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

Baptiste Souillard[1]

[1]*ECARES, SBS-EM, Université Libre de Bruxelles*

Preliminary – June 24, 2021
Last version here

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. While the compensation of chief executive officers and chief financial officers increases when their firm enters tax havens, non-executive employees, on the contrary, see their wage fall. Furthermore, this inequality-deepening effect is more pronounced in intangible-intensive sectors. These new empirical findings cast light on the distributional consequences of profit shifting and might help explain recent trends in income inequalities.

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

JEL codes: F16, H26, J30, M12.

I would like to thank Mai Nguyen for her help with the data. Funding from the F.R.S.-FNRS is gratefully acknowledged. Email: baptiste.souillard@gmail.com.

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 by 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). From a theoretical point of view, we thus expect employees to receive lower wages since the second effect dominates (Krautheim and Schmidt-Eisenlohr, 2016). This adverse effect is however less plausible for executives since they design firms' tax strategies. In addition, executives are generally compensated on an after-tax basis to alleviate agency costs associated with moral hazard and adverse selection (Newman, 1989; Gaertner, 2014). Accordingly, economic theory suggests that profit shifting increases the compensation of top executives and decreases wages of non-executive employees, thereby deepening income inequalities. All the same, no paper confronts these theoretical predictions with the data.

The present paper is a first step in this direction. It is 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 constructing a list of their worldwide 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 theoretical predictions. The compensation of CEOs and CFOs goes up when their firm expands its network of subsidiaries in tax havens, whether it is expressed in absolute value or as a ratio of the firm's average wage. I estimate a 13 percent increase after five years. Conversely, overall payments to non-executive employees decrease in the meantime. This reduction amounts to 5 percent five years post entry, and I show that it is not attributable to a drop in employment. Profit shifting therefore aggravates income inequalities within corporations. Moreover, I find that this pattern is especially notable in intangible-intensive sectors. 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. First, I demonstrate 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 clas-

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). Albeit frequent, they capture not only tax avoidance but more generally tax liability. Hence, changes in these variables could have nothing to do with changes in tax avoidance behavior in the first place. For instance, effective tax rates would significantly decrease in the case of tax loss carryforward even though the loss is unrelated to tax avoidance in the first place. On the other hand, tax haven FDIs do not encompass all tax avoidance strategies and firms can still shift profits toward low-tax non-haven countries, but tax haven FDIs have the key advantage of being a conservative metric of tax avoidance. In addition, note that tax haven FDIs constitute one of the most aggressive tax planning activities.

sification elaborated by Hines and Rice (1994), also popular in the literature, yields the same conclusions. Along the same lines, I come to 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. Second, I show that there is no pre-existing trend in employee pay before firm entry in tax havens. This observation supports the so-called "common trend" assumption, crucial when performing a DiD analysis. It also implies that entry in tax havens is uncorrelated with past (executive $\times$) firm $\times$ year unobserved shocks and alleviates reverse causality concerns. Finally, I verify that negative weights are unlikely to jeopardize the average treatment effect (ATE). The 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 my regressions with two-way fixed effects, so treatment effect heterogeneity should not constitute a major threat here.

These new empirical findings carry policy implications. They unveil a new mechanism whereby globalization fosters income inequalities: through profit shifting. In a sense, the results help understand the recent evolution of income inequalities and the backlash against MNEs and globalization (Helpman, 2017; Rodrik, 2018). Furthermore, the conclusions may enrich ongoing discussions about the international corporate taxation system. It is acknowledged 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. Perhaps surprisingly, they tend to focus on two dimensions: countries' tax revenues and attractiveness. My paper puts the accent on a more neglected dimension, income inequalities, and asserts that such reforms could be useful in curbing rising inequalities.

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. 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 show that profit shifting is in fact detrimental for the large 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). As mentioned above, 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 the decline in non-executive employees' wages is more pronounced in intangible-intensive sectors.

The remainder of the paper is organized as follows. Section 2 proposes a simplistic model. It allows me to illustrate the possible 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:

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

where $\gamma > 0$ symbolizes the relative bargaining power of workers. Assume that the firm always participates, i.e., $\pi(\bar{w},t) \geq \bar{\pi}$. The solution w^* verifies (first-order condition):

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

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 but improves executive pay.

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 γ). The (non-formal) reasoning is the following. Profits, once shifted by the firm, are not perfectly observed by workers. As a consequence, 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. They thus accept a lower share of the surplus. In total, this adverse effect dominates, so 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. Ultimately, the sign of the overall effect hinges on the extent to which profit shifting weakens the bargaining power of workers. In this regard, the negative effect might be less severe for top executives insofar as they define business strategies and oversee their implementation. [2] They notably run the financial operations. In addition, they are precisely paid on an after-tax basis to align their interests to those of the firm, so they 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-

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

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 intra-firm 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 sectors.

3 Data

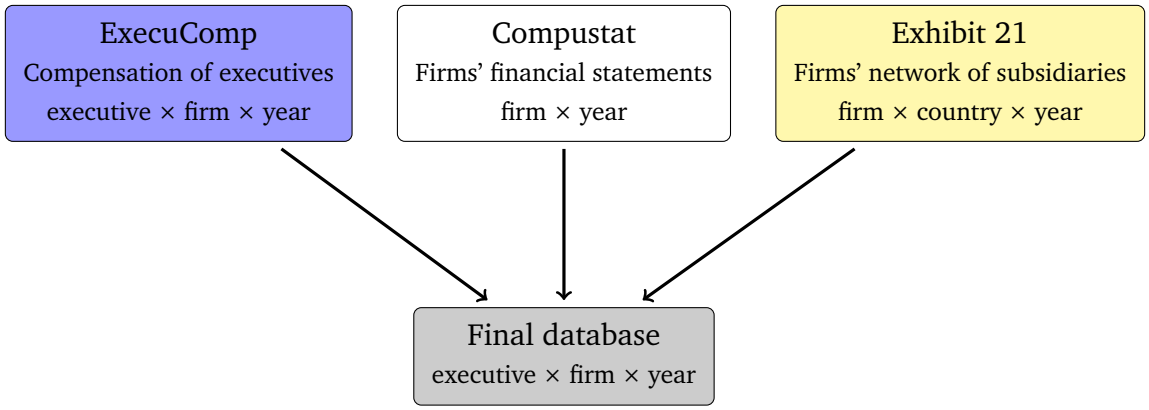
We now turn to the empirical analysis. To conduct it, I construct a panel database on financial statements, foreign subsidiaries, and executives of S&P 1500 companies between 1993 and 2013. I hereby explain where the data are coming from and describe the final sample.

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 enterprises 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-

FIGURE 1 – Construction of the database



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 large 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 disclose 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. Furthermore, any subsidiary is deemed significant if by combining all undisclosed subsidiaries into one subsidiary, this 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

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

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 1 outlines some summary statistics about the presence of firms in tax havens. 42 percent of the 3,665 firms inclu-

TABLE 1 – Summary statistics

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

ded 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. [4] 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 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 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. [5] 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. [6] To-

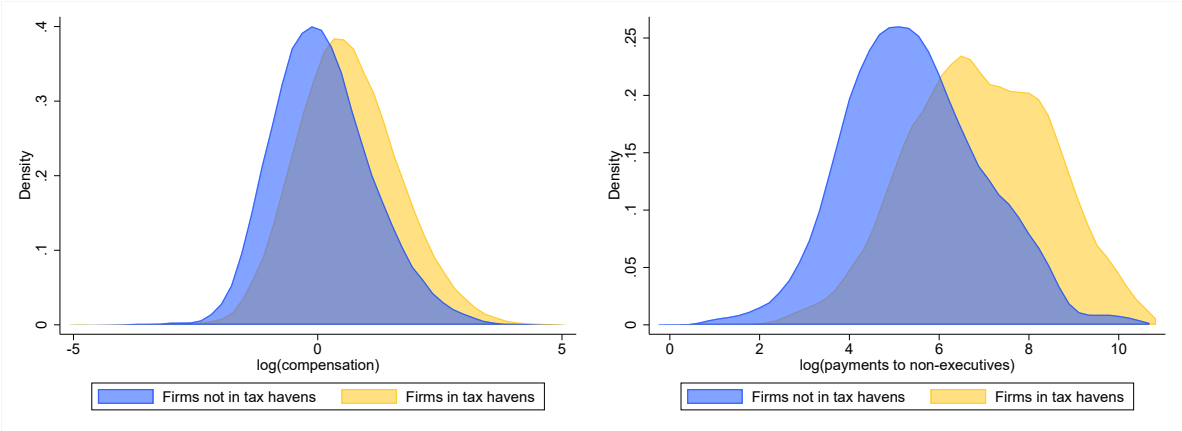
4. Their final list comprises 46 tax havens: Andorra, Anguilla, Antigua, Aruba, Bahamas, Bahrain, Barbados, Barbuda, Belize, Bermuda, Cayman Islands, Cook Islands, Costa Rica, Cyprus, Dominica, Gibraltar, Grenada, Guernsey, Hong Kong, Ireland, Isle of Man, Jersey, Lebanon, Liberia, Liechtenstein, Luxembourg, 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, and Vanuatu.

5. 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).

6. Payments to employees correspond to XLR in Compustat. Denote $compensation_{e,i,t}$ the compensation

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.

gether, 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 in line 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 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 role of intangible assets.

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 $XLR_{i,t} - \sum_e compensation_{e,i,t} = XLR_{i,t} - \sum_e TDC1_{e,i,t}$.

4.1 Main equations

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

The first equation is:

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

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). Consequently, these executives might be rewarded to a larger degree and the accent is placed on these C-level executives in the rest of the paper. To mitigate endogeneity, I insert a vector of controls and a battery of fixed effects. $X_{e,i,t}$ is composed of executives' age, firms' assets, sales, and pre-tax income (in logarithm),[7] and firms' 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 year shocks. The coefficients of interest, α and β, transcribe the change in compensations (in percentage) following 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.

I investigate the impact of firm entry in tax havens on non-executive employee pay with

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. Details are available upon request. 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).

TABLE 2 – Benchmark results

Dependent variable	(1) $log(compensation_{e,i,t})$	(2) $log(payments_{i,t})$	(3) $log\left(\frac{compensation_{e,i,t}}{XLR_{i,t}/EMP_{i,t}}\right)$	(4) $log(EMP_{i,t})$
$\left(1 + \mathbb{1}_{e,i,t}^{CEO,CFO}\right) \times TH_{i,t}$	0.15[a]		0.13[a]	
	(0.02)		(0.05)	
$TH_{i,t}$		-0.03[c]		0.02[b]
		(0.02)		(0.01)
Controls	Yes	Yes	Yes	Yes
Executive FEs	Yes	No	Yes	No
Firm FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
R-squared	0.82	0.99	0.85	0.98
Nb. of obs.	103,051	5,248	17,798	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] $p < 0.01$.

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.

4.2 Results

The estimation results of equations (3) and (4), respectively reported in table 2 columns (1) and (2), give credence to hypothesis 1. They indicate that the compensation of CEOs and CFOs grows by 15 percent as firms establish a presence in tax havens, while payments to non-executive employees fall by 3 percent. In columns (3) and (4), I demonstrate that CEOs and CFOs earnings expressed as a ratio of the firm's average wage increases by 13 percent and that, if anything, employment rises by 2 percent. It means that the decline in payments to non-executive employees cannot be mechanic and explained by job cuts.

I evaluate the robustness of these baseline results in table 3 and figure 4. In table 3, I verify that revising the set of tax havens delivers the same results. It is worth bearing

in mind that 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 secrecy and self-promotion as an offshore financial center, and the weight associated to these criteria sometimes differs. This is why I reproduce in columns (1) and (2) 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, but there are a few exceptions. 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, Hines and Rice (1994), unlike Dyreng and Lindsey (2009), incorporate the British Virgin Islands, Jordan, Maldives, Saint Martin, Channel Islands, and UK Caribbean Islands. [8] In the same spirit, I remove six tax havens in columns (3) and (4): Hong Kong, Ireland, Luxembourg, Malaysia, Singapore, and Switzerland. These countries are quite large and well-connected to the rest of the world, so saving taxes is probably not the unique/first objective of companies investing in these countries. 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 reported in table 3 globally match the benchmark ones, both statistically and economically. Hence, the inequality-deepening effect of profit shifting on employee pay is robust across classifications.

Figure 4 extends the results as it outlines the evolution of employee pay before and after firm entry in tax havens. To construct it, I enrich equations (3) and (4) with additional terms:

$$\begin{aligned} log(compensation_{e,i,t}) &= \sum_{k=0}^{5} \alpha_k TH_{i,t}^{t-k} + \sum_{k=0}^{5} \beta_k \mathbb{1}_{e,i,t}^{CEO,CFO} \times TH_{i,t}^{t-k} + \sum_{k=1}^{5} \gamma_k TH_{i,t}^{t+k} \quad (5) \\ &\quad + \sum_{k=1}^{5} \delta_k \mathbb{1}_{e,i,t}^{CEO,CFO} \times TH_{i,t}^{t+k} + \lambda X_{e,i,t} + \upsilon_e + \phi_i + \psi_t + \epsilon_{e,i,t} \\ log(payments_{i,t}) &= \sum_{k=0}^{5} \zeta_k TH_{i,t}^{t-k} + \sum_{k=1}^{5} \eta_k TH_{i,t}^{t+k} + \lambda X_{i,t} + \phi_i + \psi_t + \epsilon_{i,t} \quad (6) \end{aligned}$$

$TH_{i,t}^{t-k}$ is a dummy variable equal to one in year t if firm i has at least one subsidiary loca-

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

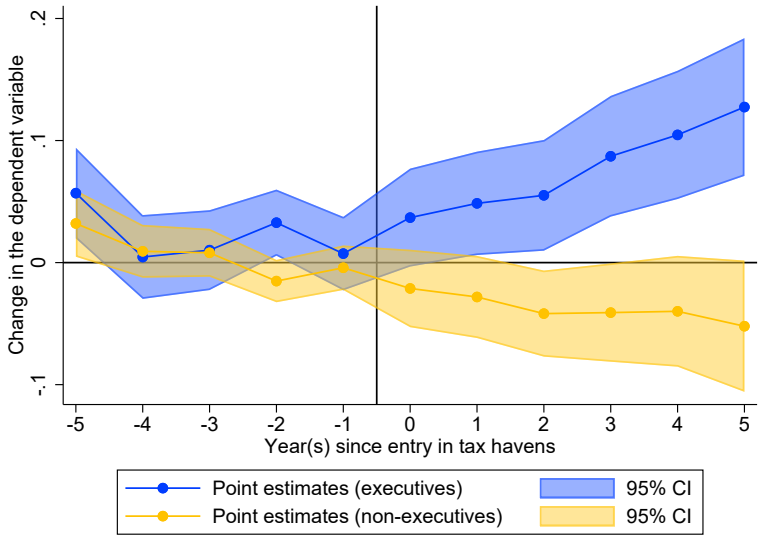
TABLE 3 – Robustness checks: alternative sets of tax havens

	(1)	(2)	(3)	(4)
	List of Hines and Rice (1994)		CHE, HKG, IRL, LUX, MYS, SGP excl.	
Dependent variable	$log(compensation_{e,i,t})$	$log(payments_{i,t})$	$log(compensation_{e,i,t})$	$log(payments_{i,t})$
$\left(1+\mathbb{1}_{e,i,t}^{CEO,CFO}\right)\times TH_{i,t}$	0.16[a]		0.14[a]	
	(0.02)		(0.02)	
$TH_{i,t}$		-0.03[d]		-0.01
		(0.02)		(0.02)
Controls	Yes	Yes	Yes	Yes
Executive FEs	Yes	No	Yes	No
Firm FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
R-squared	0.82	0.99	0.81	0.99
Nb. of obs.	107,122	5,302	107,122	5,302

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

ted in a tax haven in year $t-k$, and $TH_{i,t}^{t+k}$ 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. In equation (5), $\alpha_0+\beta_0$ reflects the immediate impact of firm entry in tax havens for CEOs and CFOs, $\alpha_0+\beta_0+\alpha_1+\beta_1$ translates the total impact for the same individuals after one year, and so on. They thus enable examining the evolution of compensations post entry. In this regard, the figure reveals that the effect on firm entry on employee pay is progressive and becomes significant only after two years. After five years, the effect amounts to +13 percent for compensations of CEOs and CFOs and to -5 percent for wages of non-executive employees. The $TH_{i,t}^{t+k}$ variables are useful to analyze changes in compensations before entry in tax havens and the existence of pre-existing trends. Moreover, they can serve as a placebo test. The rationale is as follows: If the coefficients associated to these $TH_{i,t}^{t+k}$ variables are not statistically different from zero, the evolution of compensations does not depend on future profit shifting activities. Besides, note that in this case $TH_{i,t}^{t}$ is unlikely to be a proxy for past unobserved executive × firm × year shocks and reverse causality is not a major source of concern. The estimation results in figure 4 point in this direction. Overall, the $\hat{\gamma}+\hat{\delta}$ (left subfigure) and the $\hat{\eta}$ (right subfigure) are not significantly different from zero. Hence, employee pay does not significantly change before firms establish a presence in tax havens, which statistically speaking backs up the parallel trends assumption and more generally alleviates endogeneity issues.

FIGURE 4 – Dynamics



Notes: Standard errors are clustered at the firm level.

Relatedly, I investigate whether the results for equation (4) are 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. Some weights, however, could be negative. Therefore, if the constant effect assumption is violated and the effect varies across firms and/or periods, it is a priori possible to obtain a negative coefficient even if all ATE are positive. 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 is only 11 percent, I conclude that this should not be a problem in my set-up.

4.3 The role of intangible assets

Before concluding, I dig into hypothesis 2 in table 4, where I add an independent variable that interacts $TH_{i,t}$ with $INTANGIBLES_{i,t}$. The latter denotes the industry-level (4-digit SIC) average intangible assets to total assets ratio. As expected, the reduction in wages of non-executive employees is magnified in intangible-intensive sectors. Take two firms, A and B, both entering a tax haven at some point. A operates in a sector using no intangibles

TABLE 4 – The magnifying effect of intangible assets

	(1) $log(compensation_{e,i,t})$	(2) $log(payments_{i,t})$
$\left(1 + \mathbb{1}_{e,i,t}^{CEO,CFO}\right) \times TH_{i,t}$	0.18[a]	
	(0.02)	
$\left(1 + \mathbb{1}_{e,i,t}^{CEO,CFO}\right) \times TH_{i,t} \times INTANGIBLES_{i,t}$	-0.02	
	(0.06)	
$TH_{i,t}$		-1.41e-3
		(0.02)
$TH_{i,t} \times INTANGIBLES_{i,t}$		-0.24[a]
		(0.08)
Controls	Yes	Yes
Executive FEs	Yes	No
Firm FEs	Yes	Yes
Year FEs	Yes	Yes
R-squared	0.82	0.99
Nb. of obs.	103,051	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]$p < 0.01$.

($INTANGIBLES_{i,t} = 0$) and B is in a sector using tangible and intangible assets in the same proportion ($INTANGIBLES_{i,t} = 0.5$). Following entry in tax havens, column (2) reveals that total payments to non-executive employees would remain almost constant in firm A, while non-executive employees in firm B would experience a 12 percent loss in terms of total payments.

5 Conclusion

The effect of profit shifting on employee pay has been studied merely from a theoretical perspective. This 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. Next, I assess their empirical validity. I employ a rich database on S&P 1500 firms' financial statements, foreign subsidiaries, and executives, and I observe how employee pay evolves before and after firm entry in tax havens. The results are three-fold. First, compensations of CEOs and CFOs increase when their firm establishes a subsidiary in a tax haven. Second, payments to non-executive employees, on the contrary, decline in the meantime. Last but not least, I find evidence of heterogeneous effects across sectors, the inequality-deepening effect being more pronounced

in intangible-intensive sectors. These findings are in line with the theoretical predictions and have interesting policy implications. By suggesting that profit shifting increases income 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 diminish income inequalities.

References

ALSTADSÆTER, A., S. BARRIOS, G. NICODÈME, A. M. SKONIECZNA, AND A. VEZZANI (2018): "Patent boxes design, patents location, and local R&D," *Economic Policy*, 33, 131–177.

ALVAREDO, F., L. CHANCEL, T. PIKETTY, E. SAEZ, AND G. ZUCMAN (2017): "Global inequality dynamics: New findings from WID.world," *American Economic Review*, 107, 404–09.

ARGILÉS-BOSCH, J. M., A. SOMOZA, D. RAVENDA, AND J. GARCÍA-BLANDÓN (2020): "An empirical examination of the influence of e-commerce on tax avoidance in Europe," *Journal of International Accounting, Auditing and Taxation*, 41, 100339.

ARULAMPALAM, W., M. P. DEVEREUX, AND G. MAFFINI (2012): "The direct incidence of corporate income tax on wages," *European Economic Review*, 56, 1038–1054.

AZÉMAR, C. AND R. G. HUBBARD (2015): "Country characteristics and the incidence of capital income taxation on wages: An empirical assessment," *Canadian Journal of Economics/Revue canadienne d'économique*, 48, 1762–1802.

BEER, S., R. DE MOOIJ, AND L. LIU (2020): "International corporate tax avoidance: A review of the channels, magnitudes, and blind spots," *Journal of Economic Surveys*, 34, 660–688.

BILICKA, K. R., M. DEVEREUX, AND I. GUCERI (2020): "Optimization frictions and fixed costs of profit shifting," *mimeo*.

CLAUSING, K. A. (2013): "Who pays the corporate tax in a global economy?" *National Tax Journal*, 66, 151–184.

DE CHAISEMARTIN, C. AND X. D'HAULTFŒUILLE (2020): "Two-way fixed effects estimators with heterogeneous treatment effects," *American Economic Review*, 110, 2964–96.

DESAI, M. A. AND D. DHARMAPALA (2009): "Corporate tax avoidance and firm value," *Review of Economics and Statistics*, 91, 537–546.

DISCHINGER, M. AND N. RIEDEL (2011): "Corporate taxes and the location of intangible assets within multinational firms," *Journal of Public Economics*, 95, 691–707.

DYRENG, S., J. L. HOOPES, P. LANGETIEG, AND J. H. WILDE (2020): "Strategic subsidiary disclosure," *Journal of Accounting Research*, 58, 643–692.

DYRENG, S. D., M. HANLON, AND E. L. MAYDEW (2010): "The effects of executives on corporate tax avoidance," *Accounting Review*, 85, 1163–1189.

DYRENG, S. D. AND B. P. LINDSEY (2009): "Using financial accounting data to examine the effect of foreign operations located in tax havens and other countries on US multinational firms' tax rates," *Journal of Accounting Research*, 47, 1283–1316.

FUEST, C., A. PEICHL, AND S. SIEGLOCH (2018): "Do higher corporate taxes reduce wages? Micro evidence from Germany," *American Economic Review*, 108, 393–418.

GABAIX, X., A. LANDIER, AND J. SAUVAGNAT (2014): "CEO pay and firm size: An update after the crisis," *Economic Journal*, 124, F40–F59.

GAERTNER, F. B. (2014): "CEO after-tax compensation incentives and corporate tax avoidance," *Contemporary Accounting Research*, 31, 1077–1102.

GOLDBACH, S., A. J. NAGENGAST, E. STEINMÜLLER, AND G. WAMSER (2019): "The effect of investing abroad on investment at home: On the role of technology, tax savings, and internal capital markets," *Journal of International Economics*, 116, 58–73.

GRAVELLE, J. (2013): "Corporate tax incidence: Review of general equilibrium estimates and analysis," *National Tax Journal*, 66, 185–215.

GRIFFITH, R., H. MILLER, AND M. O'CONNELL (2014): "Ownership of intellectual property and corporate taxation," *Journal of Public Economics*, 112, 12–23.

HANLON, M. AND S. HEITZMAN (2010): "A review of tax research," *Journal of Accounting and Economics*, 50, 127–178.

HARBERGER, A. C. (1962): "The incidence of the corporation income tax," *Journal of Political Economy*, 70, 215–240.

HECKEMEYER, J. H. AND M. OVERESCH (2017): "Multinationals' profit response to tax differentials: Effect size and shifting channels," *Canadian Journal of Economics/Revue canadienne d'économique*, 50, 965–994.

HELPMAN, E. (2017): "Globalisation and wage inequality," *Journal of the British Academy*, 5, 125–162.

HELPMAN, E., O. ITSKHOKI, M.-A. MUENDLER, AND S. J. REDDING (2017): "Trade and inequality: From theory to estimation," *Review of Economic Studies*, 84, 357–405.

HELPMAN, E., M. J. MELITZ, AND S. R. YEAPLE (2004): "Export versus FDI with heterogeneous firms," *American Economic Review*, 94, 300–316.

HINES, J. R. AND E. M. RICE (1994): "Fiscal paradise: Foreign tax havens and American business," *Quarterly Journal of Economics*, 109, 149–182.

HOFFMANN, F., D. S. LEE, AND T. LEMIEUX (2020): "Growing income inequality in the United States and other advanced economies," *Journal of Economic Perspectives*, 34, 52–78.

JONES, C., Y. TEMOURI, AND A. COBHAM (2018): "Tax haven networks and the role of the Big 4 accountancy firms," *Journal of World Business*, 53, 177–193.

KARKINSKY, T. AND N. RIEDEL (2012): "Corporate taxation and the choice of patent location within multinational firms," *Journal of International Economics*, 88, 176–185.

KRAUTHEIM, S. AND T. SCHMIDT-EISENLOHR (2016): "Wages and international tax competition," *Review of International Economics*, 24, 893–923.

MARTIN, J., M. PARENTI, AND F. TOUBAL (2020): "Corporate tax avoidance and industry concentration," *mimeo*.

NEWMAN, H. A. (1989): "Selection of short-term accounting-based bonus plans," *Accounting Review*, 64, 758–772.

OVERESCH, M. (2009): "The effects of multinationals' profit shifting activities on real investments," *National Tax Journal*, 62, 5–23.

RODRIK, D. (2018): "Populism and the economics of globalization," *Journal of International Business Policy*, 1, 1–22.

SAEZ, E. AND G. ZUCMAN (2020): "The rise of income and wealth inequality in America: Evidence from distributional macroeconomic accounts," *Journal of Economic Perspectives*, 34, 3–26.

US SENATE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS (2014): "Caterpillar's offshore tax strategy," *technical report*.

ZUCMAN, G. (2019): "Global wealth inequality," *Annual Review of Economics*, 11, 109–138.