Organizational capacity and firm profitability: evidence from multinationals

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Abstract

This paper analyses the effect of firm's organizational capacity on reported profitability of multinational enterprises (MNEs). Better organizational practices improve productivity and, in principle, increase potential taxable profits of firms. However, higher adoption of these practices may also enable more efficient re-allocation of profits across tax jurisdictions. We find 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 more responsive to corporate tax rate changes. These responses are also driven by more tax aggressive MNEs. These patterns are consistent with organizational capacity partially driving profit shifting behavior.[1]

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1 Introduction

Understanding heterogeneity in firm performance is one of the oldest topics in economics, and the unique role of managers highlighted in the earliest papers [Walker, 1887]. Decades of empirical work have consistently shown a clear and significant positive relationship between good managers, good management and productivity [Bandiera et al., 2015, Bloom et al., 2013, 2016, Dessein and Prat, 2019, Ichniowski et al., 1997, e.g.], but the relationship with profitability has been more mixed [Adams et al., 2005, Armstrong et al., 2012, Bloom et al., 2012a, D.Dyreng et al., 2010, Koester et al., 2017, e.g.]. While productivity is a more straightforward measure of production effectiveness, profitability measures — such as returns on assets — inherently include strategic decisions on reporting and may be more reflective of "aggressive accounting practices" than actual performance [Bertrand and Schoar, 2003].

In this paper, we explore the relationship between organizational capacity and firm profitability, proposing a novel explanation for the mixed evidence in prior work. We measure organizational capacity by the level of adoption of "formal" management practices at the firm, using a unique dataset of manufacturing multinational enterprises (MNEs) across 21 countries. We match this data to fifteen years of detailed firm accounts information and classify the tax regimes the firms operate in, as well as their levels of aggressive accounting practices. We propose a simple framework where firms adopting more "formal" management have more tractable and predictable production plans and, thus, relatively lower costs of shifting profits across jurisdictions.

We study this proposed channel using two empirical strategies. First, we provide new descriptive evidence on how MNEs with different levels of management allocate profits across jurisdictions with higher or lower statutory corporate tax rates. Second, we use an event study design to show how MNEs' profit reporting responds to changes in statutory corporate tax rates, for firms with different levels of management practices. 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 with documenting a new set of stylized facts on the relationship between the adoption of formal 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 (e.g. Bloom et al. [2010, 2013], Giorcelli [2019]). This relationship attenuates when we consider profitability (measured by return on assets, ROA). This suggests that firms adopting "formal" management practices generate higher revenues that, on average, do not translate into higher reported profits. This is consistent with the idea that these productivity-enhancing practices may also enable firms to strategically allocate their profits (i.e., engage in profit-shifting).

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 management scores 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. We do not observe a similar pattern for revenues, which are higher for MNEs with higher management scores operating in both low- and high-tax countries.

These differences could be driven by myriad factors unrelated to tax differences and profit shifting across countries; that is, if firms with "formal" management systematically locate in higher or lower tax countries due to, for example, industry agglomeration or knowledge accumulation economies [e.g., Alcácer and Delgado, 2016, Bernard et al., 2018, Helpman et al., 2004]. A main challenge in studying profit shifting practices is that the activities are not directly observable to firm outsiders. However, there are certain firm behaviors indicative of "aggressive avoidance" that can be used as proxies for these activities. We use three such proxies: first, 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]. Second, 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]. Third, we consider the raw distribution of ROA and focus on the behavior of firms that report ROAs near zero [Bilicka, 2019, Johannesen et al., 2016]. We show that the patterns we uncover in reporting practices of firms with "formal" 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.

More generally, profit shifting is an inherently dynamic process of re-allocation. As such, the relevant causal inference question relates to understanding how management practices enable 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 "formal" management practices in place.[2] 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 "formal" 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., 2010, Delis et al., 2018, Desai and Dharmapala, 2006a, Koester et al., 2017]. While this literature

[2]Causal identification of the direct effect of management practices 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 project.

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 manager quality, proxied by executive compensation. Thus, the effects of organizational capacity on profit shifting are of first order importance.

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 there is scant evidence on what characteristics enable profit shifting [Bilicka, 2019, Wier and Reynolds, 2018]. 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, there is a vast literature on the strong positive relationship (correlational and causal) between these "formal" management practices and firm performance. This relationship is consistent across sectors and countries [e.g. 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 these practices 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 these management practices and tax planning activities.

2 Conceptual framework

In this section we discuss the conceptual framework underpinning our empirical investigation. In short, we propose that MNE subsidiaries need tractable and predictable production — or, good *organizational capacity* — to enable effective tax planning and shifting of profits across subsidiaries. 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. To be sure, it is unlikely that managers will implement particular management practices to be able to do profit shifting, as such, we do not expect reverse causality

to be an issue in our framework.

Let all subsidiaries have a common objective function of after-tax profit maximisation achieved by maximizing production across all plants and minimizing tax liabilities. The manager at the HQ is responsible for the tax planning strategy of the entire corporate group.[3] 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 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 $\frac{\partial^2 c}{\partial \alpha^2} > 0$ (consistent with Hines and Rice [1994], Huizinga et al. [2008]).

We assume that profits are an increasing function of the quality of management (m), such that $\frac{\partial \pi(m)}{\partial m} > 0$ (consistent with Bloom et al. [2012b]). 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 ($m > 0$). 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:

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

[3] 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.

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. We propose that the potential effect of management on profit shifting activities is causal in the same vein that the effect of management on productivity is causal. For example, in Bloom et al. [2013] a random sample of firms were provided with professional management consulting and the authors find 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 would affect 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. To be sure, this is not to imply that we draw causal inference from the new correlations presented in the first section of this paper, but rather to provide clarity on how we perceive the causality chain in context.

Further, this is also to note that our framework 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 still of first order importance.[4]

Methods of profit shifting Profit reallocation decisions take three major forms: debt shifting, transfer pricing and patent relocation. To provide context, we briefly outline each strategy and how organizational capacity influences a firm's ability to use it.

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

[4]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.

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 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.

There is no dataset available that would allow for clear identification of which strategies firms are using, as some of these practices remain opaque even within firms. As our framework is consistent with profit shifting decisions using any (or all) the above strategies, we do not need to identify between them but simply need to understand that these are the potential channels through which organizational capacity affects the extent of profit shifting by MNEs.

3 Data

3.1 Management data

To measure the level of adoption of 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.[5] 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.

Following our framework, we focus on the 12 topics that directly relate to operations management

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

and exclude the questions relating to people management. We use the term "management" to refer to the index of these 12 operations management questions throughout this paper. We build two indices of management: a continuous index with the double-standardized average across the 12 topics, and a binary indicator dividing firms into two groups based on a methodological cutoff of the practices measured.[6] 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 "formal" management practices, while those with scores below 3 have, at best, an "informal" set of practices.[7] 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 countries from the US and the UK to Turkey and Argentina. The average MNE in each of the countries in our sample has a management operations score between 2.95 and 3.53, suggesting the average MNEs across the countries we study tend to have "formal" practices in place. However, there is substantial variation in the adoption of management practices across MNEs within countries, with scores ranging from below 2 to almost 5. Figure 1 reports the distribution of scores across countries, including the corporate tax rate for each country next to the country name. The average management score for firms in high-tax subsidiaries is 3.40 and the score for firms in low-tax subsidiaries is 3.32. While this difference is statistically significant, its magnitude is small and, on average, the countries with the lowest average management scores do not also have the lowest corporate tax rates in the sample. This should alleviate the concern that our results could be simply picking up a correlation between more "formal" management and tax rates in high tax-countries. As management practices is generally a slow moving variable, we consider it to be constant across years and take the average of the management score across years for firms that have multiple values.[8]

3.2 Firm financials and data structure

3.2.1 Baseline 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 1,438 firms in the WMS with at least one year of financial data in Orbis, yielding over 19,000 firm-year observations for the first part of the analysis. Using Orbis ownership information from 2019, we match each subsidiary for which we observe a management score with a parent company that this MNE affiliate belongs to. Our

[6] The WMS z-score is computed by standardizing each question, taking the average, and standardizing the average. The binary indicator comes from the methodological cutoff used in the scoring of each question by the WMS interviewers (as in Cornwell et al. [2019].

[7] We do not split firms into more granular bands of management using the integer cutoff points. This is because the majority of MNEs in our formal category lie between scores of 3-4, with very few firms having scores above 4.

[8] While the WMS has a set of firms with panel data, the sample size is not large enough to allow us to look at changes in management.

sample includes 1,133 unique parent companies.[9]

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.[10] We define low tax country-year cells as those with statutory corporate tax rates below median in a given year, and high tax country-year cells as those with taxes above median in a given year. As such, a particular country will be classified as high or low tax on an annual basis, depending on their relative tax rate in each year.[11] Of the 1,438 unique plants, 1,227 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.

3.2.2 Extended sample and event study sample

While the "baseline analysis" sample provides the sharpest distinction and most accurate measurement 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. However, Bloom et al. [2019] show that the largest variation in management practices is attributed to the differences between firms, rather than across establishments within firms. This suggests the average management score for a subsidiary in our sample is a reasonable proxy for all other subsidiaries within that MNE.[12]

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[13] that belong to that parent [e.g. Aminadav and Papaioannou, 2020, Belenzon et al., 2018]. We match 57,926 unique subsidiaries to the 1,133 unique HQs in the WMS data yielding over 400,000 firm-year observations. For the event study, we restrict this broader sample to only subsidiaries that experienced a single tax rate reduction within the sample period for which we observe full data for that subsidiary. This yields a sample of almost 19,000 subsidiaries with just under 100,000 firm-year observations.

Table 2 reports summary statistics for the firm-years in the three main samples used in this paper. Panel A reports the statistics for the sample used in the baseline analysis, including only firms that have a "directly-measured" management score. Panel B reports the statistics for the extended sample that serves as the basis for the event study analysis, while Panel C reports the

[9] 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.

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

[11] For instance, UK had 30% corporate tax rate in 2007 (above median tax rate), but had gradually lowered in main corporate rate to 19% in 2017 (below median tax rate).

[12] We check the robustness of our results by restricting the sample only to firms with different autonomy levels, as there is a correlation between asset partitioning choices and subsidiary autonomy levels [Belenzon et al., 2018].

[13] Majority ownership means that the the parent company owns 50% of the shares of the subsidiary.

statistics for the sample specifically used for the event study. We highlight the average values of the main variables in our analysis between subsidiaries in low tax country-years, high tax country-years, and firms that are classified as aggressive and non-aggressive for each year. Of note is that the differences in management scores and share of firms with formal practices are small in magnitude between high- and low-tax country-years, as well as between aggressive and non-aggressive types.

3.3 Main constructed measures

Main outcome variable: measuring profitability

Return on assets (ROA) is our preferred measure of firm profitability, as is common in the productivity literature as well as the tax and profit shifting literature. It is defined as profit and losses before taxes divided by total assets. An alternative outcome variable in the tax literature is the effective tax rate (ETR), which measures the amount of taxes paid relative to a firm's profits. 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 focus our analysis on profitability but report additional results using ETR as an outcome variable in the Appendix.

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

We use three proxies for aggressive tax avoidance behavior. Our first proxy follows the most commonly used approach and uses 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.[14]

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

[14] 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.

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 as more likely to be aggressive avoiders and those with below median BTDs as likely to be non-aggressive firms.[15]

A second 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 have tax havens in their firm structure, which is consistent with evidence from previous literature [Desai et al., 2006, Gumpert et al., 2016].[16]

Our third proxy follows a relatively recent approach and measures the incidence of bunching around zero reported accounting profits [Bilicka, 2019, Johannesen et al., 2016]. This approach has the benefit of having the lowest data requirements, as it simply uses the distribution of ROAs across the sample. It is also the most straightforward, as the non-parametric analysis does not require additional assumptions to be imposed for the classification of firms. The only assumption is that firms looking to minimize their tax liabilities aim to report as close to zero accounting profits as possible.

4 Empirical evidence: reduced form

4.1 Baseline results: profitability, management practices and tax rates

The core relationship between management and firm performance (measured by log of revenue and ROA) has been consistently estimated across and within countries, and we replicate this result in Panel A of Figure 2. The correlation between management and profitability is noisier than the simpler correlation between management and operating revenue. Broadly, this suggests that higher turnover generated by firms with more formal management practices does not necessarily translate into higher reported profitability. To unpack these patterns, we estimate a reduced form model correlating the ROA of each firm to their management scores, the tax rate in the subsidiary and the interaction between the two:

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

[15] 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.

[16] Note that Orbis datset has very poor coverage of financial information for tax haven subsidiaries, as discussed by Torslov et al. [2018]. However, firms do report the presence of tax have subsidiaries in Orbis data and we use only this information.

where ROA_{it} is the returns on assets, M_i is management score indicator, $CTRate_{ct}$ is the statutory corporate tax rate in country c at time t, X_{it} includes firm level and MNE level controls. η_c are country fixed effects and δ_t are year fixed effects. Firm level controls include: log of the number of employees, the log of total and fixed assets, and log of the total number of subsidiaries that MNE has. The management score indicator takes a value of 1 if the firm's score is equal to or above a value of 3, interpreted as having on average "formal" practices in place. We run the reduced form model across the main set of samples used in this paper and report the results in Table 3.[17]

Columns (1) and (4) we re-affirm the positive correlation between formal management and *average* profitability (Panel A) as well as productivity (Panel B). Columns (3) and (6) include an interaction with the country statutory corporate tax rate, and the negative coefficients on the interaction terms in Panel A suggest that firms with formal management report lower profits in higher tax countries. For example, if we were to move a firm with formal management from a country at the 25th percentile value of corporate tax rates (approximately 22%) to a country at the 75th percentile of tax rates (approximately 30%), they would report almost 1 percentage point lower ROA in the higher tax country. The relationship in the extended sample is slightly larger, with the same type of move suggesting a 2.2 percentage point lower ROA in the higher tax country.[18]

The non-significant interaction terms in Panel B, however, suggest that there is no differential relationship in terms of productivity. Figure 3 depicts the primary relationships of interest across the distribution of the management score. In Panel A we plot the local linear regressions of management scores on profitability for subsidiaries in low-tax and high-tax country-years separately. The commonly documented relationship between management and profitability seems to be primarily driven by firms located in low-tax countries, while no discernible pattern exists for firms located in high-tax countries. Panel B shows the same exercise for a raw measure of firm performance, log of operating revenue, and the relationship is similar across the two types of tax jurisdictions.

Column (6) reports the baseline correlations for the sample we later use for the event study analysis. The purpose of this is to highlight that the event study sample is, in fact, a selected set of firms that operate in countries that experienced a tax rate reduction. As such, the relationship between the tax rate and ROA for firms with formal management is larger relative to the overall sample, and it serves to provides context for the external validity of the event study discussion in the next section.

Our analysis thus far is based on a pooled cross section, which allows us to observe the *location* of reported profits, but not the *allocation* of these profits across jurisdictions within MNEs. This is a concern if firms with formal management are more likely to locate in high- or low-tax jurisdictions for reasons that are unobserved. To partially address this concern, in Column (7) we restrict the

[17] We use different standard error clustering across different specifications depending on the sample we use and the variation we explore, following Abadie et al. [2017]. We use robust standard errors in the baseline specifications, but cluster at the firm level in the extended sample.

[18] In the extended sample, the 25th percentile value of corporate tax rates is 20% and the 75th percentile value is 32%.

sample to the set of MNEs in the WMS sample for which we observe multiple subsidiaries belonging to the same MNEs and run a model with HQ fixed effects.[19] The coefficient on the interaction term with the binary management measure is significant, and we plot the marginal effects of the continuous measure of management for high- and low-tax subsidiaries in Figure 4. The differences are statistically significant beyond a management score of 3, consistent with Table 3. We interpret this as suggestive 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. Further, our descriptive statistics show that management scores and share of firms with formal management in low-tax and high-tax countries are not substantially different in magnitude.

4.2 Baseline results: the role of individual managers

In Table 4 we consider the additional role that individual managers may play in tax planning decisions by including proxies for executive quality (measured as executive compensation). 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 context, such an analysis is less feasible because our focus is not only on public firms, where this data is most commonly available, but rather in both public and private firms. Still, we include an exercise using the 282 firms we are able to match with compensation data from Orbis, yielding 4239 firm-year observations.

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]. We consider the latest current average salary within Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs).[20] This value does not vary over time, and only 2.8% of managers hold contemporaneous positions in more than one firm.

Column (1) repeats the specification from Column (3), Panel A in Table 3, but only for the sample of firms for which we have executive compensation data. The interaction term is still negative and significant, but the magnitude is almost five times larger, suggesting it is indeed a selected sample of firms. However, controlling for CEO (Column 2) or CFO (Column 3) quality does not change the magnitude of the interaction coefficient across specifications.[21] In Column

[19] This comes with the caveat that the sample includes only 474 firms and 6,864 firm-year observations, representing approximately one-third of the total baseline sample.

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

[21] We extend this exercise by running the same specification in Column (3) Panel A in Table 3 for firms with "low", "medium" and "high" executive quality. We split the sample by terciles of CEO and CFO compensation measures, and plot a comparison of the interaction coefficients in Figure A1. Relative to the baseline interaction coefficient, the direction and magnitude of the interaction coefficient across these various sub-samples is not qualitatively different. If anything, the interaction coefficient is slightly larger for firms with higher quality of individual managers, consistent

(4) to (6) we repeat the exercise with the productivity outcome. We show that the interaction term is insignificant, similar to the baseline specifications in Table 3 and the quality of CFO and CEO does change the magnitude of the coefficients. Higher CFO salaries are correlated with lower firm profitability (Column 2), but higher productivity (Column 5), consistent with their role in tax planning. These results suggest that the effect of formal management practices on firm's capacity to shift profits is important beyond the effect of individual manager quality.

In our framework, the effect of management practices is distinct from the effect of individual managers, though they can compound. Management practices are implemented by the headquarter for the whole MNEs and not by local managers, and as such we expect the agency costs that arise from differences in governance or information environments are unlikely to be a concern in our setting. Managers have a role in implementing them at the subsidiary level, but as we show in Table 4, in the context of profit shifting their role is secondary relative to that of management practices themselves.

4.3 Aggressive Tax Planning

Our evidence thus far suggests that firms with formal management may be better at tax planning. On the one hand, it is plausible that firms with formal management are simply better able to take advantage of government tax incentives. On the other hand, if the patterns presented are driven by profit shifting, we should observe that firms that are more likely to be aggressive tax planners exhibit stronger relationships. Our results are consistent with the latter explanation, and we provide two sets of supporting evidence based on our proxies for aggressive behavior.

First, in Table 5 we repeat the specification in Column (3) in Table 3 for the sub-samples of firms across two definitions of aggressive avoidance behavior. In Columns (1) and (2) we proxy for aggressive behavior with above- and below-median BTDs, and in columns (3) and (4) with the presence of tax haven in the firm ownership tree. The interaction coefficients suggest that firms with formal management report significantly lower ROAs in higher tax environments, but that relationship is stronger for firms that are more likely to be aggressive.

Second, we plot the distributions of ROAs around zero for two groups of firms: those with formal management in place and those with informal management in place, and compare MNE subsidiaries operating in high-tax countries and those operating in low-tax countries. Figure 5 shows that, for firms with formal 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 informal management, consistent with profit shifting behavior.[22]

with a notion that "better managers" could be able to take advantage of firm's organizational capacity more efficiently.

[22]Table A2 in the Appendix includes the regression analogue for one definition of a near-zero threshold. 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. This is consistent with the non-parametric results.

In Figure 6 we show the bunching plots for the sample of "aggressive" and "non-aggressive" firms (defined by median BTD)[23], reporting patterns consistent with those in Table 5.

5 Empirical evidence: event study

The reduced form evidence indicates that formal management practices are correlated with profit shifting 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. As such, the relevant causal inference question is understanding how management practices enable firms to respond to tax changes. We exploit the time dimension of our data to consider the effect of a tax rate cut 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 estimate the following specification:

$$ROA_{j,t} = \alpha + \sum_{\kappa=-5}^{5} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X'_{jt} + \eta_t + \epsilon_{jt} \tag{2}$$

where $ROA_{i,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-5}^{5} \mathbb{1}[t = \kappa]$ 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'_{jt} is a set of firm- and country-level controls (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 $t = -5$ and $t = 5$) such that the end dummies include all reforms occurring 5 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.[24]

We use the extended sample described in the data section, focusing on the subsidiaries in countries that have had only one tax cut in the event window. It is the simplest iteration of this exercise

[23] The equivalent exercise with the tax haven definition is in the Appendix, Figure A2a.

[24] 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.

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). However, this restriction is applied at the firm level, such that firms that experienced only one tax rate cut in their "sample lifetime" are also included even if the country they are located in had multiple tax changes throughout the entire sample period.[25]

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. Most countries have between 1 to 3 tax rate cuts between 2005 - 2018, with only 7 countries not enacting any changes in this period. This would not constitute a representative group of countries relative to those with tax cuts. Second, our event times span different years across different countries. If we built a synthetic control group for any one particular country, it is not clear how this would apply to other countries with different time lines and reference years. In principle it could be possible to 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.[26] However, the data requirement of such an approach are too stringent for our context and thus we favor the more straightforward approach of omitting a control group. We use the variation in tax rate changes and between different management types to identify the effects of tax rate cuts for the firms in our event study sample.

Figure 7 shows the coefficient plot of the time event dummy variables from $t = -4$ to $t = 4$, excluding $t-1$ as the reference time period (highlighted by the dashed line instead). As the sample only includes subsidiaries in country-years that experienced a tax rate cut, the interpretation of each coefficient is the reported profits relative to the year prior to the tax cut. Subsidiaries with formal management are represented by solid squares, and subsidiaries with informal management are represented by solid 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 for firms with formal management. Firms with informal management in place show a delayed slightly positive trend, though it is not statistically different from zero. The coefficients from the specification using only firms with informal management are, however, imprecise and we cannot rule out that they are statistically different from the formal management firm coefficients.

These results could be driven by a simple firm profitability response to changes in corporate tax rates that is not related to profit shifting. For example, if tax cuts also spur investment and in turn firm profitability. If our results were entirely driven by such responses, we would not expect to see differential effects between firms that we classified as "aggressive". We report the results

[25] For example, a firm located in Sweden — a country with tax cuts in 2009 and 2013 — could still be in the sample if the firm only reports data between 2004 and 2011 and not after, or between 2010 and 2017, but not before. We include a map of the count of tax rate cuts across the world in Figure A3a.

[26] As in, for example, Campos et al. [2014], Dube and Zipperer [2015]

of the event study for firms split into those with operations in tax havens and those without such operations in Figure 8.[27] Consistent with our pooled results, we find that the significant response to a tax cut for firms with formal management is driven by those that also have operations in tax havens (Panel A). For the sample of firms with informal management there is no discernible difference between the magnitude of their responses.

We also explore the propensity of subsidiaries to report near-zero profits in response to a tax cut. Figure 9 reports the results for all firms, firms in high tax countries and firms in low tax countries. Panel A includes only firms with formal management practices, and Panel B includes only firms with informal management practices in place. Consistent with the pooled results, following a tax cut in a high tax country, firms with formal management are less likely to report near-zero ROAs. The same is not true in low-tax countries, where we see no response following a tax cut. For firms with informal management we see no significant differential response, though this set of results is quite imprecisely estimated and we observe a distinctive pre-trend between firms high and low tax countries. Focusing on the more precisely estimated results for firms with formal management, these results imply that a drop in in a corporate tax rates in high tax countries induces firms to report relatively higher profitability in those jurisdictions.

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.

6 Discussion

In this paper, we present evidence that is consistent with the presence of profit shifting among firms with more formal management practices. This is the first look at how organizational practices affect firm profit allocation across subsidiaries. Using accounting data and a unique dataset of subsidiary-level management practices, we show that firms with formal management practices tend to be more profitable, though only in low-tax jurisdictions. Using an event study design, we show firms with formal management are also 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. Our results suggest that, while more formal practices may increase specific firm revenues and "real" profitability, they also seem to reduce reported profitability in high tax countries. Lower reported profits can lead to

[27] Note that the BTD definition is not appropriate here, as we measure aggressiveness at the MNE level in our extended sample — The context where we extrapolate management practices at the MNE level.

lower corporate tax revenues, having potentially important welfare implications. Further, this is relevant for countries engaging in government-funded policies to improve management quality of firms. While we are not suggesting that governments should stop funding these projects altogether, an understanding of the multiple potential effects of management beyond productivity should factor into the cost-benefit analysis.

More generally, 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, as Bilicka [2019] shows. This difference is markedly larger for multinational firms and thus the evidence shown here may be even more pronounced with tax returns data instead of accounting data for reported MNE profits.

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Tables and figures

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	957	759	198	190	139	51
2	214	206	8	176	125	51
3	108	104	4	183	149	34
4	64	63	1	192	158	34
5	50	50	0	145	123	22
6	30	30	0	144	125	19
7	7	7	0	168	148	20
8	8	8	0	208	189	19
9	-	-	-	315	290	25
10-49	-	-	-	8743	8457	286
50-99	-	-	-	8534	8423	111
100-499	-	-	-	24890	24772	118
500+	-	-	-	14038	14035	3
Total	**1438**	**1227**	**211**	**57926**	**57133**	**793**

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.

Table 2: Descriptive statistics for each sample

	Low tax vs High tax				Aggressive vs Non-Aggressive			
	Low tax Mean	High tax Mean	Low tax N	High tax N	Non-Agg Mean	Agg Mean	Non-Agg N	Agg N
Panel A: Management-only sample								
Employment	2237.31	1088.12	12482	7164	1501.18	2393.52	10418	8208
PLBT	16389.68	21016.05	12482	7164	9066.31	31294.59	10418	8208
ROA	0.06	0.05	12482	7164	0.02	0.12	10418	8208
ETR	0.18	0.23	11605	7019	0.26	0.11	10416	8208
Management	3.32	3.40	12482	7164	3.33	3.38	10418	8208
Structured = 1	0.73	0.77	12482	7164	0.73	0.76	10418	8208
Panel B: Extended sample								
Employment	999.06	1531.61	144751	108389	689.80	2045.17	137874	96828
PLBT	17529.86	18417.41	234273	166566	4083.10	38374.98	216645	143234
ROA	0.05	0.02	234273	166566	-0.01	0.14	216645	143234
ETR	0.16	0.20	202609	154475	0.22	0.11	213585	143157
Management (avg)	3.47	3.42	234273	166566	3.44	3.44	216645	143234
Structured (avg) = 1	0.85	0.82	234273	166566	0.83	0.83	216645	143234
Panel C: Event study sample								
Employment	771.83	2159.39	22884	35944	699.38	2619.71	27064	27551
PLBT	13860.75	22540.66	33943	63631	2003.34	39531.96	47792	41385
ROA	0.06	0.01	33943	63631	-0.06	0.14	47792	41385
ETR	0.16	0.15	29470	58836	0.18	0.12	46949	41357
Management (avg)	3.47	3.43	33943	63631	3.44	3.46	47792	41385
Structured (avg) = 1	0.85	0.85	33943	63631	0.84	0.86	47792	41385

Note: Data from the World Management Survey (2004-2014) matched with Orbis (2004 to 2018). PLBT is the profit and loss before taxes. ROA is the return on assets: ratio of profit and loss before taxes and total assets. ETR is the Effective Tax Rate: ratio of reported tax payments to profit and loss before taxes. Management 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.

Table 3: Summary of static results with ROA as the outcome variable

Panel A: ROA	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Formal management=1	0.013***	0.057***	0.039**	-0.006**	0.027***	0.059**	0.098*
	(0.003)	(0.017)	(0.017)	(0.003)	(0.010)	(0.026)	(0.058)
Subsidiary corp tax rate	-0.121***	0.007	0.005	-0.163***	-0.064**	-0.049	0.303
	(0.025)	(0.052)	(0.052)	(0.015)	(0.032)	(0.074)	(0.231)
Formal management=1		-0.164***	-0.127**		-0.119***	-0.262***	-0.420**
× Subsidiary corp tax rate		(0.056)	(0.057)		(0.035)	(0.079)	(0.175)
Observations	19646	19646	19646	400829	400829	97574	6864
# firms	1438	1438	1438	57926	57926	16830	474
Mean	0.058	0.058	0.058	0.038	0.038	0.025	0.063
Panel B: ln(sales/employee)							
Formal management=1	0.084***	-0.110	0.113	0.069***	0.080	0.097	-0.072
	(0.023)	(0.139)	(0.111)	(0.021)	(0.088)	(0.221)	(0.676)
Subsidiary corp tax rate	4.708***	4.135***	2.645***	1.682***	1.715***	1.187*	3.002
	(0.206)	(0.442)	(0.357)	(0.109)	(0.275)	(0.651)	(2.995)
Formal management=1		0.718	0.403		-0.039	-0.090	0.446
× Subsidiary corp tax rate		(0.468)	(0.377)		(0.290)	(0.680)	(2.361)
Observations	19020	19020	19020	235308	235308	55374	6583
# firms	1414	1414	1414	36246	36246	16830	465
Mean	5.438	5.438	5.438	5.906	5.906	5.942	5.538
Controls							
Country fixed effects	✓	✓	✓	✓	✓	✓	
Year fixed effects	✓	✓	✓	✓	✓	✓	
Firm controls			✓	✓	✓	✓	✓
Sample	**Baseline**	**Baseline**	**Baseline**	**Extended Full**	**Extended Full**	**Extended Event**	**Baseline within MNE**

Note: Data from Orbis and the World Management Survey. Baseline sample includes only firms for which we observe management scores and were directly matched in both WMS and Orbis. 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. Event study sample limits extended sample to only firms included in the event study, i.e. those that experienced one tax rate cut during the sample period. formal 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. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. The outcome variable in all columns in Panel A is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. In Panel B the outcome variable in all columns is logarithm of the ratio of revenues to number of employees. Firm controls include log of employment, log of fixed assets and log of number of subsidiaries in the MNE. Standard errors are robust in columns 1-3, clustered at the country year level in column 7 and clustered at the firm level in columns 4-6.

Table 4: Summary of static results, controlling for executive quality

	ROA			ln(sales/emp)		
	(1)	(2)	(3)	(4)	(5)	(6)
Formal management=1	0.143***	0.148***	0.143***	0.692**	0.675**	0.690**
	(0.041)	(0.041)	(0.041)	(0.284)	(0.282)	(0.284)
Subsidiary corp tax rate	0.249**	0.273**	0.249**	4.993***	4.942***	4.990***
	(0.117)	(0.117)	(0.117)	(0.861)	(0.856)	(0.861)
Formal management=1	-0.616***	-0.633***	-0.619***	-1.474	-1.419	-1.475
× Subsidiary corp tax rate	(0.135)	(0.135)	(0.134)	(0.908)	(0.902)	(0.908)
Ln(CFO compensation)		-0.027***			0.057**	
		(0.006)			(0.029)	
Ln(CEO compensation)			0.006			0.017
			(0.008)			(0.031)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓	✓	✓
Observations	4239	4239	4239	4083	4083	4083
# firms	282	282	282	279	279	279
Mean	0.069	0.069	0.069	5.548	5.548	5.548

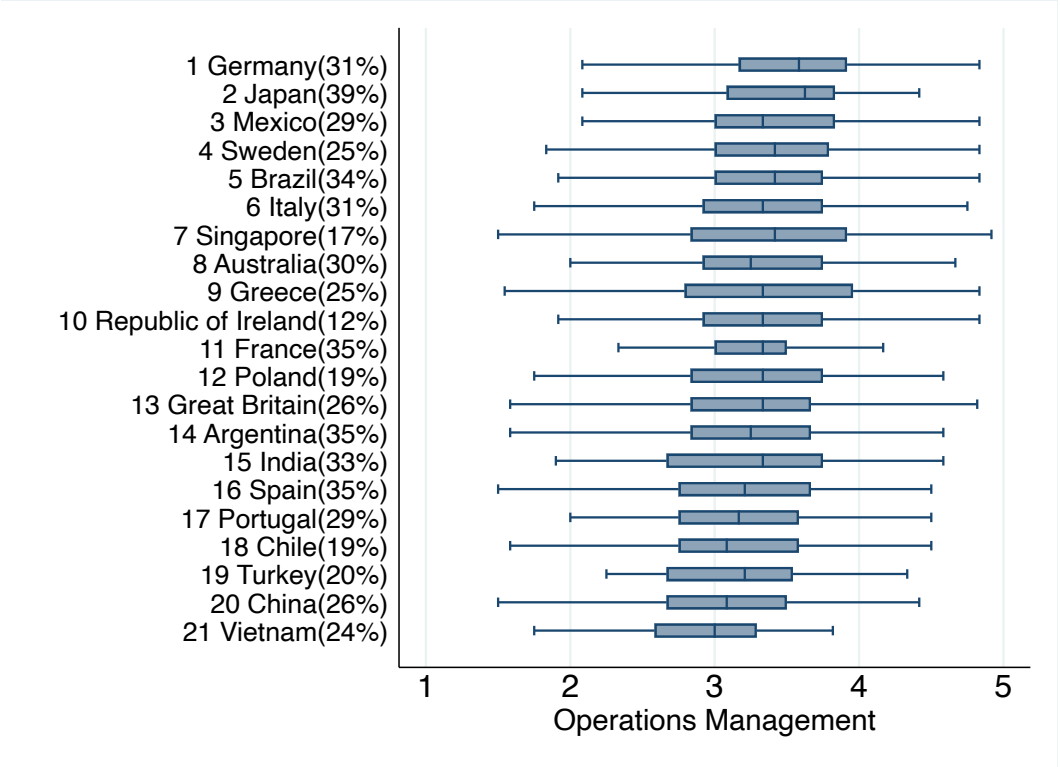
Note: Data from Orbis and the World Management Survey. All columns use baseline sample, which includes only firms for which we observe management scores and were directly matched in both WMS and Orbis. formal management==1 is a dummy equal to one when the average for the WMS operations management questions (including lean management, monitoring and target-setting) is 3 or above, on a scale of 5. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. ln(CFO compensation) is the natural logarithm of chief finance officer salary, ln(CEO compensation) is the natural logarithm of chief executive officer salary. The outcome variable in column 1-3 is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. In column 4-6 the outcome variable is logarithm of the ratio of revenues to number of employees. Firm controls include log of employment, log of fixed assets and log of number of subsidiaries in the MNE. Standard errors are robust in all columns.

Table 5: Aggressive tax avoidance: summary of results

	(1) ROA	(2) ROA	(3) ROA	(4) ROA
Formal management=1	0.056***	0.038*	0.056***	0.025
	(0.017)	(0.020)	(0.015)	(0.049)
Subsidiary corp tax rate	-0.071	-0.071	0.074*	-0.086
	(0.053)	(0.061)	(0.043)	(0.178)
Formal management=1	-0.196***	-0.117*	-0.271***	0.039
× Subsidiary corp tax rate	(0.056)	(0.070)	(0.051)	(0.166)
Country FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓
GUO controls	✓	✓	✓	✓
Observations	8208	10418	13304	6342
# firms	1193	2458	1754	1438
ROA Mean	0.121	0.018	0.066	0.041
Sample	**Aggressive: BTD**	**Non-aggressive: BTD**	**Aggressive: Haven**	**Non-aggressive: Haven**

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. formal 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. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. GUO stands 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 all columns is ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. Firm controls include log of employment and log of fixed assets. GUO controls include log of number of subsidiaries in the MNE.

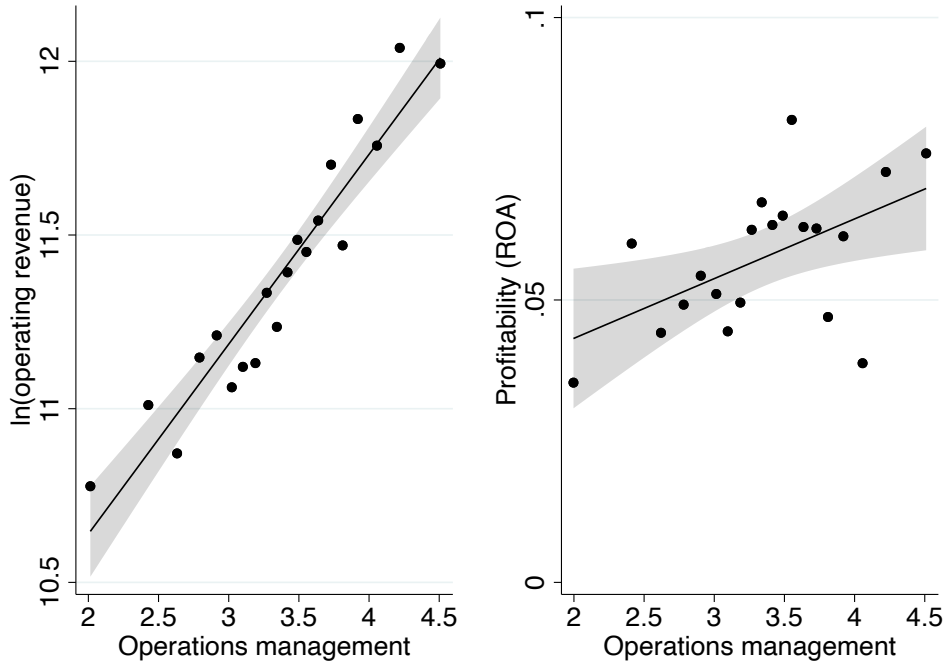
Figure 1: Average management score of multinationals with dispersion within countries.



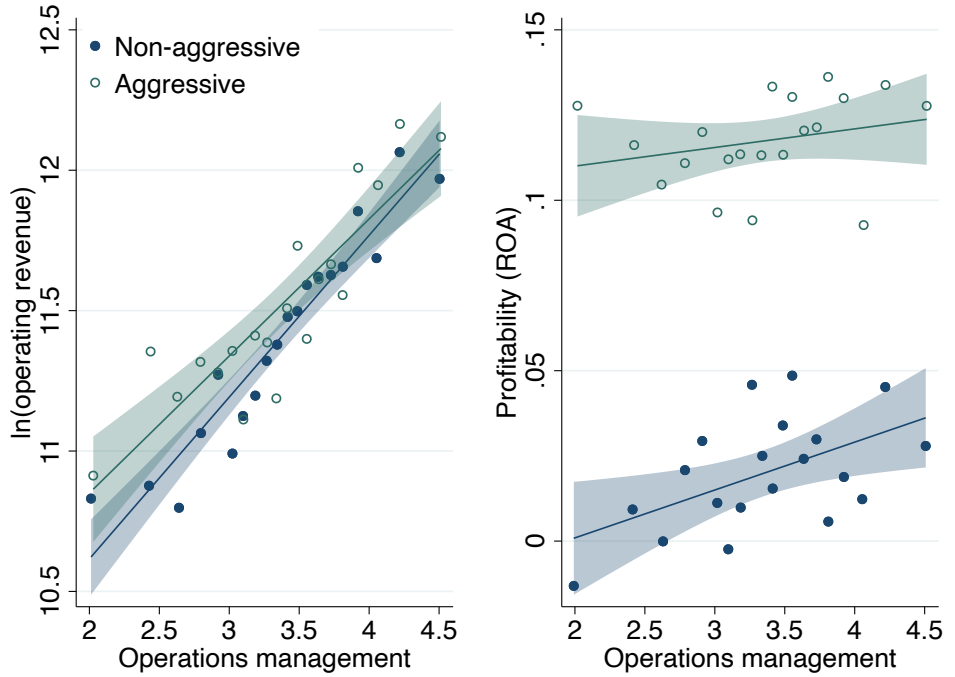
Note: In brackets next to country names we show the average statutory corporate tax rates across 2004 - 2019 from the Center for Business Taxation Tax Database. Data plotted comes from the World Management Survey. Management is the average for the WMS operations management questions (including lean management, 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.

Figure 2: Revenues, ROA, and management

(a) Overall



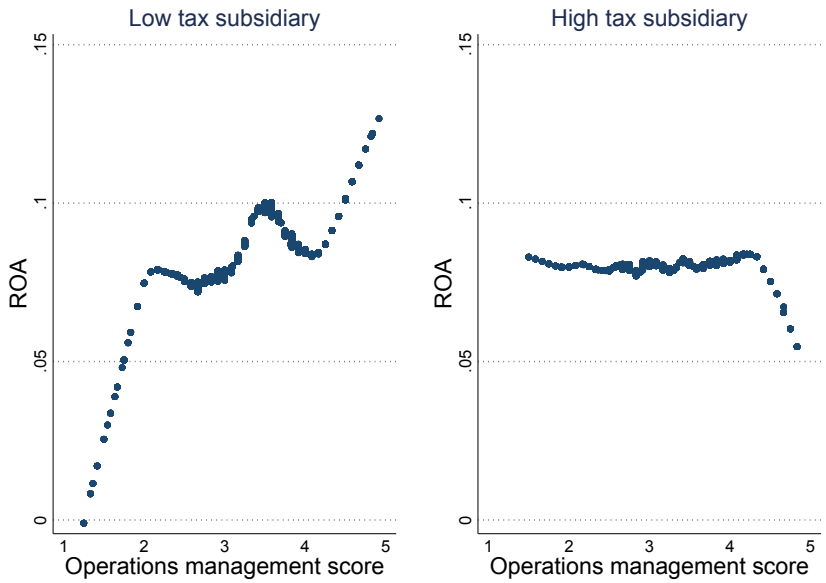
(b) By aggressiveness



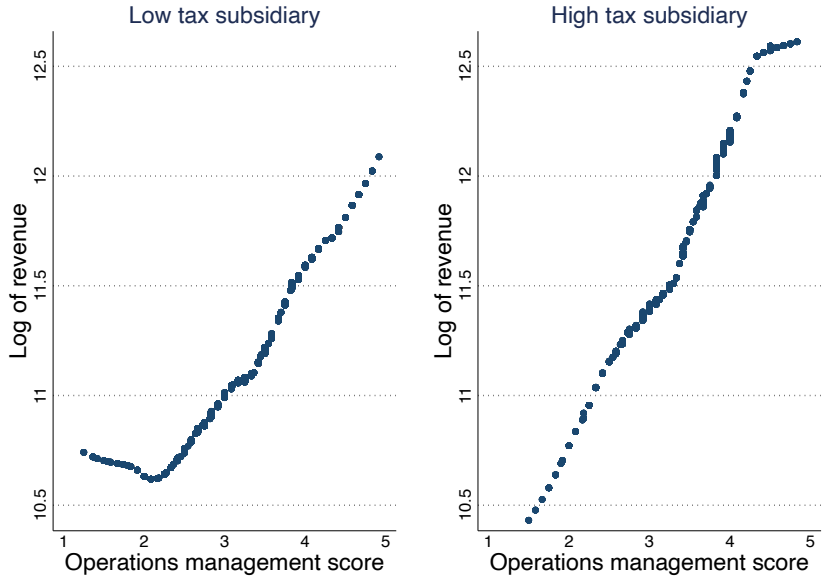
Note: Data from the World Management Survey and Orbis. Revenue is firm turnover. ROA is the ratio of profit and loss before taxes and total assets. Panel A shows average results, in Panel B we split firms according to their reported book tax differences. Firms with above median book tax difference are called aggressive and those with below median book tax difference are called non-aggressive. This figures consists of scatter plots of operations management scores and log of revenues and ROAs respectively. The line shows the fitted OLS line, and the shaded area is the confidence intervals.

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

(a) Profitability

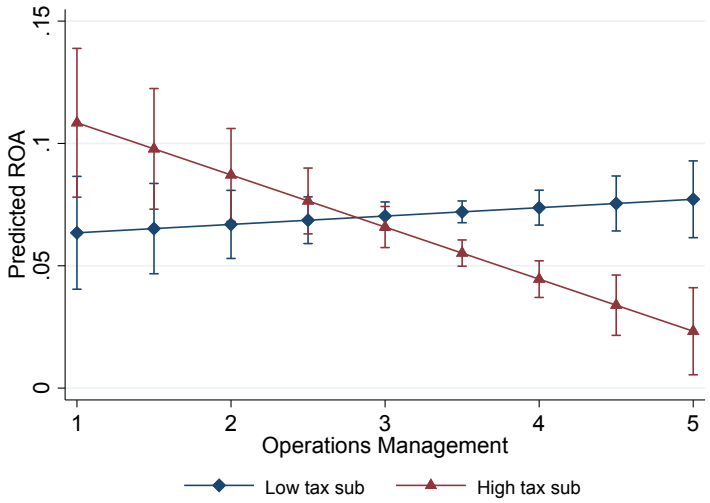


(b) Performance



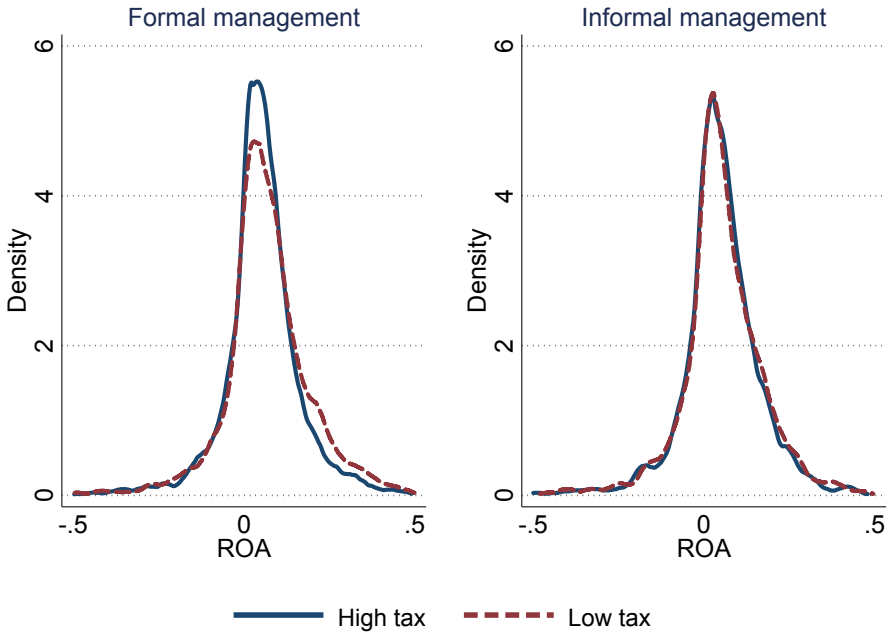
Note: Data from the World Management Survey and Orbis. Static sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. On the horizontal axis we have operations management, which is the average for the WMS operations management questions (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. Static 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 operations management score, 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.

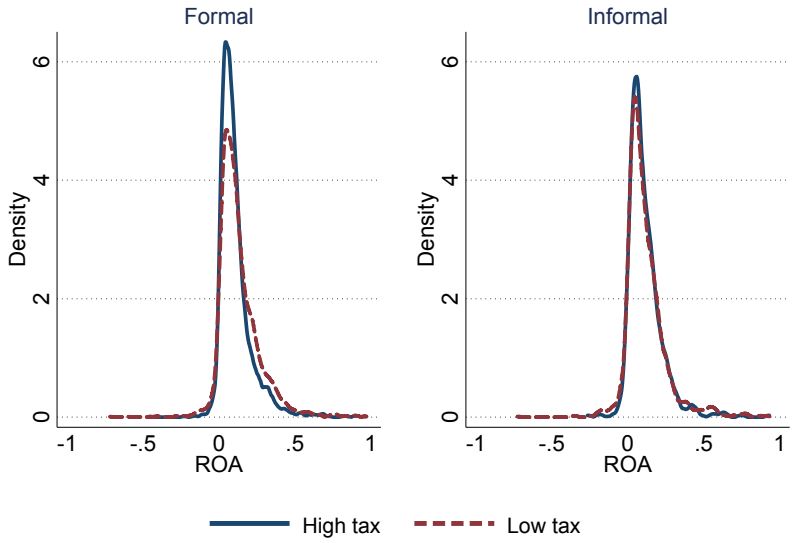
Figure 5: Bunching around zero ROA.



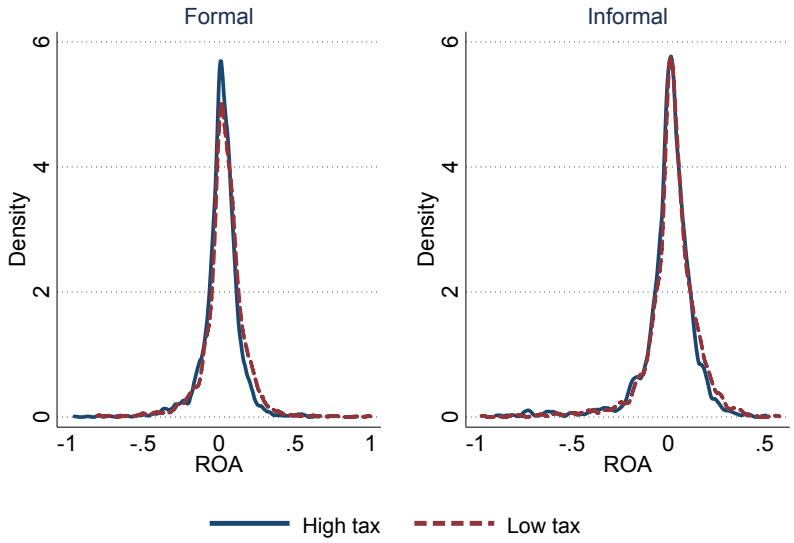
Note: Data from the World Management Survey and Orbis. Static sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. We plot the distribution of ROA, which is the ratio of profit and loss to total assets. ROA restricted between -0.5 and 0.5. formal management 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 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.

Figure 6: Bunching of ROA around zero for aggressive firms by management type

(a) Aggressive

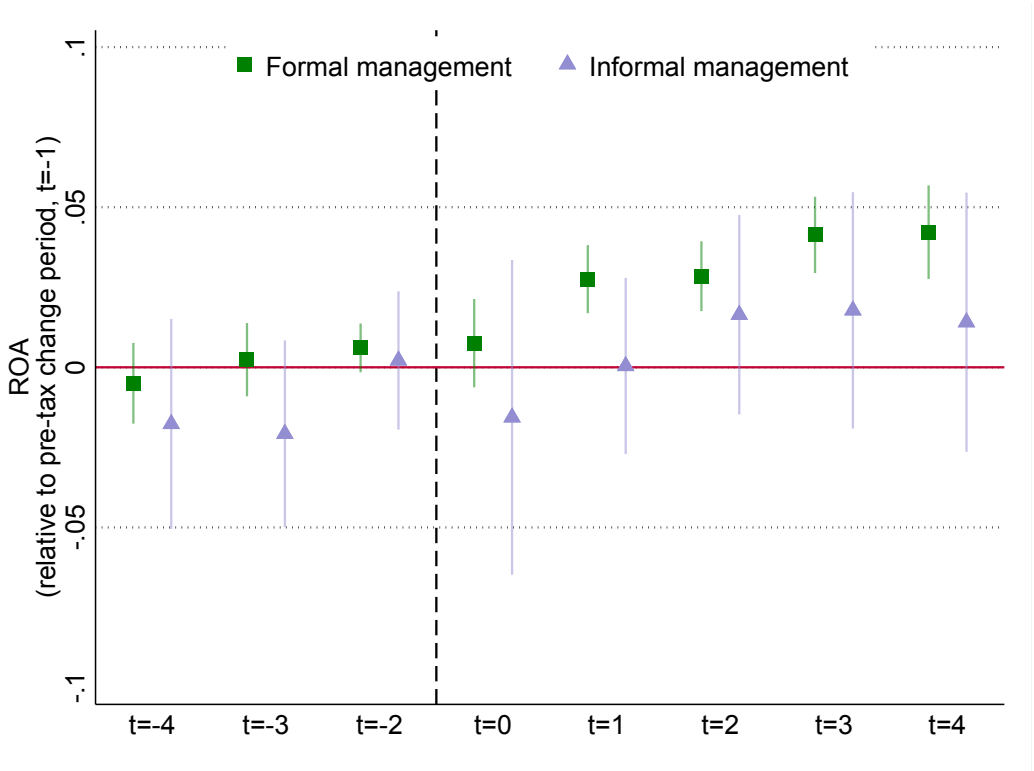


(b) Non-aggressive



Note: Data from the World Management Survey and Orbis. Static 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. formal management 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 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.

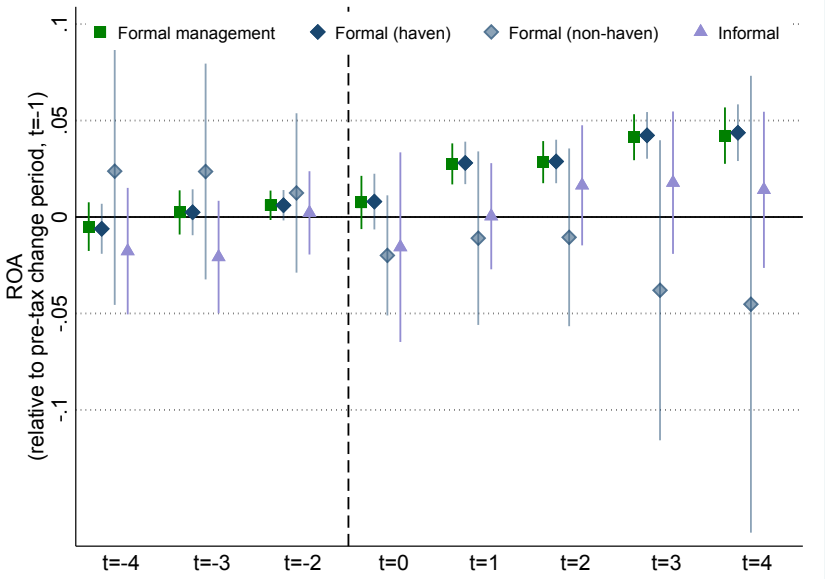
Figure 7: Event study: tax cuts and reported profits



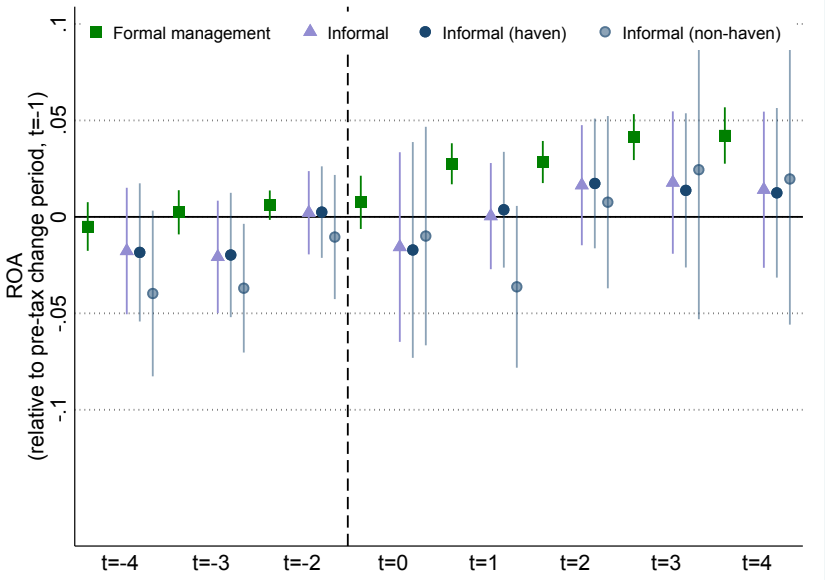
Note: In this figure we plot yearly coefficients from event study estimation. $ROA_{j,t} = \alpha + \sum_{\kappa=-5}^{5} \delta_t \mathbb{1}[t = \kappa] + X_{jt}^{'}\sigma_1 + \eta_t + \epsilon_{jt}$ where $ROA_{j,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-5}^{5} \mathbb{1}[t = \kappa]$ 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. $X_{jt}^{'}$ 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 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 management score below 3. Financial data comes from Orbis and management data from WMS.

Figure 8: Event study: tax cuts and reported profits

(a) Firms with subsidiaries or HQ in tax havens



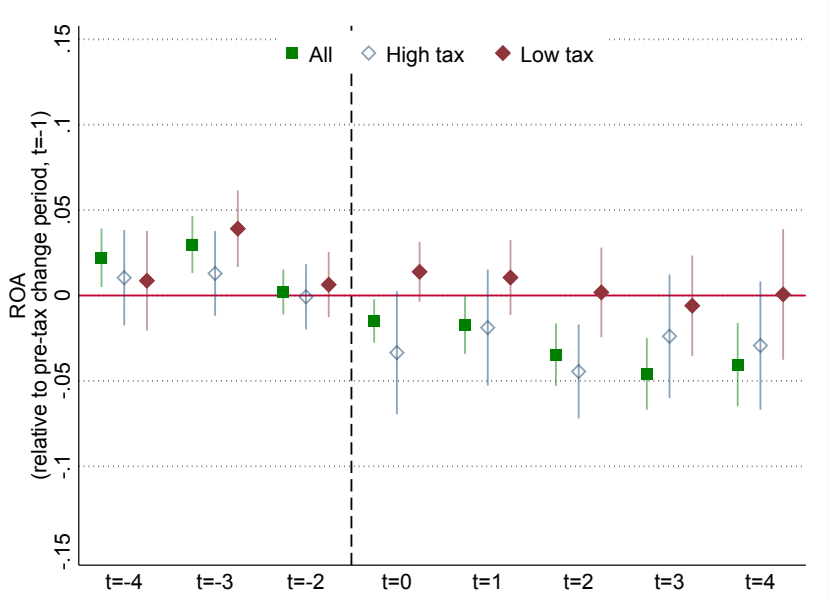
(b) Firms with no subsidiaries or HQ in tax havens



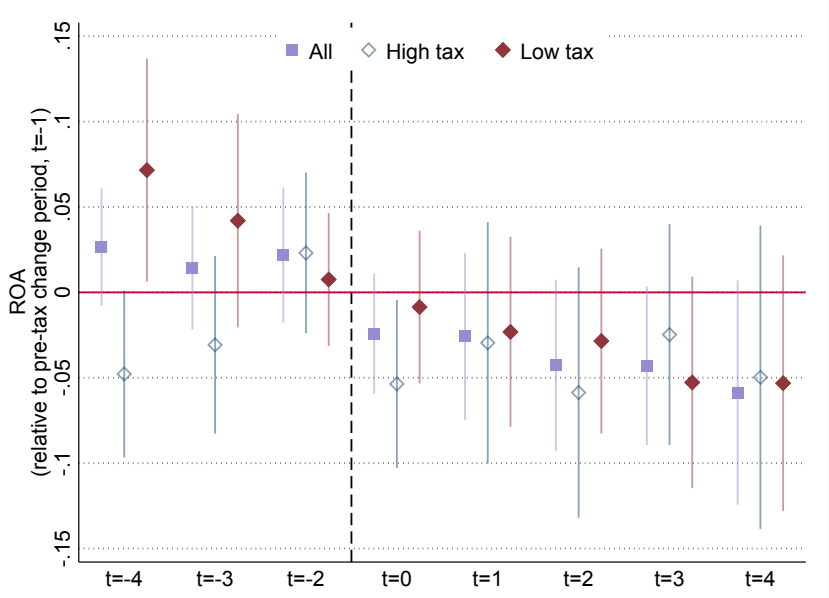
Note: In this figure we plot yearly coefficients from event study estimation. $ROA_{j,t} = \alpha + \sum_{\kappa=-5}^{5} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X'_{jt} + \eta_t + \epsilon_{jt}$ where $ROA_{i,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-5}^{5} \mathbb{1}[t = \kappa]$ 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. Diamonds represent firms with formal management that have operations in tax havens (i.e. "aggressive" behavior). Circles represent firms that have no operations in tax havens (i.e. "non-aggressive"). Financial data comes from Orbis and management data from WMS.

Figure 9: 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. $bunch_{j,t} = \alpha + \sum_{\kappa=-5}^{5} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X_{jt}^{'} + \eta_t + \epsilon_{jt}$ where $bunch_{j,t}$ is a dummy equal to 1 if ROA is withing the 0.005 of zero for firm j at time t. $\sum_{\kappa=-5}^{5} \mathbb{1}[t = \kappa]$ 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. $X_{jt}^{'}$ 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 square corresponds to the δ_t coefficients for all firms with formal management practices in place (Panel A) and informal (Panel B). Filled diamonds correspond to firms in low-tax countries, and hollow diamonds correspond to firms in high-tax countries. Financial data comes from Orbis, management data from WMS and the statutory corporate tax rates data comes from Oxford Centre for Business Taxation.

Appendices

Table A1: Summary of results, ETR

	(1) ETR	(2) ETR	(3) ETR	(4) ETR	(5) ETR
Formal management = 1	0.078	0.085	-0.218	-0.236*	-0.218
	(0.053)	(0.053)	(0.135)	(0.134)	(0.135)
Subsidiary corp tax rate	0.805***	0.824***	-0.149	-0.252	-0.149
	(0.165)	(0.165)	(0.388)	(0.389)	(0.389)
Formal management = 1	-0.354*	-0.368*	0.477	0.540	0.478
× Subsidiary corp tax rate	(0.191)	(0.191)	(0.414)	(0.415)	(0.417)
Ln(CFO compensation)				0.136***	
				(0.027)	
Ln(CEO compensation)					-0.000
					(0.024)
Country FE	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓
Firm controls		✓	✓	✓	✓
GUO controls		✓	✓	✓	✓
Observations	18624	18624	3947	3947	3947
# firms	1412	1412	276	276	276
ETR Mean	0.063	0.063	0.077	0.077	0.077
Sample	**Baseline**	**Baseline**	**Baseline Exec Comp**	**Baseline Exec Comp**	**Baseline Exec Comp**

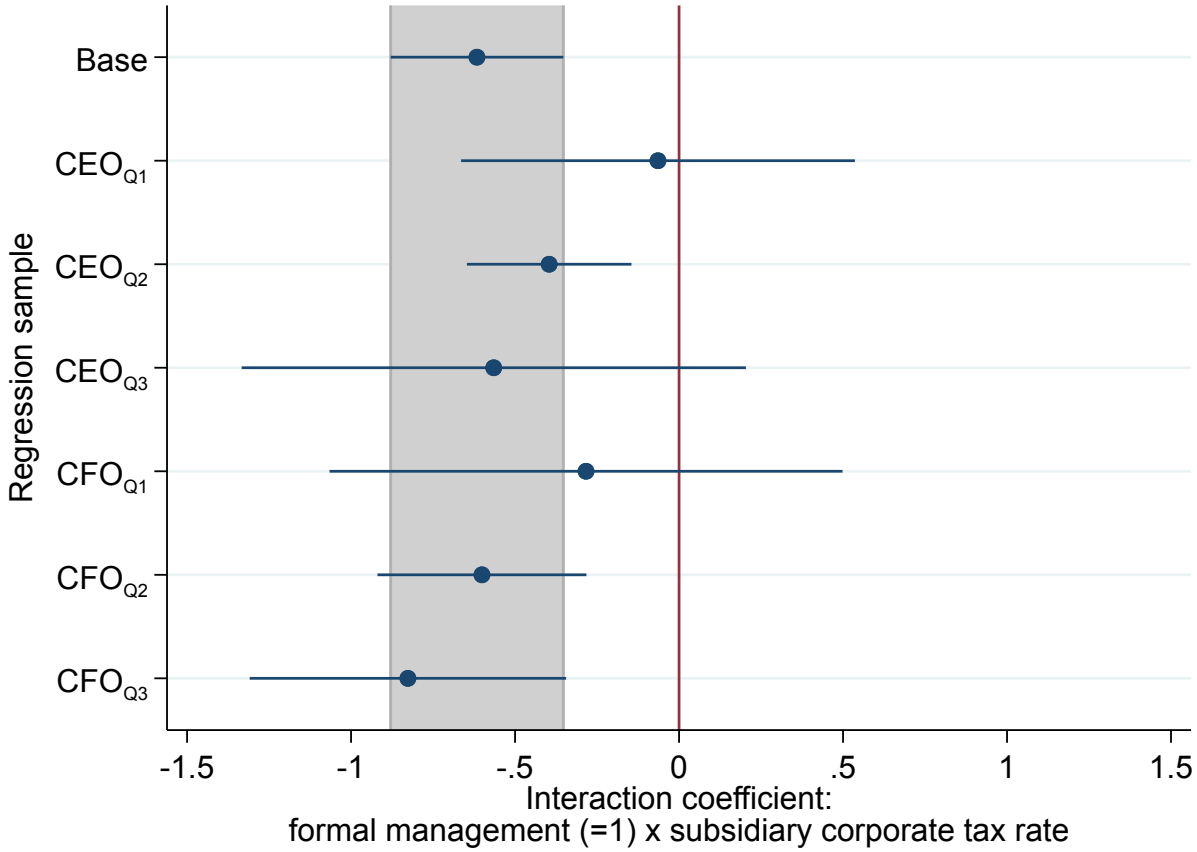
Note: Baseline sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. Extended sample includes all subsidiaries belonging to MNEs for which we observe at least one management score for a firm. Management data is then averaged across all firms within an MNE. Eventy study sample limits extended sample to only firms included in the event study. 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. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. GUO stands for global ultimate owner, which is the parent firm. The outcome variable in all columns is ETR (effective tax rate) which is the ratio of tax liability to profit and loss before taxes. Firm controls include log of employment and log of fixed assets. GUO controls include log of number of subsidiaries in the MNE. Standard errors are robust in columns 1-2 and 6 - 8, clustered at the country year level in column 5 and clustered at the firm level in columns 3-4.

Table A2: Summary of results, Bunching

	(1) Bunching	(2) Bunching	(3) Bunching	(4) Bunching	(5) Bunching	(6) Bunching	(7) Bunching
Formal management = 1	-0.128***	-0.128***	0.002	-0.204	-0.473***	-0.481***	-0.472***
	(0.038)	(0.037)	(0.018)	(0.157)	(0.100)	(0.100)	(0.100)
Subsidiary corp tax rate	-0.105	-0.208*	0.097*	-0.908*	-1.057***	-1.094***	-1.055***
	(0.124)	(0.124)	(0.055)	(0.511)	(0.325)	(0.327)	(0.325)
Formal management = 1	0.452***	0.454***	0.007	0.917*	1.499***	1.525***	1.486***
× Subsidiary corp tax rate	(0.137)	(0.136)	(0.060)	(0.534)	(0.345)	(0.346)	(0.345)
Ln(CFO compensation)						0.041**	
						(0.017)	
Ln(CEO compensation)							0.023
							(0.016)
Country FE	✓	✓	✓		✓	✓	✓
Year FE	✓	✓	✓		✓	✓	✓
Firm controls		✓	✓	✓	✓	✓	✓
GUO controls		✓	✓	✓	✓	✓	✓
Observations	19646	19646	400829	6864	4239	4239	4239
# firms	1438	1438	57926	474	282	282	282
Bunching Mean	0.058	0.058	0.038	0.063	0.069	0.069	0.069
Sample	**Baseline**	**Baseline**	**Extended Full**	**Baseline within GUO**	**Baseline Exec Comp**	**Baseline Exec Comp**	**Baseline Exec Comp**

Note: Baseline sample includes only firms that for which we observe management scores and were directly matched in both WMS and Orbis. 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. Eventy study sample limits extended sample to only firms included in the event study. 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. Subsidiary corp tax rate is the statutory corporate tax rate in the country where a firm is operating. GUO stands for global ultimate owner, which is the parent firm. The outcome variable in all columns is a dummy equal to 1 if ROA is within 0.05 of zero ROA (returns on assets) which is the ratio of profit and loss before taxes and total assets. Firm controls include log of employment and log of fixed assets. GUO controls include log of number of subsidiaries in the MNE. Standard errors are robust in columns 1-2 and 5 - 7, clustered at the country year level in column 4 and clustered at the firm level in column 3.

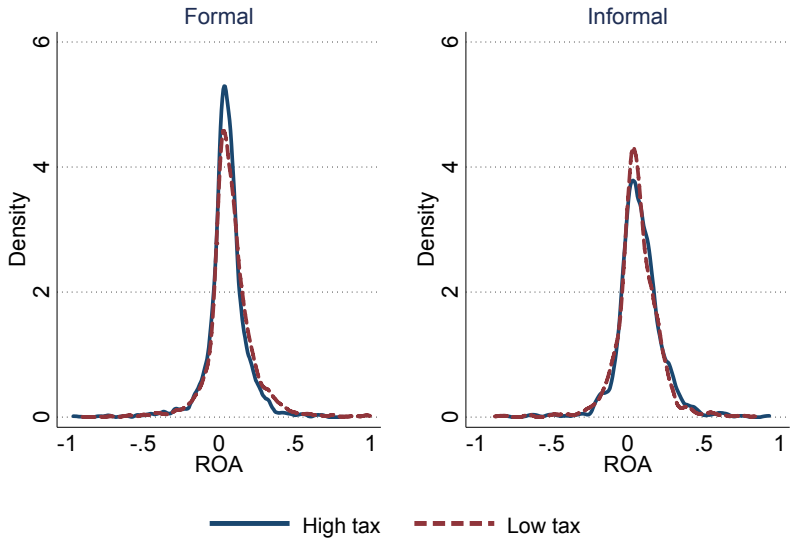
Figure A1: Comparison of interaction coefficient across terciles of CEO and CFO compensation



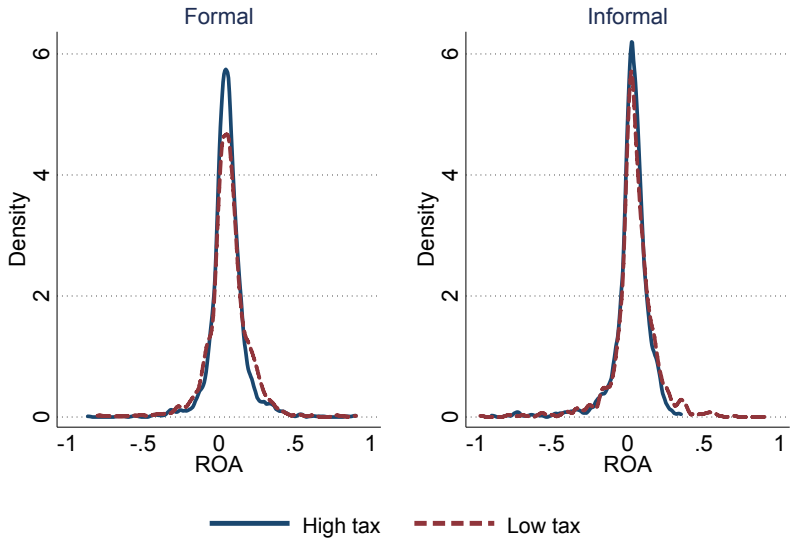
Note: This figure plots the coefficients of the interaction between structured management and the subsidiary corporate tax rate (specification from Column 3 of Table 3 for sub-samples of firms within each tercile of CEO and CFO quality.

Figure A2: Bunching of ROA around zero for firms in tax havens by management type

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



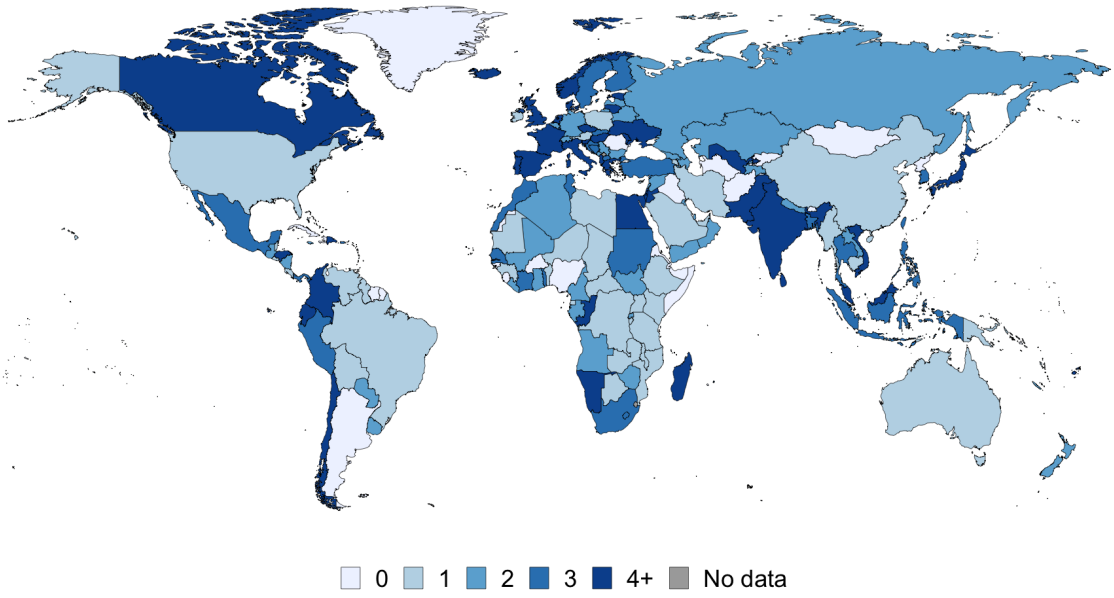
(b) Non-aggressive: no tax havens in ownership tree



Note: Data from the World Management Survey and Orbis. Static 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 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 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 1325 MNEs, 50.61% have at least one unit in a tax haven.

Figure A3: Number of corporate tax rates changes

(a) 2005-2018



(b) 2011-2017

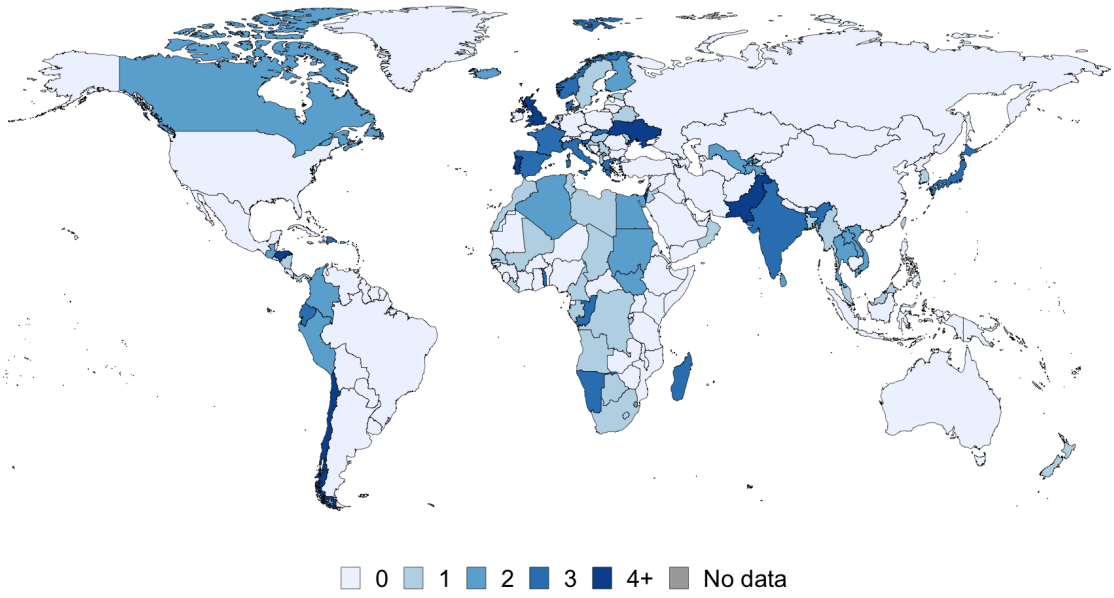
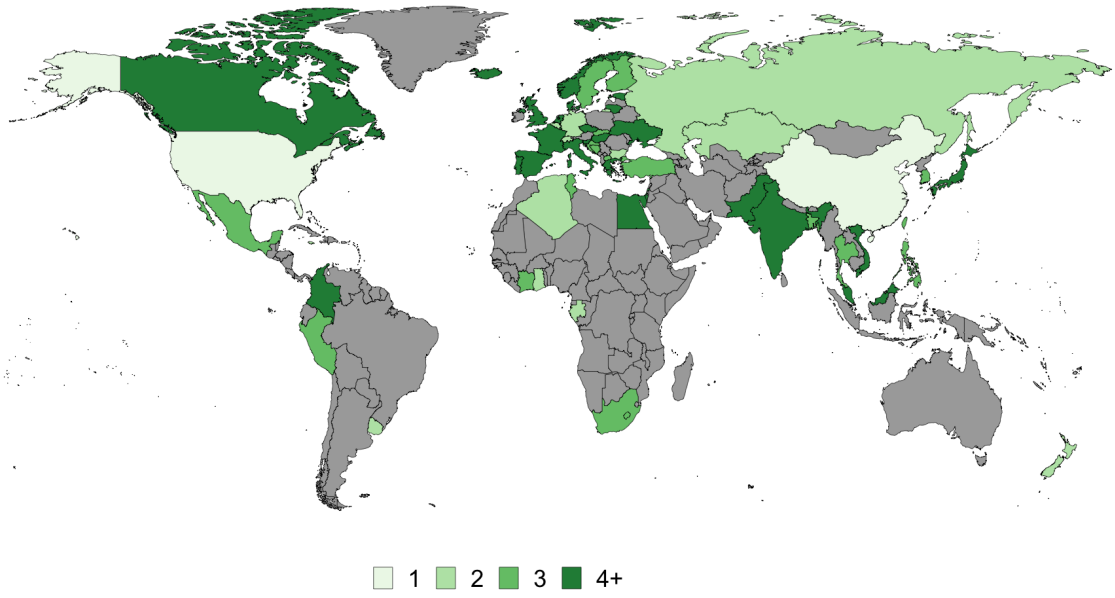


Figure A4: Sample coverage map: countries with at least one tax change in the extended sample

(a) Firms with structured management



(b) Firms with unstructured management

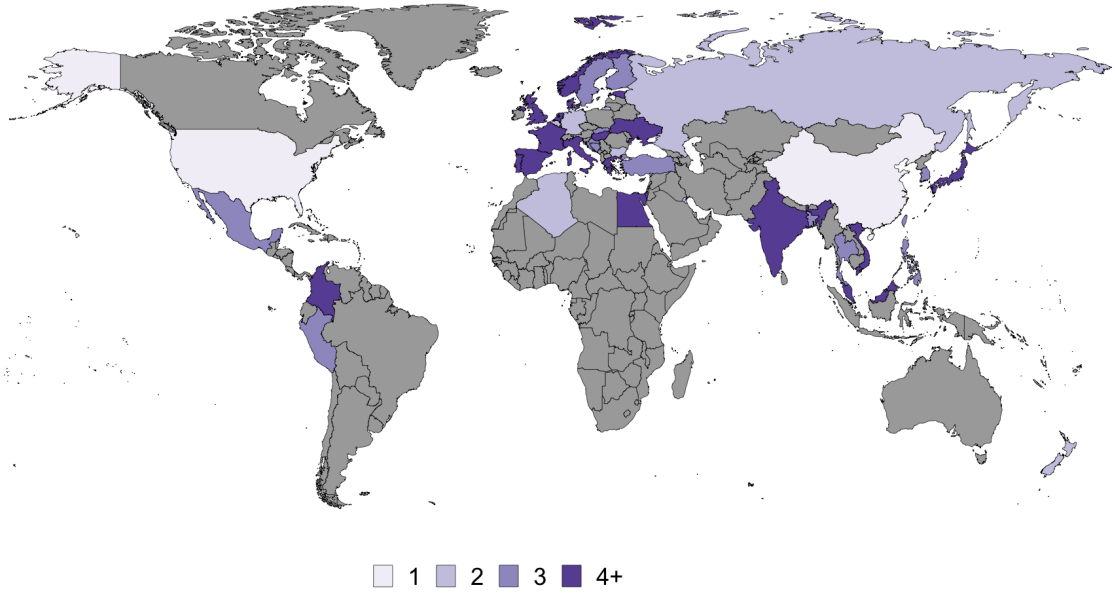
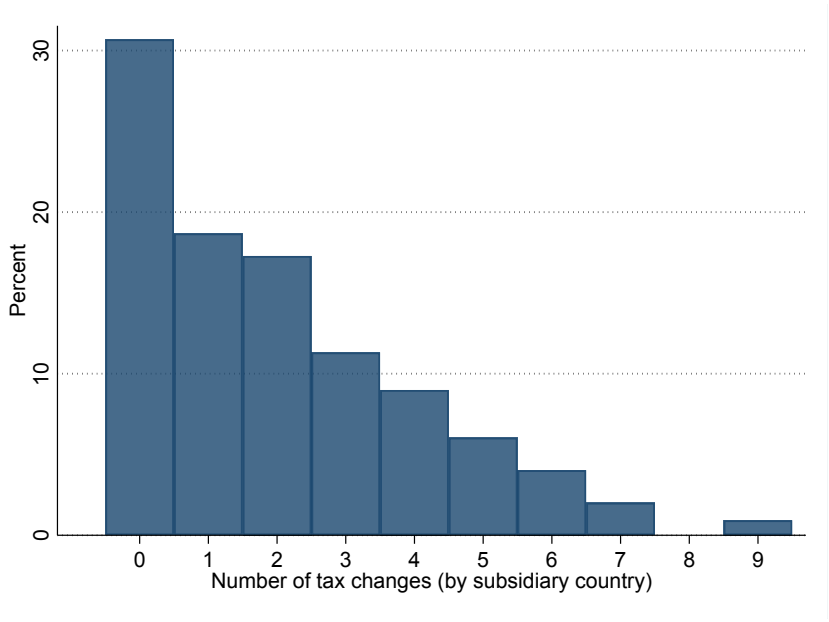
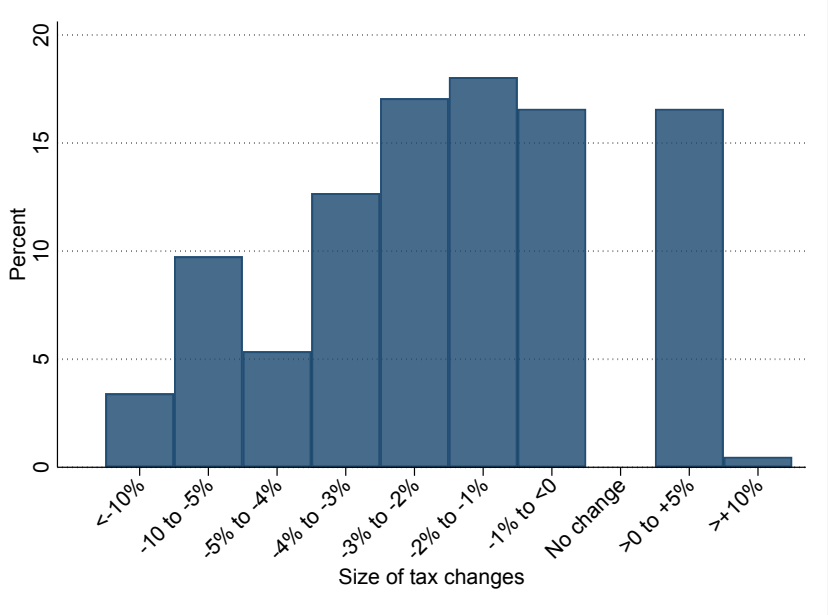


Figure A5: Number and scale of tax changes between 2004 and 2016



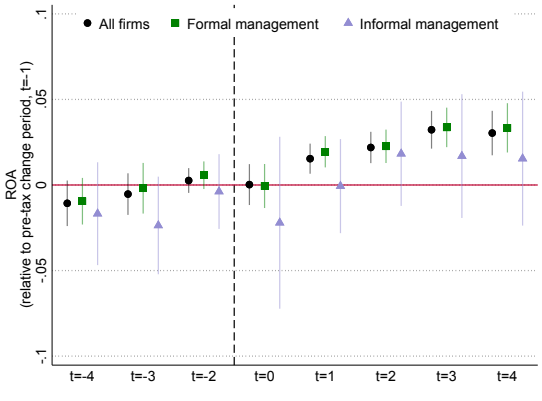
(a) Number of tax changes



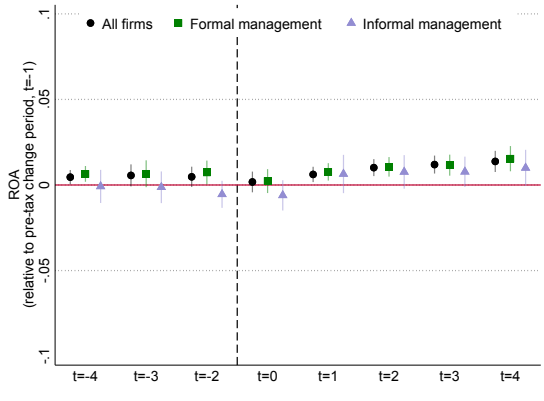
(b) Scale of tax changes

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.

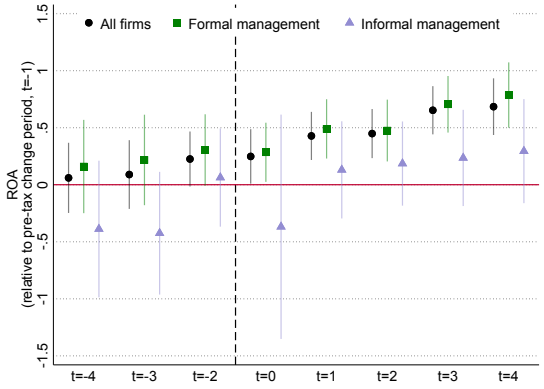
Figure A6: Event study sensitivity analysis



(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. $ROA_{j,t} = \alpha + \sum_{\kappa=-5}^{5} \delta_t \mathbb{1}[t = \kappa] + \sigma_1 X_{jt}^{'} + \eta_t + \epsilon_{jt}$ where $ROA_{j,t}$ is the return on assets for firm j at time t. $\sum_{\kappa=-5}^{5} \mathbb{1}[t = \kappa]$ 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. $X_{jt}^{'}$ 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.