firm level. $^{d}p < 0.15$, $^{c}p < 0.10$, $^{b}p < 0.05$, $^{a}p < 0.01$.

TABLE AT6 – Sensitivity test: exclusion of six tax havens

Dependent variable	(1) $log(compensation_{e,i,t})$	(2) $log(payments_{i,t})$
$TH_{i,t}$	-0.01	-4.35e-3
	(0.02)	(1.85e-2)
$\mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t}$	4.76e-3	
	(0.02)	
$\mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t}$	0.08^{c}	
	(0.04)	
$log(assets_{i,t})$	0.12^{a}	0.20^{a}
	(0.02)	(0.04)
$log(sales_{i,t})$	0.08^{a}	0.74^{a}
	(0.03)	(0.05)
$log(\textit{pre-tax income}_{i,t})$	0.11^{a}	-0.03^{a}
	(6.59e-3)	(7.25e-3)
$\textit{Subsidiaries in non-haven countries}_{i,t}$	1.94e-4^{d}	4.58e-5
	(1.20e-4)	(5.08e-5)
$age_{e,t}$	1.88e-3	
	(8.01e-3)	
$experience_{e,i,t}$	-1.03e-e	
	(8.39e-4)	
$CEO_{e,i,t}$	0.44^{a}	
	(0.02)	
$CFO_{e,i,t}$	0.22^{a}	
	(0.02)	
Executive FEs	Yes	No
Firm FEs	Yes	Yes
Year FEs	Yes	Yes
R-squared	0.83	0.99
Nb. of obs.	101,232	5,248

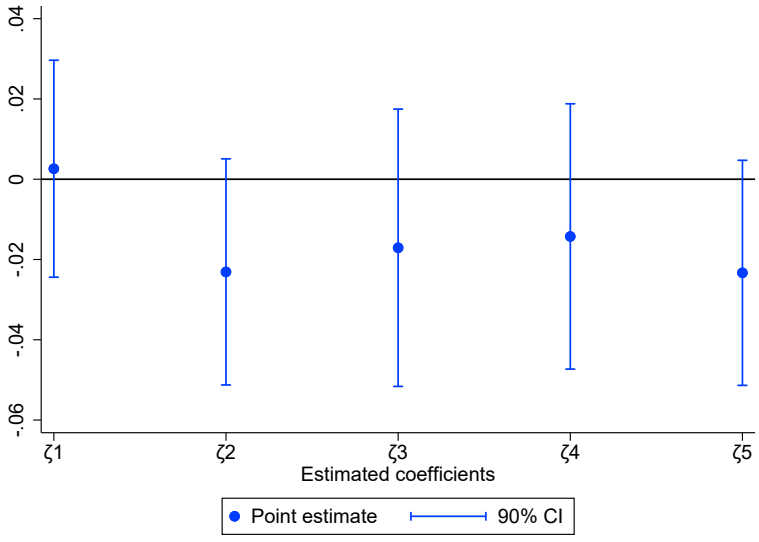
Notes: Standard errors, in parentheses, are clustered at the firm level. $^{d}p < 0.15$, $^{c}p < 0.10$, $^{b}p < 0.05$, $^{a}p < 0.01$.

FIGURE AF1 – Regression results of equation (5)



Notes: The figure depicts the $\hat{\alpha}_k$, $\hat{\beta}_k$, and $\hat{\gamma}_k$, $k \in \{1, ..., 5\}$, when estimating equation (5). Standard errors are clustered at the firm level.

FIGURE AF2 – Regression results of equation (6)



Notes: The figure depicts the $\hat{\zeta}_k, k \in \{1, ..., 5\}$, when estimating equation (6). Standard errors are clustered at the firm level.

TABLE AT7 – The magnifying effect of intangible assets

Dependent variable	(1) $log(compensation_{e,i,t})$	(2) $log(payments_{i,t})$
$TH_{i,t}$	-0.01	-0.01
	(0.02)	(0.02)
$TH_{i,t} \times INTANGIBLES_{i,t}$	-0.14^{b}	-0.17^{b}
	(0.06)	(0.08)
$\mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t}$	0.01	
	(0.02)	
$\mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t} \times INTANGIBLES_{i,t}$	0.12^{c}	
	(0.07)	
$\mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t}$	0.03	
	(0.06)	
$\mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t} \times INTANGIBLES_{i,t}$	0.25	
	(0.22)	
$log(assets_{i,t})$	0.11^{a}	0.21^{a}
	(0.03)	(0.04)
$log(sales_{i,t})$	0.09^{a}	0.74^{a}
	(0.03)	(0.05)
$log(\textit{pre-tax income}_{i,t})$	0.10^{a}	-0.03^{a}
	(6.88e-3)	(7.41e-3)
$\textit{Subsidiaries in non-haven countries}_{i,t}$	2.45e-4^{b}	8.05e-5
	(1.16e-4)	(5.67e-5)
$age_{e,t}$	3.97e-3	
	(7.83e-3)	
$experience_{e,i,t}$	1.38e-3^{c}	
	(7.81e-4)	
$CEO_{e,i,t}$	0.44^{a}	
	(0.02)	
$CFO_{e,i,t}$	0.21^{a}	
	(0.02)	
Executive FEs	Yes	No
Firm FEs	Yes	Yes
Year FEs	Yes	Yes
R-squared	0.83	0.99
Nb. of obs.	94,793	4,869

Notes: Standard errors, in parentheses, are clustered at the firm level. $^{d}p < 0.15$, $^{c}p < 0.10$, $^{b}p < 0.05$, $^{a}p < 0.01$.

In column (1):

— (1+0.01)$\left(TH_{i,t} + \mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t} + \mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t}\right)$ is equal to 0.04 with a standard error equal to 0.06.

— (1+0.26)$\left(TH_{i,t} + \mathbb{1}_{e,i,t}^{CEO/CFO} \times TH_{i,t} + \mathbb{1}_{e,i,t}^{CEO/CFO,\ after\text{-}tax} \times TH_{i,t}\right)$ is equal to 0.09 with a standard error equal to 0.04.

In column (2):

— $(1 + 0.01)TH_{i,t}$ is equal to -0.01 with a standard error equal to 0.02.

— $(1 + 0.26)TH_{i,t}$ is equal to -0.05 with a standard error equal to 0.02.