Organizational capacity and profit shifting

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Abstract

This paper analyses the effect of firm's organizational capacity on tax planning behavior of multinational firms (MNEs). Better organizational practices improve productivity and hence should increase taxable corporate income of firms. However, higher adoption of these practices may also enable more aggressive tax planning. We show that subsidiaries of MNEs located in high tax countries report significantly lower profits and have higher incidence of bunching around zero returns on assets, if they have better organizational practices. This is especially true for more tax aggressive MNEs. Using an event study design, we find that firms with better practices are also more responsive to corporate tax rate changes. These responses are driven by more tax aggressive MNEs. These patterns are consistent with organizational capacity partially driving profit shifting behavior. We add a novel explanation for why some firms are more likely to engage in aggressive tax planning.[1]

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1 Introduction

The revelations from Panama and Paradise papers exposed a sizable amount of international tax avoidance by firms, and in particular multinational enterprises (MNEs). Despite a multilateral effort to curb such practices, the extent of profit shifting has been increasing over time (Clausing [2016], OECD [2017]).[2] The size of profit shifting is substantial [Torslov et al., 2018] but Bilicka [2019] finds observable characteristics fail to explain differences between aggressive and non-aggressive tax avoiders. As such, we still have much to understand about the types of firms that are the largest profit-shifters, and what drives and enables them.

In this paper, we explore the relationship between organizational capacity and firms' propensity to engage in profit shifting, proposing a novel explanation for the observed differences in firms' ability to legally avoid taxation. We measure organizational capacity by the level of adoption of structured management practices at the firm level. As higher adoption of these practices improves productivity (Bloom and Van Reenen [2007], Bloom et al. [2013]), in principle this should also increase firm revenues and taxable corporate income. However, firms adopting these practices could also be more effective at legally avoiding taxation. To study this, we use a unique dataset that matches structured management practices of manufacturing firms across 21 countries from the World Management Survey (WMS) and fifteen years of detailed firm accounts information from Bureau van Dijk's Orbis. We propose a simple framework where firms adopting higher levels of structured management have more tractable and predictable production plans and thus relatively lower costs of shifting profits.

We study this proposed channel using two empirical strategies. First, we provide novel descriptive evidence on how MNEs with different levels of structured management allocate profits across jurisdictions with higher or lower corporate statutory tax rates. Second, we use an event study design to show how MNEs' profit reporting responds to changes in corporate statutory tax rates, for firms with different levels of structured management. We focus our analysis on multinational corporations (MNEs) for three reasons: first, they are able to shift profits abroad, unlike domestic firms. Second, due to their international nature and size, they are a reasonably comparable group with publicly available data. Third, MNEs often span several jurisdictions, allowing us to exploit variation in statutory tax rates across jurisdictions and time.

We start by documenting a new set of stylized facts on the relationship between the adoption of structured management practices in firms and their reported revenues, profits and taxes. In line with prior literature, we find a strong positive relationship between management practices and firm revenues [Bloom et al., 2010, 2013, Giorcelli, 2019]. This relationship attenuates when we consider profitability (measured by return on assets, ROA) and dissipates completely when considering the effective tax rates (measured by the ratio of tax paid to pre-tax profits, ETR). This suggests that firms adopting structured management on average generate higher revenues yet have lower effective

[2] For example, the OECD Base Erosion and Profit Shifting (BEPS) initiative was set up in 2016.

tax rates, consistent with the idea that these productivity-enhancing practices may also enable firms to lower their tax bill.

To unpack these patterns, we classify firms based on the location of their operations, for every year identifying whether they operate their production subsidiaries in low- statutory tax rate or high-statutory tax rate countries. We show that MNEs with higher levels of structured management operating in high-tax countries report lower levels of profitability relative to those operating in low-tax countries. This pattern persists in the sample of firms where we observe management practices for multiple subsidiaries within the same MNE. While we primarily focus on measures of profitability, our results are robust to using effective tax rates to proxy for tax planning activities of firms [Dyreng et al., 2017].

These differences could, however, be driven by myriad factors unrelated to profit shifting; for example, if structured management firms tend to mostly locate in lower tax countries. While profit shifting activities are not directly observable to firm outsiders, certain firm behaviors indicative of "aggressive avoidance" can be used as proxies for these activities. We use three such proxies: first, we consider firms that report near zero ROA [Bilicka, 2019, Johannesen et al., 2016]. Second, we consider firms that have large disparities between their reported financial and taxable profits, using book tax differences (BTDs) to measure the disparity [Desai, 2003, Desai and Dharmapala, 2006b, 2009]. Third, we consider MNEs that have tax haven subsidiaries or headquarters in their ownership tree [Desai et al., 2006, Dowd et al., 2017, Gumpert et al., 2016, Hines and Rice, 1994]. We show that the patterns we uncover in reporting practices of firms with structured management are driven by firms also classified as aggressive tax avoiders. This suggests that these differences are likely to be linked to profit shifting activities.

As profit shifting is an inherently dynamic process of re-allocation, the relevant causal inference question is understanding how structured management enables firms to respond to changes in tax rates across jurisdictions. Using an event study design, we estimate the differential causal effect of corporate tax cuts on reported profitability for firms with and without structured management practices in place.[3] Fuest et al. [2018] and Serrato and Zidar [2016] use a similar design to consider the effects of corporate tax rate cuts on wages. We find that firms respond to tax rate cuts by reporting higher profits in jurisdictions that enact those cuts, but that this increased reporting is driven by firms with structured management. This is especially pronounced for firms with subsidiaries or headquarters in tax havens, suggesting our results are not simply picking up the effects of tax rate cuts on firm local profitability.

Our findings are distinct from, though complementary to, the literature on the effect of individual managers, or manager-specific qualities on profit shifting [Armstrong et al., 2012, D.Dyreng et al.,

[3]Causal identification of the direct effect of structured management on profit shifting would require random variation in management across firms, *while keeping tax rates constant*. While an interesting question, the fact that countries regularly change their tax rates renders this a second order issue for MNEs. The direct effect of an improvement in management practices on tax reporting in a "relatively stable" tax rate environment is more salient for domestic firms, and the subject of a separate paper.

2010, Desai and Dharmapala, 2006a, Koester et al., 2017]. While this literature focuses on the characteristics of individuals who are in the position of manager, we focus on the organizational structure those managers operate in. There could certainly be an interaction effect; that is, a "better" manager could be more able to take advantage of a given level of organizational structure, relative to a "worse" manager. But we propose that even a good manager will not be able to shift profits effectively without the appropriate organizational structure in place. Empirically, we show that the effect of organizational capacity on profit shifting does not vary substantially across firms with different levels of individual management quality, proxied by executive compensation. Thus, the effects of organizational capacity on profit shifting are of first order importance.

More broadly, our paper contributes to the literatures on profit shifting and the effect of management practices on firm performance. First, the profit shifting literature finds that large MNEs with links to tax havens tend to report low profits in high-tax countries [Desai et al., 2006, Dowd et al., 2017, Gumpert et al., 2016, Hines and Rice, 1994], but beyond firm size we know little about what enables profit shifting [Bilicka, 2019]. There is evidence on a variety of strategies that firms can use to avoid paying corporate taxes, such as debt shifting [Desai et al., 2004, Huizinga et al., 2008], transfer pricing [Cristea and Nguyen, 2016, Davies et al., 2018] and intellectual property location [Dischinger and Riedel, 2011]. Our paper provides a mechanism that enables firms to use these various tools more (or less) effectively. Second, the literature on the economics of structured management practices finds a strong positive relationship (correlational and causal) between these practices and firm performance. This is consistent across sectors and countries [Bloom and Van Reenen, 2007, Bloom et al., 2019, 2020a, Lemos et al., 2020]. More recently, studies have started to focus on the relationship between structured management and outcomes other than productivity, such as labor flows Bender et al. [2018], Cornwell et al. [2019] and inequality [Bloom et al., 2020b]. We contribute to this new set of outcomes, providing the first evidence of the relationship between structured management and profit shifting activities.

2 Conceptual framework

In this section we discuss the conceptual framework underpinning our empirical investigation. Let us assume that all subsidiaries have a common objective function of after-tax profit maximisation achieved by production maximization and tax minimization. The manager at the HQ is responsible for the tax planning strategy of the entire corporate group.[4] Let a firm have two subsidiaries, one in a high tax (with tax rate τ_H) and one in a low tax (with tax rate τ_L) location. The HQ manager wants to minimize its tax liabilities, by reallocating a share, $\alpha \in [0, 1]$, of profits from the high tax location to the low tax location. Moving profits is costly and consistent with the previous literature

[4]While a subsidiary can also be involved in tax planning decisions, we assume it is always in conjunction with the HQ as tax planning across borders — profit shifting — involves at least two entities located in different jurisdictions and requires a certain level of coordination.

[Hines and Rice, 1994, Huizinga et al., 2008], we assume that the cost of profit shifting (c) increases in the amount of profits (π) that a firm makes and in the share of profits (α) that a firm shifts at an increasing rate, such that $\frac{\partial c}{\partial \pi} > 0$, $\frac{\partial c}{\partial \alpha} > 0$, and $\frac{\partial^2 c}{\partial \alpha^2} > 0$.

The empirical literature on management and productivity has shown consistently that profits are an increasing function of the quality of management (m), such that $\frac{\partial \pi(m)}{\partial m} > 0$ [Bloom et al., 2012]. We propose that the cost function that the HQ manager faces takes the form $c(\alpha, m, \pi(m))$. In particular, we include an additional factor: the quality of management of the MNE ($m > 0$). We propose that MNE subsidiaries need tractable and predictable production — or, good *organizational capacity* — to enable effective tax planning. Predictability of production, such as being able to request and receive information on accurate production and profits forecasts for different subsidiaries, allows the HQ manager to plan tax liabilities accordingly. Tractability of production, such as having clear production plans with reasonable timelines enables the HQ manager to request specific changes to subsidiary production plans to fit specific target requirements. Having those figures on hand allows the HQ manager to make production targets and profit reallocation decisions between subsidiaries for the current year as well as plan for the following years. Thus, firms with better management will face lower costs for shifting profits: $\frac{dc}{dm} = \frac{\partial c}{\partial m} + \frac{\partial c}{\partial \pi}\frac{\partial \pi(m)}{\partial m} < 0$. We assume that they are going to have decreasing cost of shifting when the share of shifted profits increases, such that $\frac{\partial^2 c}{\partial \alpha \partial m} < 0$, and those that shift more profits in levels are also going to face decreasing costs, such that $\frac{\partial^2 c}{\partial \alpha \partial \pi} < 0$.

The firm is minimizing its tax liability:

$$\min_{\alpha \in [0,1]} \tau_H (1-\alpha)\pi(m) + \tau_L \alpha \pi(m) + c(\alpha, m, \pi(m))$$

The first order condition for this problem is:

$$(\tau_L - \tau_H)\pi(m) + \frac{\partial c}{\partial \alpha} = 0$$

We use this simple minimization problem to show how management affects the share of shifted profits; that is, the sign of $\frac{\partial \alpha *}{\partial m}$. Thus, we differentiate the FOC with respect to m, which yields:

$$\frac{\partial \alpha *}{\partial m} = \frac{-\frac{\partial^2 c}{\partial \alpha \partial m} + (\tau_H - \tau_L)\frac{\partial \pi(m)}{\partial m} - \frac{\partial^2 c}{\partial \alpha \partial \pi}\frac{\partial \pi(m)}{\partial m}}{\frac{\partial^2 c}{\partial \alpha^2}} > 0$$

Proposition: Better management increases share of shifted profits α.

Our framework implies that better management, via more tractable and predictable production, enables firms to carry out effective tax planning and thus shift a larger share of profits, as they seek to maximize their after-tax profits. For example, consider the experiment in Bloom et al. [2013], where a random sample of firms were provided with professional management consulting. The conclusion from this study was that there is a causal relationship between "better management" and firm performance, as the treated firms experienced a bump of 13% in productivity and expanded their operations within the first year. This improvement in performance naturally happened via the managers who implemented the changes and the employees who became more efficient in their production activities. In our context, better management affects profit shifting in a similar manner, in that the shifting happens via the managers who decide on the allocation of profits. However, it is the existence of the "good management" structures that make such reallocations possible. As such, we propose that this effect is causal in the same way that the effect of management on productivity is causal.

This is distinct from the literature that considers the effect of individual managers, or manager-specific quality on profit shifting [Armstrong et al., 2015, Desai and Dharmapala, 2006a, Koester et al., 2017]. While this literature focuses on the characteristics of individuals who are in the position of manager, we assume that managers across MNEs are "homogeneous" and focus on the organizational structure those managers operate in. If the managers were not homogeneous, there could be an interaction effect such that a "better" manager could take more advantage of a given level of organizational structure relative to a "worse" manager, but even a good manager will not *be able* to shift profits effectively without the appropriate organizational structure. Thus, we suggest that the effect that organization capacity has on profit shifting is of first order importance.[5]

Methods of profit shifting Profit reallocation decisions take three major forms: debt shifting, transfer pricing and patent relocation. Our framework is consistent with profit shifting decisions using all the above strategies, as each requires the predictability and tractability of production. Here, we discuss each strategy in detail.

For debt shifting, a subsidiary of an MNE located in high-tax country borrows funds from a subsidiary located in low-tax country. Interest payments on this debt are deductible against taxable profits, reducing the tax liability in the high-tax country. The interest payments accrue to the subsidiary in the low-tax country, being taxed at the lower rate and reducing the overall tax liability of the MNE. In our context, predictable income streams enable effective debt shifting as lending to a subsidiary with a clear profit forecast allows the tax planner to predict the appropriate amount of debt to reduce the overall tax liability to near zero, but not as far as leaving the subsidiary reporting negative profits. Note that firms generally avoid reporting negative profits because (i) they care about shareholder perception and thus would prefer a subsidiary not to incur losses, especially

[5] Our framework also yields two additional propositions that are consistent with previous literature, namely: that higher tax rates in H lead to higher α and that more profitable firms have higher α.

if it is in fact involved in profitable activities; (ii) too much debt could increase the likelihood of risky investments and result in potential bankruptcy; (iii) there is a limit on the amount that low-tax subsidiaries can lend.

For transfer pricing, a subsidiary located in high-tax country buys intermediate products from subsidiaries in low-tax countries at prices that are higher than market prices, reducing profits by increasing costs. The low-tax seller earns revenue from the sale which is taxed at lower rates. This strategy relies on mis-pricing (or, inflating) goods relative to their market value and is best achieved using goods that are difficult to price on third party markets, such as intangibles or patents. For patent relocation, MNEs can relocate their patents to low-tax subsidiaries, such that any profits earned on those patents will be taxed at lower rates. Further, royalties for the use of those patents by other subsidiaries will also be taxed at lower tax rates, while the cost of paying the royalties will be deducted against profits in high-tax countries. In our context, mis-pricing of goods relies on knowing how many are produced and can be easily traded between locations, while determining the amount of royalty payments is easier when one can track firm productivity.

3 Data

3.1 Management data

To measure the level of adoption of structured management practices in a firm we use the World Management Survey, a project that has systematically collected data on the adoption of structured management practices in firms since 2004.[6] The WMS focuses on medium- and large-sized firms, drawing a random sample of firms with employment of between 50 and 5,000 workers. The WMS methodology, first described in Bloom and Van Reenen [2007], employs a double-blind, interview-based evaluating tool that defines and scores a set of 18 basic management practices on a scoring grid from one ("little/no formal management practices") to five ("best practice"). The topics covered include adoption of lean manufacturing practices, performance monitoring, target setting and people management.

We focus on the 12 topics that directly relate to operations management and exclude the questions relating to people management. We build two indices of operations management: a continuous index with the simple average across the 12 topics, and a binary indicator dividing firms into two groups based on a methodological cutoff of the practices measured. The indicator takes a value of 1 if the firm scores above 3 on the 1 to 5 scale, or having achieved a minimum level of "structured" management practices, while those with scores below 3 have, at best, an "unstructured" set of practices. The survey collects additional information on ownership and firm organization, though it does not include any financial data.

We use only firms that are subsidiaries of MNEs from the WMS sample. They operate in various

[6] See Bloom et al. [2014] for a survey.

countries including the US and the UK to Turkey and Argentina. The average MNE in each of the countries in our sample has a structured management operations score between 2.95 and 3.53, suggesting the average MNEs across the countries we study are similarly well managed (Figure 1). However, there is substantial variation in the adoption of management practices across MNEs within countries, with scores ranging from below 2 to almost 5. We report the corporate tax rate for each country next to the country name. The average management score for high-tax subsidiaries in 3.38 and 3.29 for low-tax subsidiaries (2) and the countries with the lowest average management scores do not also have the lowest corporate tax rates in our sample. This is important, as otherwise we could be picking up the simple correlation between more structured management and tax rates in high tax-countries that is unrelated to tax planning practices.

The WMS has a set of firms with panel data, where they interview the same firm across years. As management is a slow-moving variable and the panel dimension does not constitute a large enough sample for our purposes, we consider management a static variable across years and take the average of the management score across years for firms that have multiple values.

3.2 Firm financials and data structure

3.2.1 Static analysis sample

We match the subsidiaries of MNEs from WMS with their financial information from Bureau van Dijk (Orbis) dataset between 2004 and 2019. We matched 1,860 firms in the WMS with at least one year of financial data in Orbis, yielding 27,748 firm-year observations for the first part of the analysis. Using Bureau van Dijk (Orbis) ownership information from 2019, we match each subsidiary for which we observe management quality with a parent company that this MNE affiliate belongs to. We find 1,462 unique HQ in Orbis.[7]

Using the location of the HQ and the subsidiary, we merge in country-year corporate statutory tax rates from the Centre for Business Taxation Corporate Tax Database.[8] We define a high and low tax rate countries using the median statutory tax rate across all countries in each year. We define low tax country-year cells as those with statutory corporate tax rates below median in a given year. Considering the recent statutory corporate tax rate changes among many countries, we allow each country to change from high tax to low tax during the sample period by using the pooled data.[9] Of the 1,860 unique plants, 1,649 are operating at subsidiary location while 211 are co-located with the global HQ (see Table 1). We observe only one plant for about 66% of the MNEs in our sample, and two or more for the remainder of the sample.

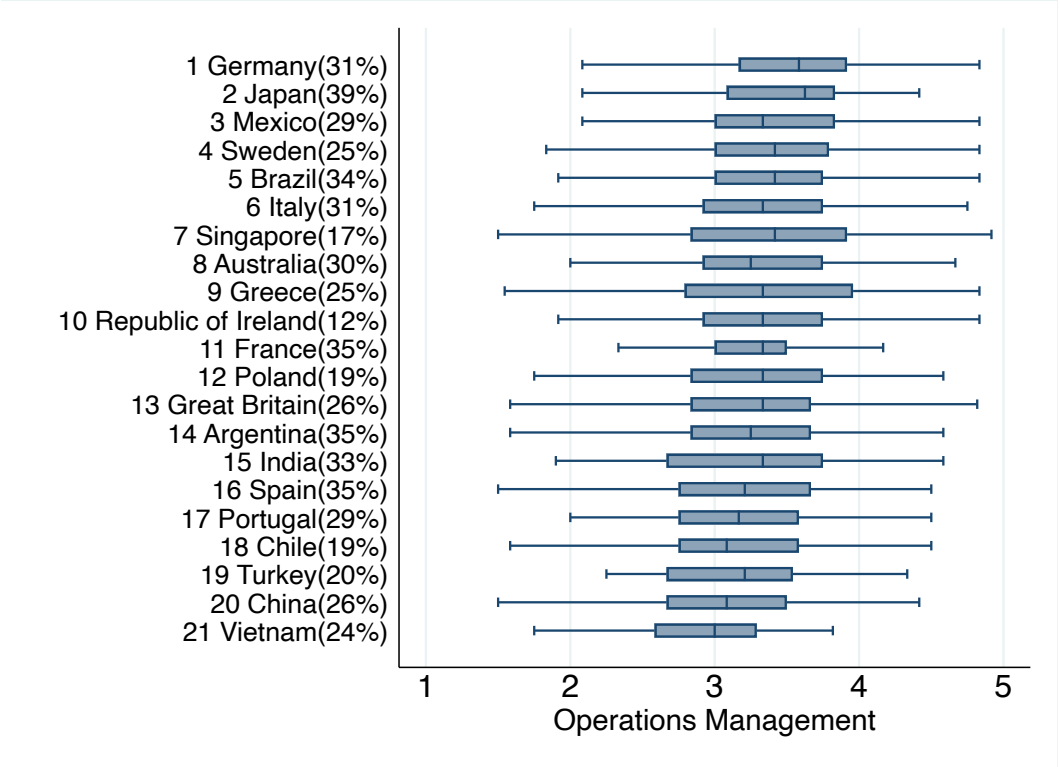
The main variables of interest include operating revenue, profit and loss before tax (PLBT), total

[7] We require unconsolidated subsidiary level data to analyze differences in the allocation of profits between firm subsidiaries. Thus, we are unable to use Compustat for the US, which includes consolidated level data.

[8] For the dataset see: data website and for the information on the dataset see: Eureka website.

[9] For instance, UK had 30% corporate tax rate in 2007, but had gradually lowered in main corporate rate to 19% in 2017.

Figure 1: Average management score of multinationals with dispersion within countries.



Note: In brackets next to country names we show the average statutory corporate tax rates across 2004 - 2019 from the Center for Business Taxation Tax Database. Data plotted comes from the World Management Survey. Management is the average for the WMS operations management questions (including lean management, monitoring and target-setting). There is 1,860 firms in total across all countries. Each row shows the average management score for all firms in each country (dark blue) and the bars show the standard deviation in management scores across firms in each country.

Table 1: Descriptive Statistics: corporate group structure for firms in the WMS sample

	WMS sample			**Extended sample**		
Firms in the same corporate group	**Total factories**	**Subsidiary factories**	**HQ factories**	**Total factories**	**Subsidiary factories**	**HQ factories**
count	N	N	N	N	N	N
1	1222	1024	198	628	555	73
2	312	304	8	296	226	70
3	132	128	4	261	212	49
4	84	83	1	308	259	49
5	55	55	0	290	254	36
6	30	30	0	300	268	32
7	-	-	-	301	271	30
8	16	16	0	320	289	31
9	9	9	0	369	341	28
10-49	-	-	-	13972	13533	439
50-99	-	-	-	14039	13866	173
100-499	-	-	-	36898	36728	170
500+	-	-	-	12013	12009	4
Total	**1860**	**1649**	**211**	**79995**	**78811**	**1184**

Note: This tables shows descriptive statistics for the WMS and the extended samples. WMS sample consists of firms for which we observe management measures at the firm level. Extended sample includes all subsidiaries of MNEs where we observe management for at least one subsidiary. Each row represents information for MNE with different numbers of subsidiaries that are in the same corporate group. For instance, row 1 shows how that we have 1,222 factories where we observe just one factory belonging to the MNE group. Row 9 shows that we have 9 factories, where we observe 9 factories belonging to the MNE group, i.e. we have 1 MNE for which we observe 9 factories. In the context of WMS sample, this shows the within group variation we can explore. In the context of the extended sample, it shows the size distribution of MNEs in our sample. Data from ORBIS and the World Management Survey.

assets and taxation from income statement. We construct our main measure of firm profitability, ROA, as the ratio of profits and loss before tax to total assets. We construct a measure of effective tax rates as the ratio of tax paid to profit and loss before taxes (ETR).

3.2.2 Dynamic analysis sample

While the "static analysis" sample provides the sharpest distinction and most accurate measurement of adoption of management practices across firms, it severely limits the analysis sample relative to the large availability of financial data. The WMS collects data for a random sample of manufacturing plants and we match the financial data from Orbis at the establishment level, which allows us to directly observe management for only 2% of our full financial sample. To extend our sample and use the full financial information, we follow the insights from Bloom et al. [2019]. The authors show that the largest variation in management practices is attributed to the differences between firms, rather than across establishments within firms. This suggests it is reasonable to calculate the average management score for each MNE in our sample, and assign that value to every subsidiary for which we have financial data.

Using ownership data from Orbis, we build the ownership tree for each global ultimate owner (HQ) of the firms in the WMS sample. For all firms interviewed at least once in the WMS, we determine their HQs and build a dataset of their entire corporate structure — including all majority owned subsidiaries that belong to that parent.[10] We match almost 80,000 unique subsidiaries to the 1462 unique HQs in the WMS data yielding over 590,000 firm-year observations. For the event study, we restrict this broader sample to only countries that have experienced a single tax rate reduction over the sample period.

In Table 2 we report the financial characteristics of the datasets that we use in this paper. Panel A reports the statistics for the sample used in the static analysis, including only firms that have a specific management score. Panel B reports the statistics for the extended sample that serves as the basis for the dynamic analysis, while Panel C reports the statistics for the sample specifically used for the event study. The ROAs reported in subsidiaries located in low-tax countries are higher than those in high-tax locations, and substantially higher for firms classified as aggressive tax avoiders. Reported effective tax rates, on the other hand, are lower in low-tax countries relative to high-tax countries.

3.3 Main constructed measures

Profitability: return on assets

We use ROA as our preferred measure of profitability because it is the best available measure of a company's profitability relative to its size. The tax literature often uses ROA as the main outcome

[10] We only include affiliates that are majority owned, i.e. the parent company owns 50% of their shares. This is because the parent company needs to have control over the subsidiary to be able to implement profit shifting practices.

Table 2: Descriptive statistics for each sample

	Obs N	Firms N	HQs N	Empl Median	ROA	PLBT	ETR	Mgmt
Panel A: Management-only sample								
Low tax sub	17067	1243	293	673	0.065	15064	0.165	3.290
High tax sub	13234	905	213	368	0.048	18336	0.209	3.380
Non-aggressive	16052	1136	262	493	0.015	7721	0.247	3.318
Aggressive	12610	868	214	628	0.122	29323	0.105	3.348
Panel B: Extended sample								
Low tax sub	373000	47265	938	103	0.042	15649	0.149	3.290
High tax sub	271464	32729	882	90	0.036	19702	0.202	3.380
Non-aggressive	353578	44414	941	95	-0.002	4463	0.212	3.318
Aggressive	224538	26220	728	107	0.134	38079	0.111	3.348
Panel C: Event study sample								
Low tax sub	53844	6722	136	125	0.056	18522	0.148	3.303
High tax sub	92684	10646	257	84	0.031	24539	0.157	3.356

Note: Data from the World Management Survey (2004-2014) matched with Orbis (2004 to 2018). Headquarters (HQs) are defined as the global ultimate owner identified in Orbis. ROA is the return on assets: ratio of profit and loss before taxes and total assets. PLBT is the profit and loss before taxes. ETR is the Effective Tax Rate: ratio of reported tax payments to profit and loss before taxes. Mgmt is the average for the WMS operations management questions (including lean management, monitoring and target-setting). Panel A shows descriptive statistics for the sample for which we observe management measures at the firm level. Panel B show descriptives for the extended sample, where we include all subsidiaries of MNEs where we observe management for at least one subsidiary. In Panel C we limit the extended sample to include only firms located in countries that experienced one tax rate cut throughout the sample period. Low tax subs are firms located in countries with below median statutory corporate tax rate. High tax subs are firms located in countries with above median statutory corporate tax rate. Non-aggressive are firms with book tax difference (BTD) below median and Aggressive are firms with BTD above median.

variable when studying profit shifting behavior. The alternative outcome variable is the ETR, which measures the amount of taxes paid relative to a firm's profits. We focus our analysis on profitability but report additional results using ETR as an outcome variable in the Appendix.

Aggressiveness: bunching near zero ROA, book-tax differences and tax havens

We use three proxies for aggressive tax avoidance behavior. First, an emerging proxy is the incidence of bunching around zero reported accounting profits, especially if those firms are located in high-tax countries (Bilicka [2019], Johannesen et al. [2016]). Second, and more common, approach for measuring aggressive tax avoidance is the size of book-tax difference (BTD), which measures the difference between pre-tax book earnings and taxable income. The literature has linked this measure with tax-planning activities of MNEs, and in particular Manzon and Plesko [2002] show that approximated measures of demand for tax shelters help explain the variation in BTDs across firms. These measures have been subsequently used in the literature to approximate for aggressive tax planning. Desai and Dharmapala [2006b] show that increases in incentive compensation tend to reduce the level of tax sheltering, Desai and Dharmapala [2009] show that the effect of tax avoidance on firm value is a function of firm governance. Desai [2003] points out further that the size of BTDs is related to managerial motives associated with earnings management. Thus, BTDs have been shown to be reliable proxies for both tax sheltering and earnings management and are thus an appropriate tool to use in the context of analyzing the relationship between management and tax planning practices.[11]

We calculate BTDs following the literature and subtract from the pre-tax profits the current tax expense grossed up by the rate. We calculate the size of that difference for each firm, adjusting for deferred taxes where firms report them, to create permanent book tax differences. We then scale the size of this difference by firm's total assets and divide the sample into firms with larger than median BTDs and smaller than median BTDs. We classify firms with larger than median BTDs aggressive avoiders and those with below median BTDs as non-aggressive firms.[12]

A third proxy for aggressive tax avoidance is the use of tax havens by multinational firms. [Gumpert et al., 2016, Hines and Rice, 1994] show that having a tax haven in the firm structure signifies behaviour consistent with more aggressive profit shifting. We use this proxy as a dummy indicator that takes value 1 when an MNE has at least one tax haven subsidiary in the firm ownership tree or if it has a parent headquartered in tax haven. Note, that BTD is a firm level proxy for tax aggressiveness, while presence of tax haven is an MNE level proxy. 50.6% of MNEs in our sample

[11] Blackburne and Blouin [2016] and Erickson et al. [2004] show that traditional BTD measures may not always be a reliable signal of earnings manipulation. BTDs of companies that were committing some tax fraud are not larger than those companies that did not. In the context of this paper, this means that there may be firms that we have classified as non-aggressive avoiders that may be aggressively tax planning. This would bias the findings against our hypothesis.

[12] Note that we have experimented with dividing the sample into top 25% as being aggressive avoider and bottom 25% as not. The results are not sensitive to these various sample cuts.

have tax havens in their firm structure, which is consistent with evidence from previous literature [Desai et al., 2006, Gumpert et al., 2016].

4 Empirical evidence: reduced form

We start with our static analysis sample and estimate a reduced form model correlating the ROA of each firm to structured management practices, the tax rate in the subsidiary and the interaction between the two:

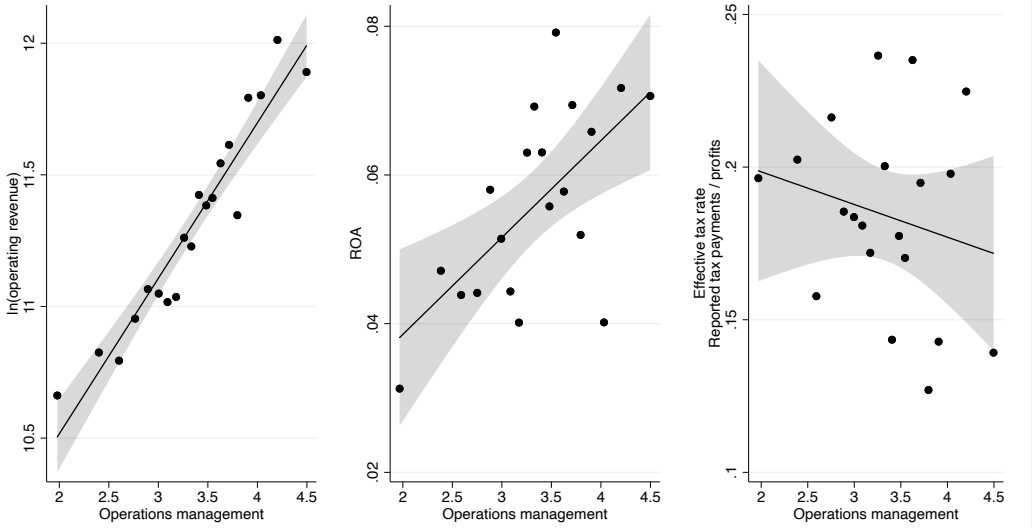
$$ROA_{it} = \alpha + \beta_1 M_i + \beta_2 HTSub_{ct} + \beta_3 M_i \times HTSub_{ct} + \gamma \times X_{it}\eta_c + \delta_t \quad (1)$$

where ROA_{it} is the returns on assets, M_i is structured management, $HTSub_{ct}$ is an indicator equal to 1 if the tax rate in the country of the subsidiary is larger than the median tax rate in that year across the countries in our sample, X_{it} includes firm level and MNE level controls. η_c are country fixed effects and δ_t are year fixed effects. We control for labor and capital inputs by including the logarithm of the number of employees and the logarithm of fixed assets, respectively. We also control for subsidiary size by using the logarithm of total assets and for the size of the MNE by including logarithm of the total number of subsidiaries that MNE has. In all specifications we use binary management score, where we define formal management as scores of 3 or above. We use a high tax subsidiary dummy and a continuous variable of the subsidiary corporate tax rate. Table 3 reports the results across the full sample and relevant sub-samples. Column (1), (3) - (6), and (8) use the full sample, Columns (2) and (7) include only firms that have at least two subsidiaries within the same MNE with a measure of management.

4.1 Relationship between management and profitability

Figure 2 depicts the relationship between management and operating revenue, ROA and effective tax rates (ETR) using the continuous management measure. The relationship between ROA and management practices is noisier than the simpler relationship between operating revenue and management. Further, we find effectively no relationship between management practices and effective tax rates (ETRs) — if anything, the relationship is negative. Effective tax rates are often used in profit shifting literature to illustrate how little tax MNEs pay in various jurisdictions relative to the tax rates. We find that higher turnover generated by firms with more structured management practices does not necessarily translate into higher taxable profits.

Figure 2: Revenues, ROA, ETR and management: all firms



Note: Data from the World Management Survey and Orbis. Revenue is firm turnover. ROA is the ratio of profit and loss before taxes and total assets. ETR is the reported tax payments over profit and loss before taxes. This figures are scatter plots of operations management scores and log of revenues, ROAs and ETRs respectively. The line shows the fitted OLS line, and the shaded area is the confidence intervals.

Table 3: Results for ROA, bunching and ETR, baseline sample

	(1) ROA	(2) ROA	(3) ROA	(4) Bunching*	(5) Bunching*	(6) ETR	(7) ETR	(8) ETR
Structured management=1	0.005	0.003	0.035**	-0.024**	-0.125***	0.007	0.019	0.085
	(0.005)	(0.010)	(0.016)	(0.011)	(0.037)	(0.016)	(0.033)	(0.053)
High tax sub	-0.014**	0.025**		-0.010		0.072***	0.187***	
	(0.006)	(0.011)		(0.015)		(0.021)	(0.047)	
Structured management=1	-0.002	-0.034***		0.040**		-0.045*	-0.161***	
× High tax sub	(0.007)	(0.011)		(0.016)		(0.023)	(0.048)	
Subsidiary corp tax rate			-0.003		-0.212*			0.824***
			(0.051)		(0.124)			(0.166)
Structured management=1			-0.116**		0.444***			-0.368*
× Subsidiary corp tax rate			(0.055)		(0.136)			(0.191)
Year x Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓	✓	✓	✓	✓
GUO controls	✓	✓	✓	✓	✓	✓	✓	✓
Observations	19649	9659	19649	19649	19649	18624	9085	18624
R-squared	0.0313	0.217	0.0310	0.0333	0.0334	0.00675	0.0665	0.00791
Sample	**Baseline**	**Baseline within GUO**	**Baseline**	**Baseline**	**Baseline**	**Baseline**	**Baseline within GUO**	**Baseline**

Note: Data from Orbis and the World Management Survey. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. Structured management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. HQ stands for headquarter, GUO for global ultimate owner, which is the parent firm. Non-aggressive are firms with book tax difference (BTD) below median and Aggressive are firms with BTD above median. The outcome variable in columns 1-5 is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. The outcome variable in columns 6 and 7 is a dummy equal to 1, if ROA is within 0.005 distance from zero. Firm controls include log of employment and log of fixed assets. GUO controls include log of number of subsidiaries in the MNE.

4.2 Relationship between management and ROA by country tax rates

The relationship between profitability and management is driven by firms operating in low-tax countries. Columns (1) and (2) in Table 3 show the interaction between the structured management indicator and a high-tax subsidiary indicator and Column (3) shows the interaction with the continuous subsidiary corporate tax rate. All interaction terms are negative suggesting that, in high tax environments, firms with structured management report lower ROAs. The contrasting relationship is clear in Figure 3, where we plot the local linear regressions separately for subsidiaries in low-tax countries and high-tax countries. There is a clear positive relationship between structured management and ROA in low-tax subsidiaries, while no discernible pattern exists in high-tax subsidiaries. A similar pattern occurs when we use ETRs as a dependent variable, see columns (6) - (8).

One could be concerned that there may be a correlation between low tax rates and low organizational capacity in these countries. We present two pieces of evidence to show that this is not the case. First, our descriptive statistics show that firms with more structured management are not systematically located in low-tax rate countries. Second, results in columns (2) and (7) in Table 3 include headquarter fixed effects to consider the analysed relationship within the MNE. Even for subsidiaries belonging to the same parent, those located in high tax countries report lower ROAs relative to those in low tax countries, if they are better managed.

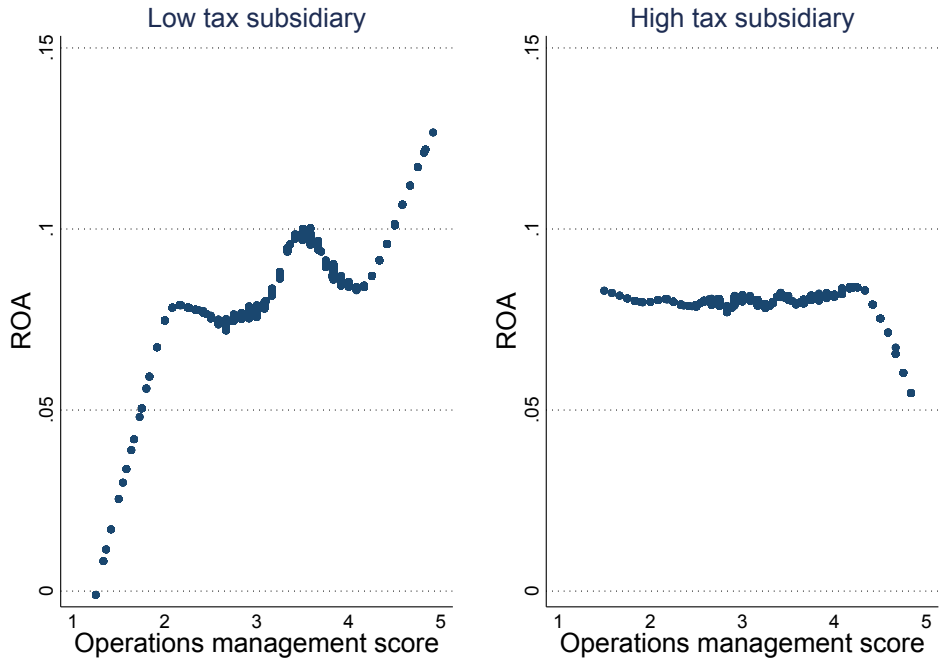
Figure 4 plots the marginal effects of structured management on predicted ROA for high-tax and low-tax subsidiaries, across the distribution of management scores. There is a clear negative relationship between higher management scores and predicted ROA in high-tax countries. The differences between low-tax and high-tax subsidiaries are statistically significant beyond a management score of 3, consistent with our parametric results. Hence, we interpret our findings as evidence that these MNEs are likely to shift profits from *their* high-tax subsidiaries to low-tax subsidiaries in order to minimize their overall tax bill.

4.3 Aggressive Tax Planning

We interpret the evidence presented thus far as suggestive that firms with structured management may be better at tax planning. This relationship is likely to be starker when considering aggressive and non-aggressive tax planners. We categorize the firms in our sample by this definition using three methods described above.

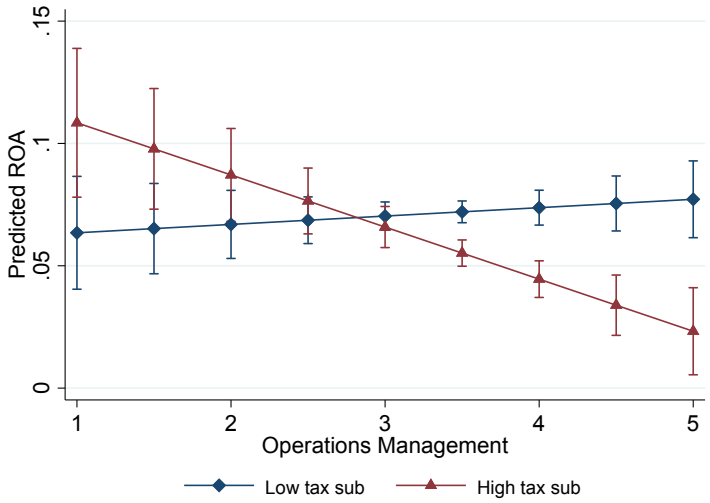
First, columns (4) and (5) in Table 3 use the propensity of MNEs to report near zero ROAs as a proxy for tax avoidance behavior. We report the results of a linear probability model with an indicator taking a value of 1 if ROA is within 0.05 percentage points of zero as an outcome variable. The interaction coefficients suggest that firms with formal management have a significantly higher probability of reporting near zero ROA in high tax countries. In Figure 6 we plot the distributions of ROAs around zero for two groups of firms: those with structured management structures in

Figure 3: ROA and operations management in low- and high-tax country-years



Note: Data from the World Management Survey and Orbis. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. On the horizontal axis we have structured management, which is the average for the WMS operations management questions (including lean management, monitoring and target-setting). On the vertical axis we have ROA which is the ratio of profit and loss to total assets. Low tax subsidiary are firms located in countries with below median statutory corporate tax rate. High tax subsidiary are firms located in countries with above median statutory corporate tax rate. The graphs present coefficients from local linear regressions run with bandwidth 0.5.

Figure 4: Within-group relationship between management and ROA



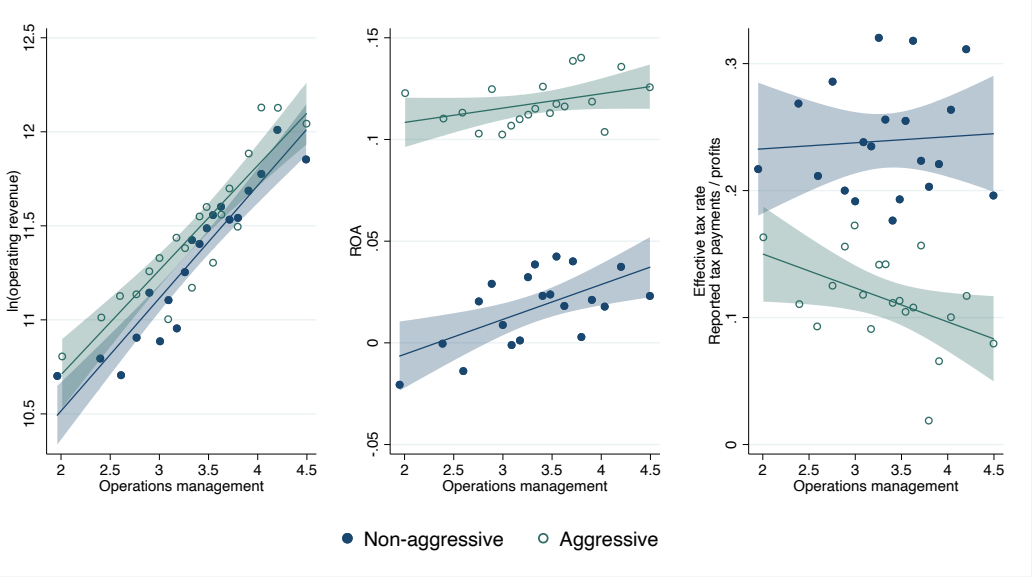
Note: Data from the World Management Survey and Orbis. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. Here, we limit the sample to MNEs with at least two subsidiaries for which we observe management. The results presented in this graph are marginal effects from the regression of ROA on operations management score interacted with high tax subsidiary dummy using MNE fixed effects. Thus, they show within MNE variation. Each red triangle corresponds to the predicted ROA at a given management level for firms located in high tax countries. Each blue circle corresponds to the predicted ROA at a given management level for firms located in low tax countries. On the horizontal axis we have structured management, which is the average for the WMS operations management questions (including lean management, monitoring and target-setting). On the vertical axis we have predicted ROA which is the ratio of profit and loss to total assets. Low tax subsidiary are firms located in countries with below median statutory corporate tax rate. High tax subsidiary are firms located in countries with above median statutory corporate tax rate.

Table 4: Results for ROA, bunching and ETR, baseline sample

	(1) ROA	(2) ROA	(3) ROA	(4) ROA
Structured management=1	0.056***	0.036*	0.074***	-0.022
	(0.017)	(0.019)	(0.016)	(0.036)
Subsidiary corp tax rate	-0.071	-0.077	0.139***	-0.155
	(0.053)	(0.060)	(0.047)	(0.130)
Structured management=1	-0.198***	-0.111	-0.347***	0.159
× Subsidiary corp tax rate	(0.057)	(0.068)	(0.055)	(0.121)
Year x Country FE	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓
GUO controls	✓	✓	✓	✓
Observations	8212	10415	11255	8394
R-squared	0.0579	0.0439	0.0364	0.0403
Sample	**Aggressive: BTD**	**Non-aggressive: BTD**	**Aggressive: Haven**	**Non-aggressive: Haven**

Note: Data from Orbis and the World Management Survey. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. Structured management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. HQ stands for headquarter, GUO for global ultimate owner, which is the parent firm. Non-aggressive are firms with book tax difference (BTD) below median and Aggressive are firms with BTD above median. The outcome variable in columns 1-5 is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. The outcome variable in columns 6 and 7 is a dummy equal to 1, if ROA is within 0.005 distance from zero. Firm controls include log of employment and log of fixed assets. GUO controls include log of number of subsidiaries in the MNE.

Figure 5: Revenues, ROA, ETR and management: by aggressive category



Note: Data from the World Management Survey and Orbis. Revenue is firm turnover. ROA is the ratio of profit and loss before taxes and total assets. ETR is the reported tax payments over profit and loss before taxes. This figures are scatter plots of operations management scores and log of revenues, ROAs and ETRs respectively. The line shows the fitted OLS line, and the shaded area is the confidence intervals. Non-aggressive are firms with book tax difference (BTD) below median and Aggressive are firms with BTD above median.

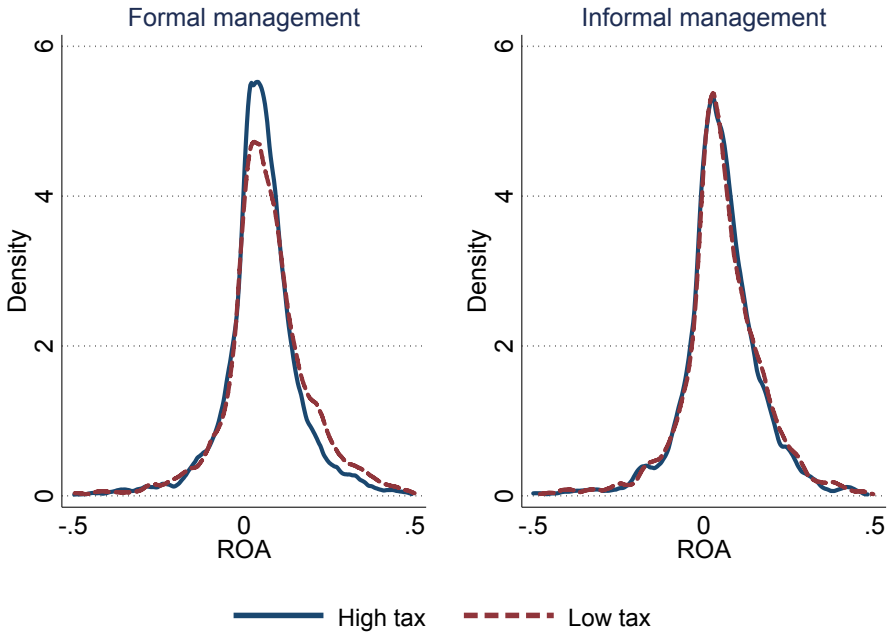
place and those with unstructured management structures in place, and compare MNE subsidiaries operating in high-tax countries and those operating in low-tax countries. Figure 6 shows that, for firms with structured management in place, a larger share of MNEs operating in high-tax countries reports near zero ROAs relative to MNEs operating in low-tax countries. No such pattern is apparent in firms with unstructured management, consistent with a profit shifting pattern.

Second, in Table 4 we show the relationship between subsidiary corporate tax rates, structured management and ROA for the sub-samples of aggressive and non-aggressive firms. In columns (1) and (2) we use BTD and in columns (3) and (4) we use presence of tax haven in the firm ownership tree. The interaction coefficients suggest that firms with structured management report significantly lower ROAs, the higher the corporate tax rate, but that relationship is only significant for firms that are more likely to be tax aggressive.

To support this evidence, in Figure 5 we show that the relationship between management practices and operating revenue, ROA and ETRs. This relationship is not statistically different between aggressive and non-aggressive firms, though we see vastly different relationships for ROA and ETR. The level of reported ROA for aggressive firms is higher than for non-aggressive firms, and both have a positive relationship. The non-aggressive firms show no relationship between ETR and management practices, while we see evidence of a negative relationship for aggressive firms.

To understand differences in profit reporting between the two types of firms we combine the two

Figure 6: Bunching around zero ROA for firms with structured management



Note: Data from the World Management Survey and Orbis. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. We plot the distribution of ROA, which is the ratio of profit and loss to total assets. ROA restricted between -0.5 and 0.5. Structured management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Hence, blue solid lines show the distribution of ROA for subsidiaries in high tax countries, while red dashed lines for subsidiaries in low tax countries.

approaches and plot the distribution of ROA for firms with structured an unstructured management, by the aggressive and non-aggressive classification using BTD in Figure 7a and using the presence of tax haven in the firm ownership tree in Figure A1a in the Appendix. These figures suggest that the bunching around zero ROA evident in the distribution of firms with formal management is driven by firms that are also classified as aggressive tax avoiders. The results are consistent across both approaches.

Robustness We test the robustness of these baseline results in several ways. First, for baseline results Table A2 shows that they are robust to excluding controls and Table A3 that they are robust to extending the sample to full ORBIS financial population. Second, we show that our results are driven by firm subsidiaries, rather than headquarters, suggesting that firms have different preferences in how they allocate profits between subsidiaries and headquarters [Dischinger et al., 2014]. Third, while most of our MNEs are manufacturing firms, they have finance and service subsidiaries. We show that our results are weaker when we include only manufacturing subsidiaries. This suggests that holding companies play a large role in profit shifting for firms with structured management. Fourth, we show that our results are non-linear in ROA, as most of our effect is driven by firms with higher ROAs. Using quantile regressions, we show that the interaction effect between management and tax rate is larger for upper quantities of the ROA distribution.

4.4 The role of individual managers

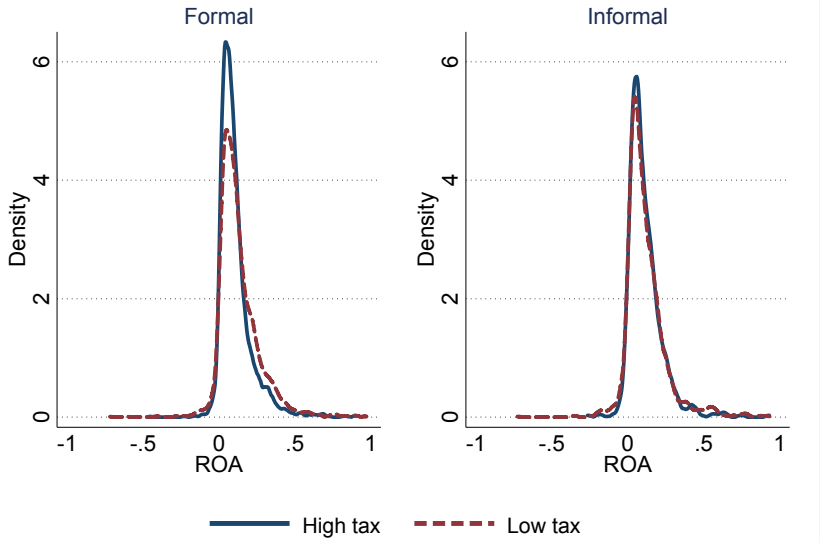
We consider the additional role that individual managers may play in profit shifting decisions by looking at differences in executive compensation between firms. We use parent firm compensation data from Orbis as a proxy manager quality. The Orbis directors data includes the latest information on position and salary of various executive managers, but is often missing the time frame in which they serve. As such, we cannot build a panel of executive compensation and aggregate over the executive team, as in Armstrong et al. [2012], Desai and Dharmapala [2006a]. Instead, we consider the latest current average salary within each of the following two executive groups: CEO and CFO.[13] This proxy does not vary over time.

We use this data we test the robustness of our observed correlations to the inclusion of a manager quality proxy. First, in Table A2 we show our baseline results from Table 3 controlling for CEO and CFO salaries. Second, in Figure A2 we plot coefficients from static regression from Column (3) Table 3 for each tercile of executive compensation measures. We show that the coefficient on the interaction between structured management and tax rate does not change when we control for the quality of individual managers at the firm level. Further, this coefficient does not vary much across terciles of executive compensation distribution. The coefficient is slightly larger for firms with higher quality of individual managers, which is consistent with a notion that "better managers" may

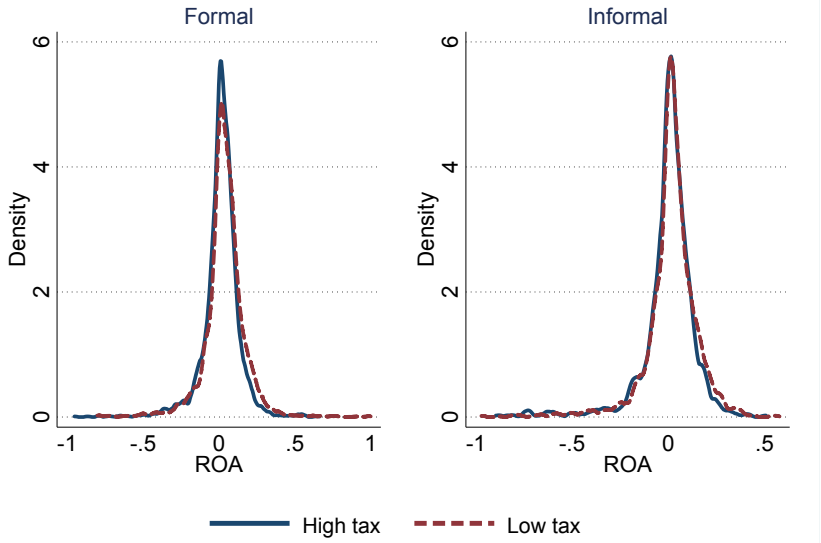
[13]The average salary in the finance, accounting and legal departments within our sample of MNEs is similar to the the CFO average salary.

Figure 7: Bunching of ROA around zero for aggressive firms by management type

(a) Aggressive



(b) Non-aggressive



Note: Data from the World Management Survey and Orbis. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. We plot the distribution of ROA, which is the ratio of profit and loss to total assets. ROA restricted between -1 and 1. Structured management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Hence, blue solid lines show the distribution of ROA for subsidiaries in high tax countries, while red dashed lines for subsidiaries in low tax countries. In Panel A we show the ROA distributions for aggressive firms and in Panel B for non-aggressive. Non-aggressive are firms with book tax difference (BTD) below median and Aggressive are firms with BTD above median.

be able to take advantage of firm's organizational capacity more efficiently. This suggests that the effect of structured management on firm's capacity to shift profits is of first order importance across firms with different quality of individual managers.

There exists a large literature on the role of individual managers on firm's performance [Bertrand and Schoar, 2003] and on firm's tax avoidance [D.Dyreng et al., 2010, Koester et al., 2017]. In this literature, the effects of individual managers are separated from that of firm specific characteristics by exploiting the movement of managers across firms. In our data, only 2.8% of managers hold contemporaneous positions in more than one firm and we do not observe movements across time.

5 Empirical evidence: event study

The reduced form evidence indicates that the level of management practices adopted by a firm is correlated with the profit reporting behaviour. In particular, firms tend to report lower profits in countries with higher tax rates. The pooling across years yields a static analysis of the stock of profit allocated to each type of jurisdiction across all years. However, profit shifting is a dynamic process, and MNEs reallocate profits often in response to corporate tax rate changes across all jurisdictions where they operate. We exploit the time dimension of our data to consider the causal effect of tax rat cuts on the allocation of profits across jurisdictions. We define an *event* as a change in the corporate tax rate relative to the previous year for that particular country. According to our conceptual framework, a reduction in a tax rate should induce a subsidiary to report more profits in that country (all else equal). We expect this behavior to manifest in firms with formal management practices in place, as they are the only set of firms that have the tractability and predictability of profits that would enable an efficient reallocation of profits.

We conduct an event study exercise using changes in the corporate tax rates across various subsidiary locations of MNEs and estimate the following specification:

$$ROA_{j,t} = \alpha + \sum_{\kappa=-4}^{4} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X'_{jt} + \eta_t + \epsilon_{jt} \tag{2}$$

where $ROA_{i,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-4}^{4} \mathbb{1}[t = \kappa]$ is a series of year dummies that equal one when the tax reform was κ years away, with the dummy variable corresponding to $\kappa = -1$ as the omitted category. X'_{it} is a set of firm- and country-level control variables (including GDP growth, cost of capital, investment as share of GDP in both subsidiary and HQ countries), η_t is a year fixed effect, and ϵ_{jt} is the error term.

The coefficients of interest are the δ_t, as they measure the average change in reported profits relative to the κ year before or after the reform across the subsidiaries in our sample. Following McCrary [2007], we bin event dummies at endpoints of the event window (in our case, at $t = -4$

and $t = 4$) such that the end dummies include all reforms occurring 4 or more years beyond the window. This is to account for the different timing of tax rate cuts across countries, which yields an unbalanced panel for event times.[14]

For the event study, we use the extended sample described in the data section where we assign the average of the management scores for the available subsidiaries to all subsidiaries within an MNE's ownership tree. This is a more appropriate sample for this analysis for two reasons: (i) it is a much larger panel, making the event study design feasible, and (ii) the event study explores dynamic decisions at the MNE level and thus requires inclusion of the financial data of as many subsidiaries as possible. Within this larger sample, we focus on the subsidiaries in countries that have had only one tax cut in the event window. It is the simplest iteration of this exercise with the most straightforward interpretation. Restricting our analysis to this subset of countries avoids issues related to possible anticipation of tax changes as well as slow and staggered sequential introductions of large tax rate cuts (such as the large 9% UK tax cut scheduled to be rolled in smaller pieces on an annual basis from 2010 to 2022). Countries that we include in our sample are marked in Figure A3a. Because our event study sample relies on analyzing firms that may exist only for a part of the sample time period, our firms are sometime located in countries that experienced multiple tax rate cuts, but the firm itself only experienced one tax rate cut. Given that these firms likely did not exist before or after the reported time periods, they should not be affected by reforms introduced a few years before or after they exit/enter the sample.

In our sample country-year tax rates, almost 31% of the country-year combinations do not have any tax rate changes, about 18% have one tax rate change, 26% have between two and five tax changes, and about 7% have more than five tax rate changes (Figure 8a). The majority of the tax rate changes are tax cuts (Figure 8b), with just under 3% of the country-year observations including a tax increase.[15]

We do not include a control group in our event study analysis sample. There are several reasons for not doing so. First, the ideal control group would include firms located in countries where no tax rate changes occurred during our sample period. In Figure A3a in the Appendix we show the distribution of the number of tax cuts across countries. Most countries has between 1-3 tax rate cuts between 2005 - 2018. There are in fact only 7 countries that did not change their tax rates during 2005 - 2018: Argentina, Ireland, Burkina Faso, Romania, Cayman Islands. This is not a representative group of countries relative to the ones in our treatment group. Limiting the sample period to a more recent spell, (i.e. 2011 - 2017) also restricts the number of countries that had experienced 1 tax rate cut substantially (Figure A3b). These countries are less representative of

[14] The binning at the end-points of the window is the reason we do not not plot the endpoint estimates in the event study graphs.

[15] Further, these tax rate increases were mainly small (over 80% under 2 percentage points) and often introduced as a surcharge on corporate tax rate or a local tax increase in response to poor macroeconomic conditions within a country. In contrast, tax rate cuts are often a part of package of larger tax reforms aiming to make a country a more competitive tax system (for example, the announced tax cuts in the UK from 2009).

the set of countries we have in the extended sample, and the number of countries that did not change their tax rates increases. Relative to the countries included in our WMS sample, this group consists mostly of Russia, China and Germany. Third, the control group countries inherently do not have event year dummies. Thus, we would need to artificially assign these to be year zero in 2014 and year t+3 in 2017 and t-3 in 2011. Fourth, we could treat each tax rate cut as a separate event and construct a synthetic group for each of those weighting the outcomes of each of those event studies. Given the stringent data requirement of such an approach, we favor the more straightforward approach of avoiding a control group analysis. As such, we use the variation in tax rate changes and between different management types to identify the effects of tax rate cuts in our event study.[16]

Figure 9 shows the coefficient plot of the time event dummy variables from $t = -3$ to $t = 3$, excluding $t - 1$. The sample only includes subsidiaries in country-years that experienced a tax rate cut, and the interpretation of each coefficient is the reported profits relative to the year prior to the tax cut. We show results for all subsidiaries in circles, subsidiaries with formal management in squares, and subsidiaries with informal management in triangles. There is no evidence of a pre-trend in periods before the tax rate cut, but there is a clear positive and statistically significant trend starting from $t = 1$ forward. This trend is likely driven by firms with formal management in place, as the coefficients are similar across the two specifications. Firms with informal management in place, on the other hand, show a delayed positive trend but that is not statistically different from zero. The coefficients from the specification using only firms with informal management are, however, imprecise and we cannot suggest they are statistically different from the coefficients using the sample of firms with formal management.

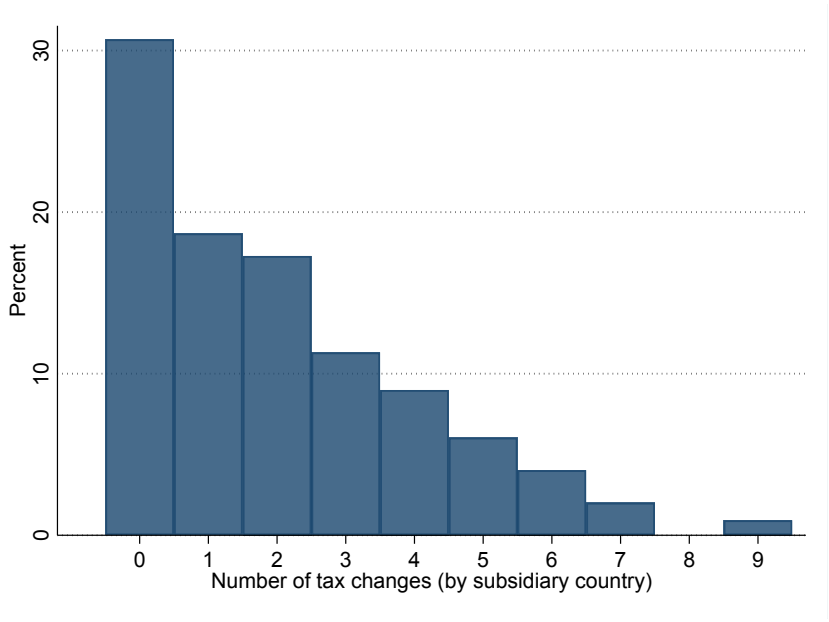
To further unpack these differences, we explore an alternative definition of "good management" focusing on the tails of the distribution as in Bender et al. [2018]. This is especially salient in our MNE sample as the majority of multinationals adopt some basic level of formal management practices. While we see results that are consistent with our conceptual framework when separating firms under the formal and informal management definition, we may expect the MNEs at the bottom of the distribution of this well-managed sample are the least likely to be able to respond to changes in tax rates. These are firms with management scores below 2.5, suggesting there are no areas of operations management that are properly formalized. The hollow squares and triangles show the point estimates of the coefficients for regressions using the sample of firms above and below the 5th percentile of the management distribution respectively. There is no discernible trend in the profit reporting behavior of the "worst managed" firms, and this is a statistically significant difference from those above the 5th percentile.[17]

The results presented in Figure 9 could be driven by a simple response in firms profitability

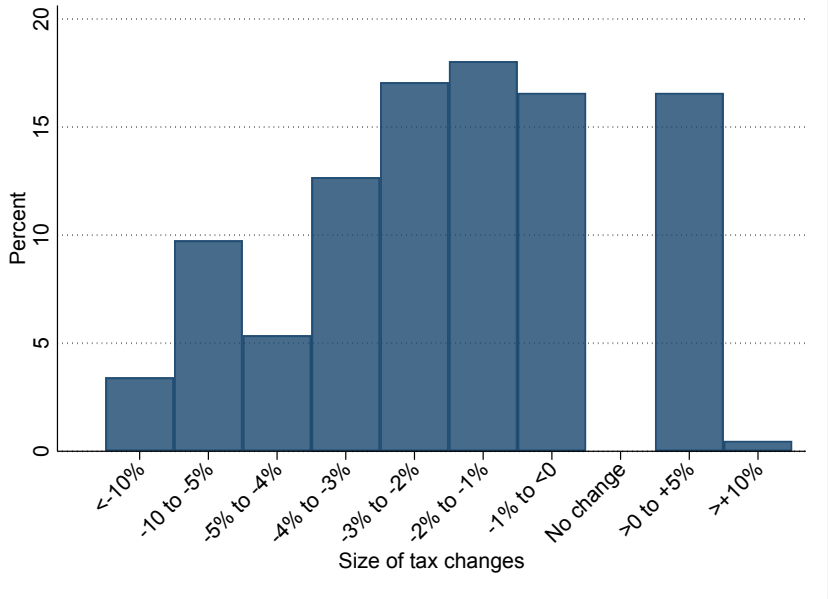
[16] See Figure A4 we show the distribution of tax rate cuts in our extended sample, for MNEs with structured management (panel A) and MNEs with unstructured management (panel B).

[17] This is also consistent with emerging evidence suggesting that most of the profit shifting is done by primarily the "most successful" (largest) multinationals (Wier and Reynolds [2018]).

Figure 8: Number and scale of tax changes between 2004 and 2016



(a) Number of tax changes

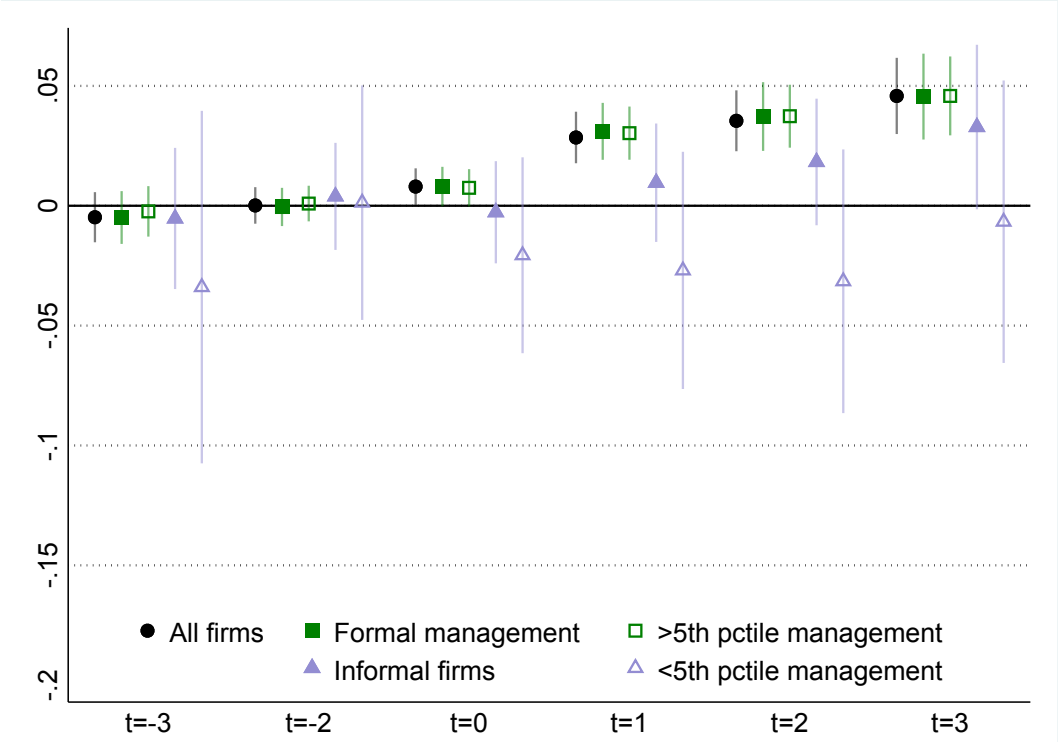


(b) Scale of tax changes

Note: In Panel A we plot the distribution of statutory corporate tax rate changes for firms in our sample. 30% of firms in our sample is located in countries with no statutory corporate tax rate changes. 8% of firms are located in countries with 4 statutory tax rate changes during the sample period. In Panel B we plot the distribution of the size of tax rate changes. 17% of firms in our sample experienced a tax rate decrease between 0 and 1%. 5% of firms experiences a tax rate decrease of 4-5%. Financial data comes from Orbis and the statutory corporate tax rates data comes from Oxford Centre for Business Taxation.

to changes in corporate tax rates that is not related to profit shifting. We address this concern by splitting our MNEs into those that are considered tax aggressive and those that are not, using the tax haven presence in the firm ownership tree.[18] Our results are driven by those MNEs that are considered to be more tax aggressive (Figure 10a), while non-aggressive MNEs do not respond significantly to tax cuts, irrespective of whether they are formally or informally managed (Figure 10b).

Figure 9: Event study: tax cuts and reported profits



Note: In this figure we plot yearly coefficients from event study estimation. $ROA_{j,t} = \alpha + \sum_{\kappa=-4}^{4} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X_{jt}^{'} + \eta_t + \epsilon_{jt}$ where $ROA_{i,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-4}^{4} \mathbb{1}[t = \kappa]$ is a series of year dummies that equal one when the tax reform was κ years away, with the dummy variable corresponding to $\kappa = -1$ as the omitted category. $X_{it}^{'}$ is a set of firm- and country-level control variables (including GDP growth, cost of capital, investment as share of GDP in both subsidiary and HQ countries), η_t is a year fixed effect, and ϵ_{jt} is the error term. Each black circle corresponds to the δ_t coefficients and year $t-1$ is omitted. Each filled green square corresponds to δ_t coefficients for firms with formal management practices in place, where formal management is defined as a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. Each empty green square corresponds to δ_t coefficients for firms with structured management score in the top 5th percentile of the management scores distributions. The triangles show δ_t coefficients for informally managed firms. Filled triangles plot δ_t coefficients for firms with structured management score below 3. Empty triangles plot δ_t coefficients for firms not in the tip 5th percentile of the management scores distribution. Financial data comes from Orbis and management data from WMS.

[18] Note that the BTD definition is not helpful here, as we want to measure aggressiveness at the MNE level in our extended sample, i.e. in the context where we extrapolate management practises at the MNE level.

We conducted a series of robustness and sensitivity checks with various definitions of event windows and event definitions. We conducted the following exercises using the same definition of *event*: accounting for multiple tax changes within the sample period, accounting for the size of the tax change, including only subsidiaries in a balanced sample. We also conducted exercises changing the definition of the event to a tax increase rather than a tax cut, and to an event when the tax rate fell below the median tax rate that each MNE is exposed to (rather than the yearly median). They yield broadly similar results. We report the results of these exercises in the appendix.

Finally, we explore the propensity of subsidiaries to report near-zero profits in response to a tax cut. Figure A5a shows the results for the samples of firms with formal management in all countries in our sample, as well as only those in high tax country-years and low tax country years. The results suggest that subsidiaries in this sample located in high tax countries are less likely to report near-zero profits after a tax cut. There are no discernible patterns in the response of firms with informal management in place (Figure A5c). These results are consistent with the bunching graphs in Figure 6, where firms with formal management were more likely to bunch around zero ROAs when the tax rates were higher than the median. This implies that a drop in in a corporate tax rate should induce a firm to reduce the likelihood of reporting near zero ROAs.

6 Discussion

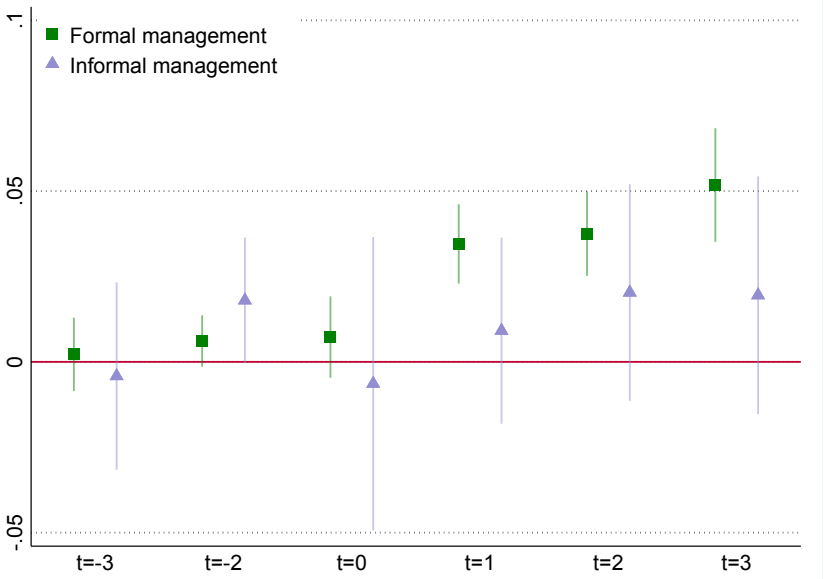
In this paper, we present evidence that is consistent with the presence of profit shifting among firms with more structured management practices. This is the first look at the issues of profit shifting and aggressive tax avoidance from an organizational economics lens. Using proprietary accounting data and a unique dataset of subsidiary-level management practices, we show that firms with more structured management are more profitable, though only in low-tax jurisdictions. Using an event study design, we further show firms with structured management are more likely to respond to a tax cut with reallocating profits into the newly-lower tax jurisdiction.

The results in this paper are important from a policy perspective. As management has been shown to improve productivity, this has resulted in multiple countries introducing government-funded policies to improve management quality of firms. Our results suggest that, in addition to increasing revenues, more structured management practices at the firm level may lead to lower reported profits and effective tax rates in high tax countries. This means that government-funded management-enhancing projects could reduce tax revenues to governments introducing them. While this does not mean governments should stop funding these projects, an understanding of the multiple potential effects of management beyond productivity should factor into the cost-benefit analysis.

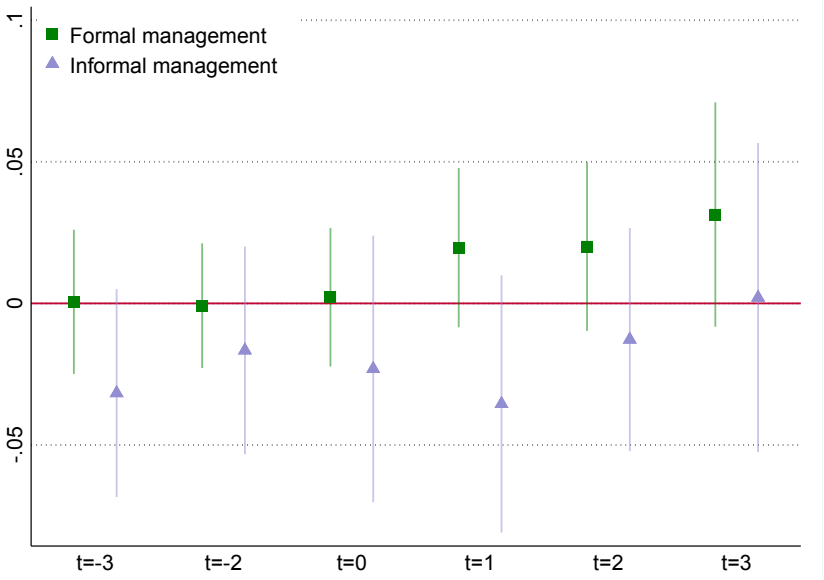
The results presented in this paper are likely to be lower bound estimates of how large the effect of management is for profit shifting. This is because profits reported by firms are generally different between tax returns and accounting statements. Bilicka [2019] shows that accounting profits overstate what is reported for tax purposes on tax returns. This difference is markedly

Figure 10: Event study: tax cuts and reported profits

(a) Firms with subsidiaries or HQ in tax havens

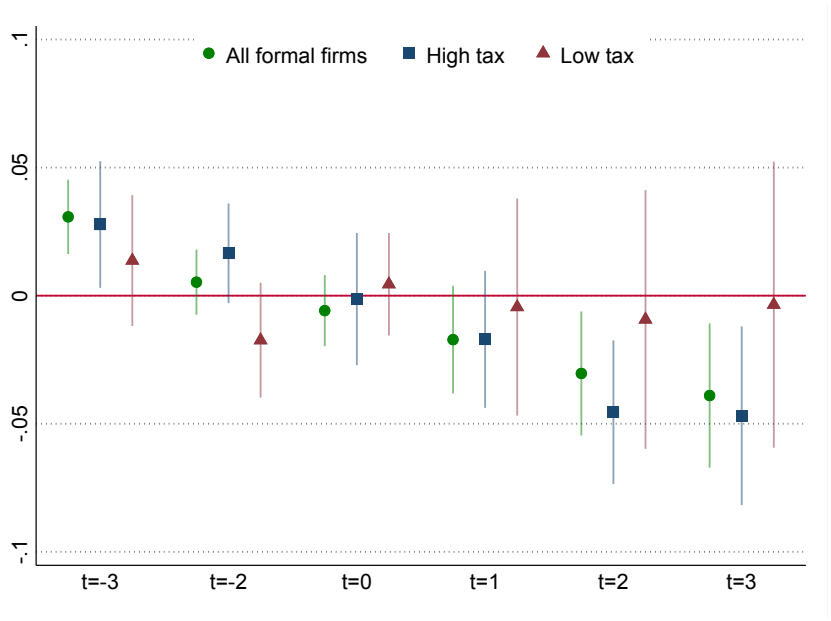


(b) Firms with no subsidiaries or HQ in tax havens

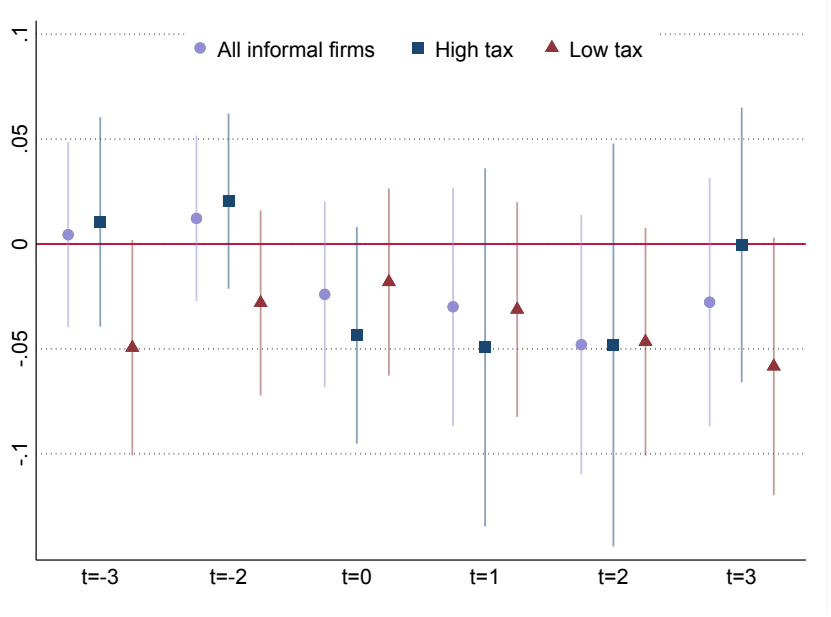


Note: In this figure we plot yearly coefficients from event study estimation. $ROA_{j,t} = \alpha + \sum_{\kappa=-4}^{4} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X_{jt}^{'} + \eta_t + \epsilon_{jt}$ where $ROA_{i,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-4}^{4} \mathbb{1}[t = \kappa]$ is a series of year dummies that equal one when the tax reform was κ years away, with the dummy variable corresponding to $\kappa = -1$ as the omitted category. $X_{it}^{'}$ is a set of firm- and country-level control variables (including GDP growth, cost of capital, investment as share of GDP in both subsidiary and HQ countries), η_t is a year fixed effect, and ϵ_{jt} is the error term. Each green square corresponds to δ_t coefficients for firms with formal management practices in place, where formal management is defined as a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. The triangles show δ_t coefficients for informally managed firms. Financial data comes from Orbis and management data from WMS.

Figure 11: Event study: tax cuts and the propensity to report zero profits



(a) Firms with formal management



(b) Firms with informal management

Note: In this figure we plot yearly coefficients from event study estimation. $bunch_{j,t} = \alpha + \sum_{\kappa=-4}^{4} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X_{jt}^{'} + \eta_t + \epsilon_{jt}$ where $bunch_{i,t}$ is a dummy equal to 1 if ROA is withing the 0.005 of zero for firm j at time t. $\sum_{\kappa=-4}^{4} \mathbb{1}[t = \kappa]$ is a series of year dummies that equal one when the tax reform was κ years away, with the dummy variable corresponding to $\kappa = -1$ as the omitted category. $X_{it}^{'}$ is a set of firm- and country-level control variables (including GDP growth, cost of capital, investment as share of GDP in both subsidiary and HQ countries), η_t is a year fixed effect, and ϵ_{jt} is the error term. We split firms into formally (Panel A) and informally (Panel B) managed ones. Formal management is defined as a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. Year $t-1$ is omitted from each plot. Each circle corresponds to the δ_t coefficients for all firms with formal management practices in place (panel A) and informal (Panel B). Each square corresponds to δ_t coefficients for firms located in high tax countries. Each triangle show δ_t coefficients for firms located in low tax countries. Financial data comes from Orbis, management data from WM and the statutory corporate tax rates data comes from Oxford Centre for Business Taxation.

larger for multinational firms. Thus, the evidence shown here may be even more pronounced, if we used tax returns data instead of accounting data for reported MNE profits.

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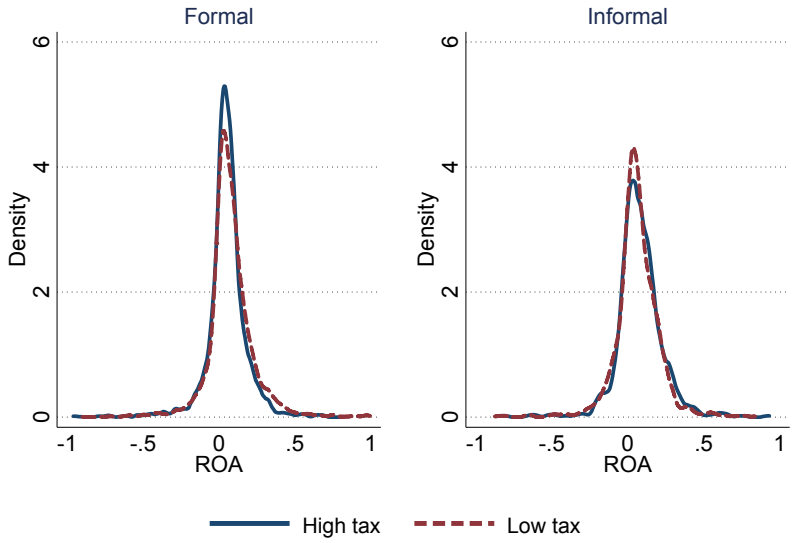
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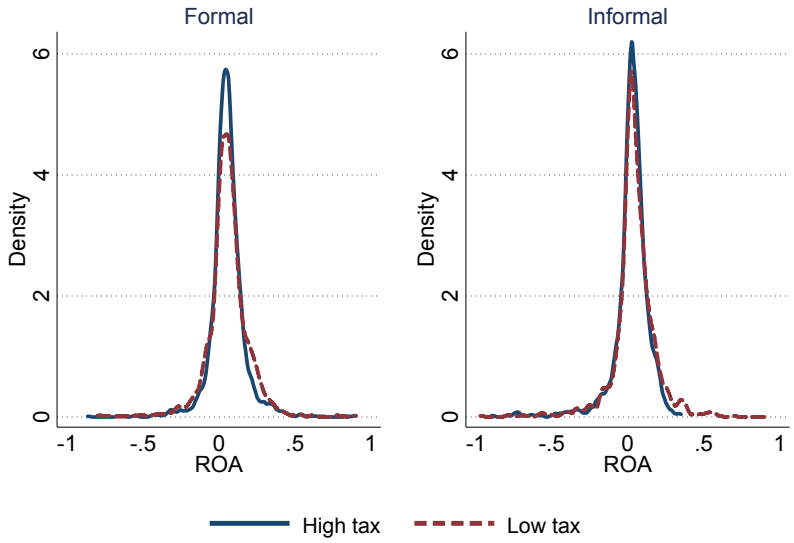
Appendices

Figure A1: Bunching of ROA around zero for firms in tax havens by management type

(a) Aggressive: has a tax haven in the ownership tree



(b) Non-aggressive: no tax havens in ownership tree



Note: Data from the World Management Survey and Orbis. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. We plot the distribution of ROA, which is the ratio of profit and loss to total assets. ROA restricted between -1 and 1. Structured management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Hence, blue solid lines show the distribution of ROA for subsidiaries in high tax countries, while red dashed lines for subsidiaries in low tax countries. In Panel A we show the ROA distributions for aggressive firms and in Panel B for non-aggressive. Non-aggressive are firms that have no subsidiary or headquarters located in a tax-haven and Aggressive are firms that have at least one subsidiary or headquarter located in a tax haven. Out of 1,717 MNEs, 50.61% have at least one unit in a tax haven.

Table A1: Summary of results, management sample, robustness check: raw correlations

	(1) ROA	(2) ROA	(3) ROA	(4) Bunching*	(5) Bunching*	(6) ETR	(7) ETR	(8) ETR
Structured management=1	0.013***	0.006	0.053***	-0.024**	-0.124***	0.003	0.016	0.078
	(0.005)	(0.010)	(0.016)	(0.011)	(0.038)	(0.016)	(0.033)	(0.053)
High tax sub	-0.013**	0.028**		0.002		0.070***	0.182***	
	(0.006)	(0.011)		(0.015)		(0.021)	(0.046)	
Structured management=1	-0.002	-0.038***		0.039**		-0.044*	-0.156***	
× High tax sub	(0.007)	(0.011)		(0.016)		(0.023)	(0.048)	
Subsidiary corp tax rate			-0.001		-0.107			0.805***
			(0.050)		(0.124)			(0.165)
Structured management=1			-0.153***		0.439***			-0.354*
× Subsidiary corp tax rate			(0.055)		(0.137)			(0.191)
Year x Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	19649	9659	19649	19649	19649	18624	9085	18624
R-squared	0.0195	0.210	0.0199	0.0247	0.0248	0.00640	0.0661	0.00756
Sample	**Baseline**	**Baseline within GUO**	**Baseline**	**Baseline**	**Baseline**	**Baseline**	**Baseline within GUO**	**Baseline**

Note: Data from Orbis and the World Management Survey. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. Structured management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. HQ stands for headquarter, GUO for global ultimate owner, which is the parent firm. Non-aggressive are firms with book tax difference (BTD) below median and Aggressive are firms with BTD above median. The outcome variable in columns 1-5 is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. The outcome variable in columns 6 and 7 is a dummy equal to 1, if ROA is within 0.005 distance from zero.

Table A2: Summary of results, management sample, robustness check: executive compensation

	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA
Structured management=1	0.001	0.003	0.000	-0.015	-0.015	-0.015	0.143***	0.148***	0.143***
	(0.012)	(0.012)	(0.012)	(0.017)	(0.017)	(0.017)	(0.041)	(0.041)	(0.041)
High tax sub	0.021	0.025*	0.021	0.002	0.002	0.002			
	(0.014)	(0.014)	(0.014)	(0.020)	(0.020)	(0.020)			
Structured management=1	-0.068***	-0.071***	-0.068***	-0.028	-0.028	-0.028			
× High tax sub	(0.016)	(0.016)	(0.016)	(0.021)	(0.021)	(0.021)			
Subsidiary corp tax rate							0.249**	0.273**	0.250**
							(0.117)	(0.117)	(0.117)
Structured management=1							-0.616***	-0.634***	-0.620***
× Subsidiary corp tax rate							(0.134)	(0.135)	(0.134)
CFO compensation (log)		-0.026***			0.042*			-0.027***	
		(0.006)			(0.023)			(0.006)	
CEO compensation (log)			0.006			-0.094*			0.006
			(0.008)			(0.052)			(0.008)
Year x Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
GUO controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	4239	4239	4239	3418	3418	3418	4239	4239	4239
R-squared	0.0437	0.0467	0.0439	0.229	0.229	0.229	0.0438	0.0472	0.0440
Sample	**Baseline**	**Baseline**	**Baseline**	**Baseline within GUO**	**Baseline within GUO**	**Baseline within GUO**	**Baseline**	**Baseline**	**Baseline**

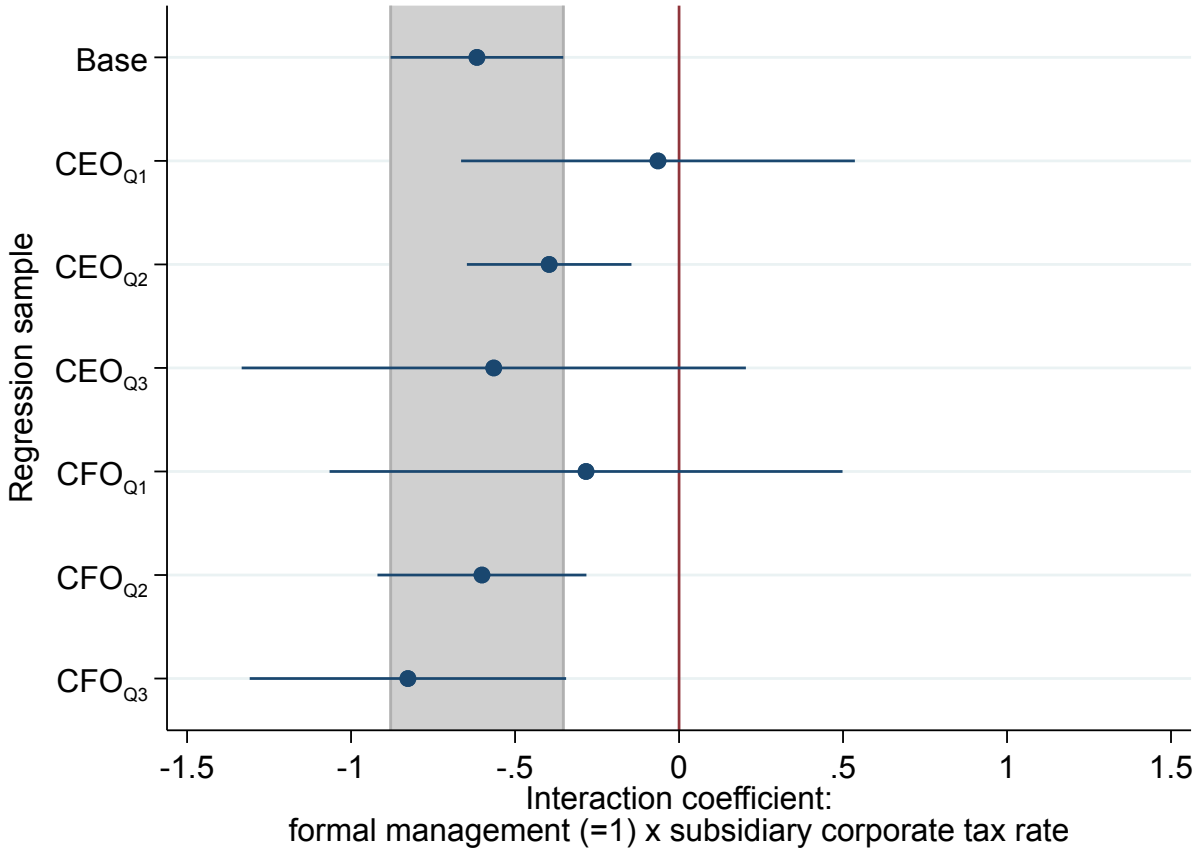
Note: Data from Orbis and the World Management Survey. Management sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. Structured management=1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. HQ stands for headquarter, GUO for global ultimate owner, which is the parent firm. The outcome variable is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. **ADD NOTE ON CEO COMP SOURCE**.

Table A3: Summary of results for extended sample

	(1) ROA	(2) ROA	(3) Bunching*	(4) Bunching*	(5) ETR	(6) ETR
Structured management=1	0.001	0.025***	0.005*	-0.002	-0.004	0.006
	(0.002)	(0.005)	(0.003)	(0.009)	(0.004)	(0.011)
High tax sub	-0.003		0.020***		0.043***	
	(0.002)		(0.004)		(0.005)	
Structured management=1	-0.015***		-0.003		0.006	
× High tax sub	(0.002)		(0.004)		(0.006)	
Subsidiary corp tax rate		-0.037**		0.110***		0.364***
		(0.016)		(0.027)		(0.036)
Structured management=1		-0.113***		0.021		-0.024
× Subsidiary corp tax rate		(0.018)		(0.030)		(0.039)
Year x Country FE	✓	✓	✓	✓	✓	✓
Observations	401776	401766	401776	401766	357467	357457
Mean DV	0.036	0.036	0.407	0.407	0.036	0.036
Sample	**Baseline**	**Baseline**	**Baseline**	**Baseline**	**Baseline**	**Baseline**

Note: Data from Orbis and the World Management Survey. Extended sample includes all subsidiaries belonging to MNEs for which we observe at least one management score for a firm. Management data is then averaged across all firms within an MNE. Structured management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. High tax sub is a dummy equal to 1 when the firm is located in a country with above median statutory corporate tax rate. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. HQ stands for headquarter, GUO for global ultimate owner, which is the parent firm. Non-aggressive are firms with book tax difference (BTD) below median and Aggressive are firms with BTD above median. The outcome variable in columns 1-5 is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. The outcome variable in columns 6 and 7 is a dummy equal to 1, if ROA is within 0.005 distance from zero.

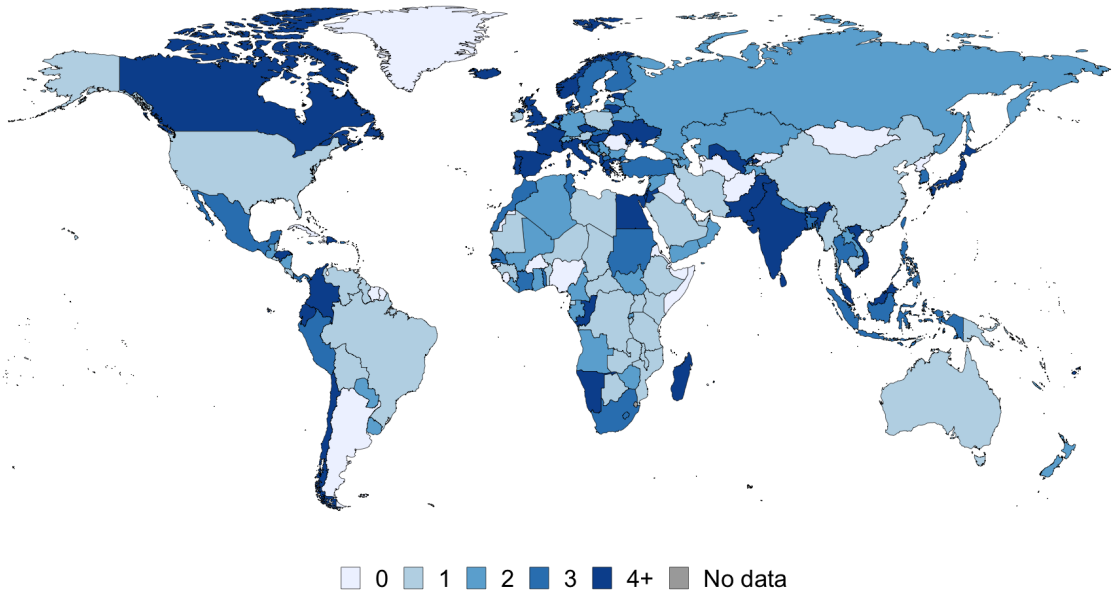
Figure A2: Comparison of interaction coefficient across terciles of CEO and CFO compensation



Note: This figure plots the coefficients of the interaction between structured management and the subsidiary corporate tax rate (specification from Column 3 of Table 3 for sub-samples of firms within each tercile of CEO and CFO quality.

Figure A3: Number of corporate tax rates changes

(a) 2005-2018



(b) 2011-2017

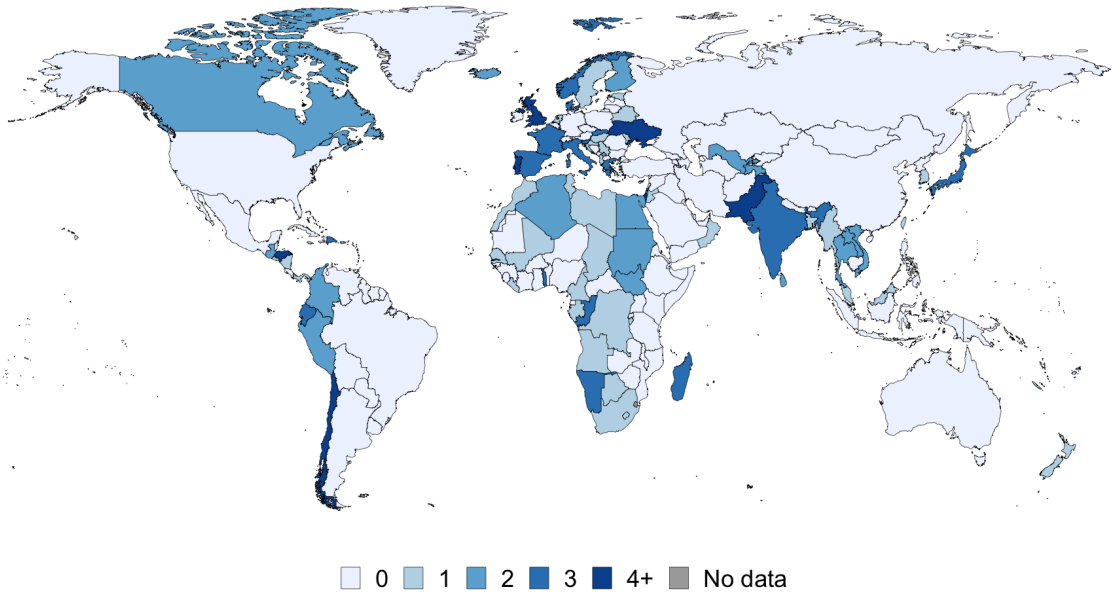
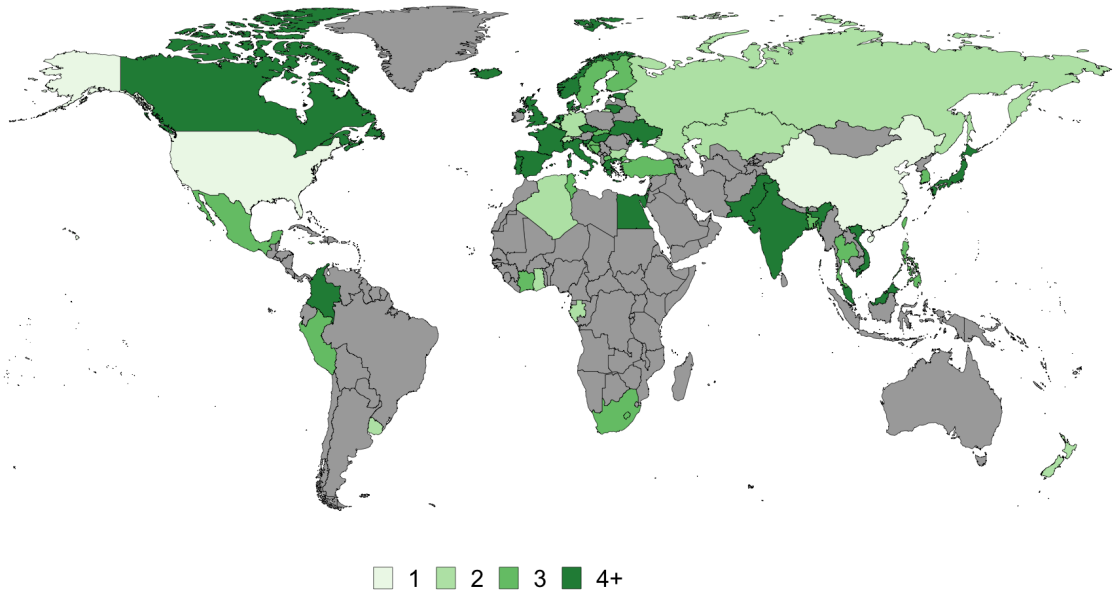


Figure A4: Sample coverage map: countries with at least one tax change in the extended sample

(a) Firms with structured management



(b) Firms with unstructured management

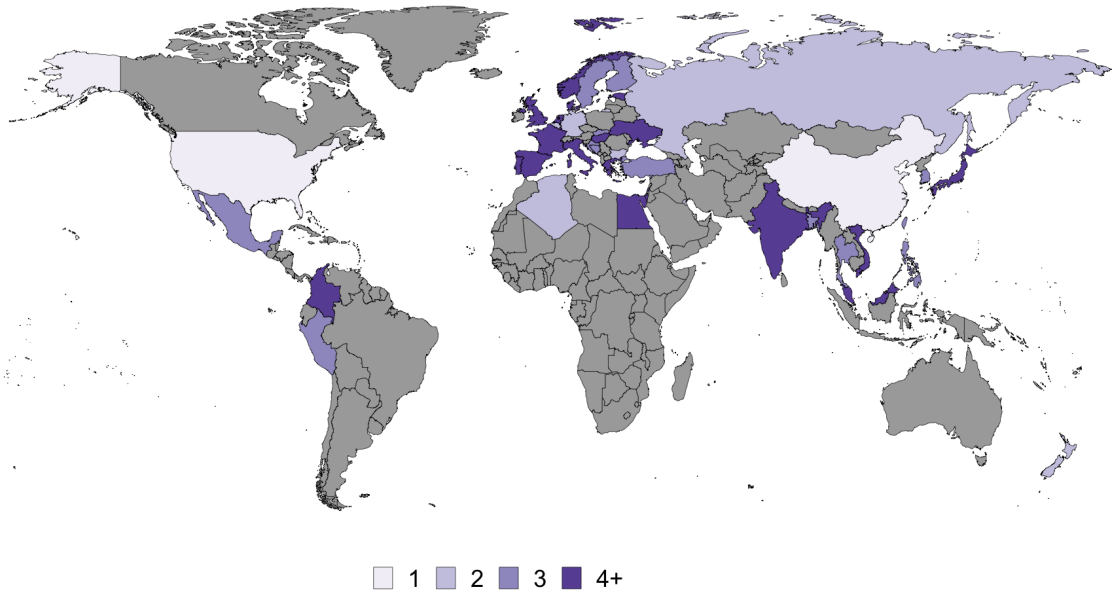
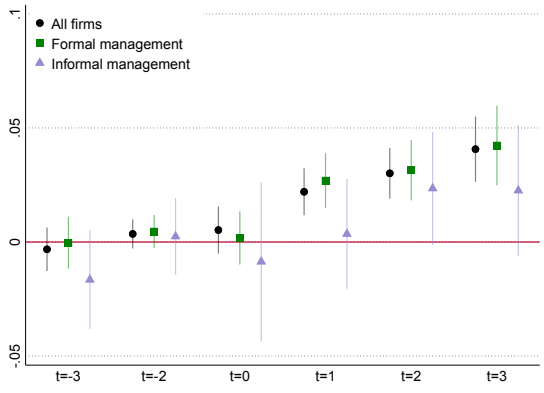
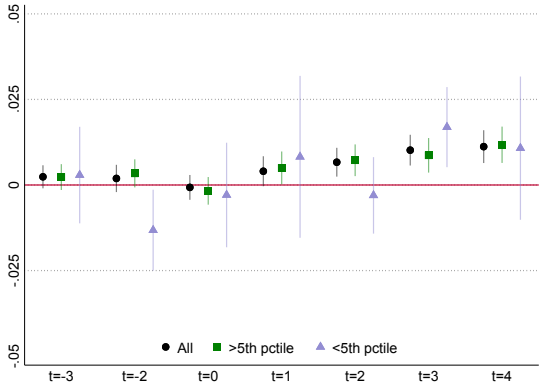


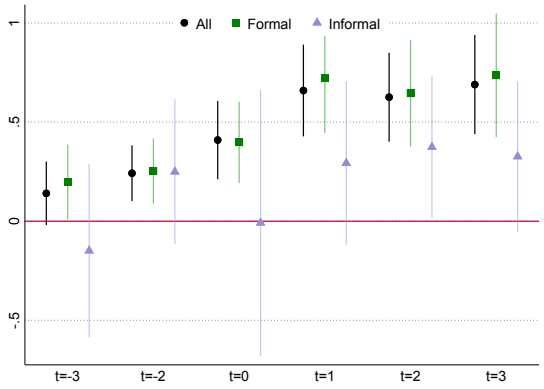
Figure A5: Event study sensitivity analysis



(a) Only balanced panel subsidiaries



(b) Countries with multiple tax changes



(c) Accounting for tax change size

Note: In this figure we plot yearly coefficients from event study estimation. $ROA_{j,t} = \alpha + \sum_{\kappa=-4}^{4} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X_{jt}^{'} + \eta_t + \epsilon_{jt}$ where $ROA_{i,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-4}^{4} \mathbb{1}[t = \kappa]$ is a series of year dummies that equal one when the tax reform was κ years away, with the dummy variable corresponding to $\kappa = -1$ as the omitted category. $X_{it}^{'}$ is a set of firm- and country-level control variables (including GDP growth, cost of capital, investment as share of GDP in both subsidiary and HQ countries), η_t is a year fixed effect, and ϵ_{jt} is the error term. Each black circle corresponds to the δ_t coefficients and year $t-1$ is omitted. Each filled green square corresponds to δ_t coefficients for firms with formal management practices in place, where formal management is defined as a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. The triangles show δ_t coefficients for informally managed firms with structured management score below 3. In Panel A we show results from restricting the sample to include only balanced panel. In Panel B we show results including countries with multiple tax rate changes during the sample period. In Panel C we show results that take into account the size of tax changes by multiplying the $\mathbb{1}[t = \kappa]$ dummies by the size of the tax change. Financial data comes from Orbis and management data from WMS.