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ABSTRACT

This study examines whether multinational corporations employ managers jointly at the headquarters and foreign subsidiaries (vertical manager interlocks) to facilitate tax planning by mitigating an internal principal-agent conflict. We utilize a cross-sectional dataset for European firms to demonstrate that vertical manager interlocks are more prevalent in multinational corporations with greater potential for tax-motivated profit shifting and implemented mainly in high-tax subsidiaries. A one standard deviation increase in the statutory tax rate volatility within a multinational corporation is associated with 1.2 percent more vertical manager interlocks, representing over 25 percent of the sample average. We reveal that applying vertical manager interlock structures results in a lower effective tax rate. Vertical manager interlocks are especially pertinent for profit shifting through transfer pricing rather than debt shifting. A one standard deviation increase in the usage of this structure is associated with a 1.2 percentage point reduction in the multinational corporation's ETR, corresponding to almost 5 percent of the average ETR.

Keywords: management structure, profit shifting, principal-agent-theory

JEL Classifications: H25, H26, M12

Data Availability: Data are available from the public sources cited in the text.

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I. INTRODUCTION

We analyze whether the internal management structure of multinational corporations is important for the implementation of tax avoidance strategies. More specifically, we examine the association between vertical manager interlocks (VMIs)—instances where a headquarters manager also holds a position in a subsidiary—and the corporate tax burden, and explore how this relationship varies across different tax planning channels.

Multinational corporations face several constraints when implementing tax avoidance strategies, some of which stem from the internal management structure.¹ In particular, effective tax planning requires high-quality internal information (Gallemore & Labro, 2015) as well as effective coordination and cooperation between headquarters and subsidiaries or among subsidiaries.² Internal principal-agent conflicts, i.e. conflicts between the incentives of headquarter and subsidiary managers (Scharfstein & Stein, 2000; Stein, 2003), can prevent multinational corporations from effectively implementing tax planning. Managers of high-tax subsidiaries may abstain from engaging in tax-motivated profit shifting or withhold information if such actions negatively affect their own compensation, career advancement, or local investment conditions (Fey and Furu, 2008; Feltham & Hofmann, 2012; Kohlhase & Wielhouwer, 2022). While tax avoidance increases after-tax profits at the group level, it potentially harms the subsidiary manager's local performance metrics.

Analytical models (e.g., Smith, 2002; Baldenius et al., 2004; Ortmann & Schindler, 2022) predict that such internal conflicts can materially reduce the efficiency of tax avoidance. In a one-book transfer pricing system—where internal prices affect both tax reporting and managerial

¹ In a global survey among Deloitte's lead client survey partners, 68 percent of the responding partners state that the parent company boards of their clients spend significant time in overseeing subsidiary boards, particularly those in foreign countries. One reason is differences in tax law (Deloitte, 2013).

² We test the robustness of our findings to including earnings announcement speed as well as restatements as a proxy for internal information quality (Gallemore & Labro, 2015) and find qualitatively similar inferences.

evaluation—the conflict is especially pronounced. If subsidiary managers are rewarded based on local EBIT or EBITDA, they may oppose central tax strategies that lower local profits, even when these strategies are optimal from the multinational corporation’s perspective. Moreover, information asymmetries exacerbate this problem: subsidiary managers often have superior information but can withhold it if sharing would put their unit at a disadvantage within the firm’s internal capital market (Stein, 2002; Amberger et al., 2021).

Prior empirical studies address various responses to these frictions. Performance-based pay can help align incentives (Phillips, 2003; Klassen & Valle Ruiz, 2022), and some firms centralize tax planning decisions to overcome agency conflicts (Kohlhase & Wielhouwer, 2022). However, centralized tax planning may create other issues, such as increased conflict with local tax authorities or coordination inefficiencies (Baersch et al., 2023). Additionally, internal information quality is difficult to monitor or mandate (Gallemore & Labro, 2015).

In this context, VMIs can offer a practical, less costly governance tool to mitigate internal conflicts. A VMI embeds a headquarters manager within the decision-making structure of the subsidiary, potentially improving both information flow (Wang et al., 2022) and incentive alignment. VMIs can enhance the transmission of strategic goals from headquarters, allow for better monitoring of local decision-making, and reduce the likelihood of information hoarding. According to Deloitte (2013), 65% of large multinational corporations utilize VMIs in some form³, and their usage is particularly common in settings where agency conflicts are severe or local control is difficult. Compared to centralization, VMIs may retain subsidiary flexibility while still reinforcing group-wide coordination. We therefore expect VMIs to be associated with more effective tax avoidance, especially in subsidiaries exposed to high statutory tax rates.

³ The interviews were conducted with Deloitte partners from Americas, EMEA and Asia-Pacific. Their clients are typically large multinational corporations with, on average, 90 subsidiaries (Deloitte, 2013).

We test these hypotheses using cross-sectional data from 6,567 European MNCs obtained via the AMADEUS database. The dataset includes 21,365 subsidiaries and 82,051 managerial positions. We identify VMIs based on job titles indicating a dual role at both headquarters and subsidiary level, focusing on tax-relevant managerial functions. In our sample, 23% of all MNCs and 68% of listed multinational corporations employ at least one VMI, suggesting widespread adoption of this governance structure.

Our empirical analysis yields three key findings. First, VMIs are significantly more prevalent among multinational corporations with greater potential for tax-motivated profit shifting, as proxied by statutory tax rate differentials within the firm. A one standard deviation increase in tax rate dispersion is associated with a 1.2 percentage point increase in the VMI share—representing more than 25% of the sample mean. VMIs are especially common in high-tax subsidiaries, consistent with the idea that these units pose greater internal frictions to tax planning.

Second, multinational corporations with a higher proportion of VMIs have significantly lower GAAP ETRs. A one standard deviation increase in the average VMI share is associated with a 0.71 percentage point reduction in the GAAP ETR. This effect is nearly twice as large for VMIs located in high-tax subsidiaries, reinforcing our argument that VMIs are particularly valuable where agency frictions are strongest.

Third, VMIs improve tax outcomes through the transfer pricing channel, but not through debt shifting. This pattern aligns with theoretical predictions by Ortmann & Schindler (2022), who argue that internal agency conflicts primarily distort transfer pricing decisions—where subsidiary-level performance and incentives are directly affected—but are less relevant for decisions like debt allocation, which typically lie outside the scope of local managerial control.

Our study is closely related to Wang et al. (2022), who find that VMIs reduce tax burdens in a sample of Chinese firms. However, their results are not directly transferable to our setting due

to important contextual differences. First, 80 percent of Wang et al. (2022) sample firms are purely domestic. Hence, they rather examine to what extent VMIs help Chinese firms to exploit tax advantages in their local market than analyze cross-border profit shifting of multinational corporations. According to Delis et al. (2021), corporate governance implications for domestic tax planning will likely be different from those for cross-border profit shifting. Second, more than 40 percent of their observations relate to state-owned firms, which may be subject to special governance frameworks. Third, Chen & Yang (2021) argue that the motives for using VMIs in China may differ from those in other countries. Since large state-owned enterprises or private enterprise groups cannot be directly listed on the Chinese stock market, listing parts of these business groups is common practice. In many of these cases, the unlisted parent companies send executives or directors to the management boards of the listed entities to assert their interests against minority shareholders. In contrast, our European sample captures VMIs in an environment with stronger investor protection and different institutional incentives.

This paper makes three main contributions. First, it adds to the emerging literature on internal agency conflicts by providing empirical evidence that VMIs—an underexplored organizational solution—can mitigate such frictions and improve tax planning outcomes. Second, we position VMIs as a viable alternative to performance-based contracts or centralized control, offering a middle ground that balances monitoring and flexibility. Unlike centralization, VMIs do not appear to increase tax disputes, and unlike incentive contracts, they avoid complexity and implementation difficulties. Third, we contribute to the literature on managerial networks by showing that internal managerial ties—within the same firm—can facilitate knowledge sharing and strategic alignment. While our results focus on tax planning, the underlying mechanisms likely apply to other areas requiring inter-unit coordination.

The remainder of this paper is organized as follows. Section 2 provides a summary of previous research and derives our main hypotheses. Sections 3 and 4 outline the econometric design and utilized dataset. In Section 5, we present the empirical results. The paper concludes in Section 6.

II. THEORETICAL BACKGROUND AND HYPOTHESES

Internal agency conflict, possible countermeasures, and corporate tax avoidance

Agency conflicts can arise at two different levels within the multinational corporation: (1) a top-level conflict between headquarters management and shareholders, and (2) an internal conflict between headquarter's management and subsidiary management (Vaysman, 1996; Scharfstein & Stein, 2000; Amberger et al., 2021).⁴ Both types of conflicts can influence the extent to which MNCs engage in tax avoidance. The top-level agency conflict concerns the overall incentives of executives to pursue tax planning strategies that benefit shareholders, while the internal conflict affects the implementation of these strategies across organizational units.

The top-level agency conflict may occur when potential personal costs of tax avoidance, such as penalties or reputational risks, are not offset by sufficient compensation (Chen & Chu, 2005; Crocker & Slemrod, 2005). In some cases, firms may intentionally under-incentivize tax avoidance to not enable rent extraction by executives (Desai & Dharmapala, 2009; Jacob et al., 2021).⁵

The internal agency conflict, by contrast, arises during the implementation of tax planning strategies, particularly when these rely on coordination between headquarters and foreign subsidiaries. This misalignment occurs when subsidiary managers' objectives diverge from group-

⁴ Other studies focus, e.g., on the effect of a principal-agent conflict on optimal team size (Duerr et al., 2020). While this is closely related, we abstain from drawing conclusions for this stream of literature.

⁵ Other studies show that more disclosure of tax-relevant information (Luo et al., 2023), increasing the power of the board (Li et al., 2022), and the introduction of M&A laws (Hu et al., 2021) mitigate the agency conflict.

level tax goals (e.g., Vaysman, 1996; Smith, 2002; Baldenius et al, 2004; Ortmann & Schindler, 2022)—either due to incentive design or informational asymmetries. This misalignment affects tax planning primarily through two channels:

First, through *incentive misalignment*. In many multinational corporations, internal transfer prices not only determine taxable income but also influence performance evaluation at the subsidiary level—particularly in a one-book system, where the same transfer prices are used for both tax reporting and managerial accounting (Reineke et al., 2022). Shifting profits from a high-tax subsidiary to a low-tax affiliate increases group-level after-tax profit but simultaneously reduces the reported profitability of the high-tax unit. If local managers' compensation, budget authority, or promotion prospects are tied to these performance measures, they may oppose such profit shifting (Baldenius et al., 2004). Even when managers are unable to oppose such strategies, they may reduce their effort or commitment to the implementation of tax strategies that negatively affect their local metrics (Ortmann & Schindler, 2022).

Second, through *information asymmetries*. Successful tax planning depends on access to timely, granular, and high-quality information from various business units. This information is often concentrated at the subsidiary level (Gallemore & Labro, 2015). Subsidiary managers typically have superior knowledge of local market conditions, transactional structures, and regulatory environments (Kohlhase & Wielhouwer, 2022). However, if revealing such information is perceived to weaken the manager's position in the firm's internal capital market—for example, by exposing underperformance or reducing the bargaining power of the unit—managers may withhold or selectively disclose information (Jensen & Meckling, 1976; Stein, 2002; Hoenen & Kostova, 2015; Kostova et al., 2018; Amberger et al., 2021). These behaviors can prevent headquarters from identifying or executing viable tax planning strategies.

A few recent empirical studies provide support for the relevance of these frictions. Gallemore & Labro (2015) document a link between internal information quality and lower effective tax rates, though they do not analyze the organizational sources of such quality. Kohlhase & Wielhouwer (2022) provide a more direct test and find that multinational corporations centralize tax planning decisions when information asymmetries are high but rely on decentralized structures when internal agency conflicts dominate. Similarly, Klassen & Valle Ruiz (2022) show that when internal transfer pricing policies change but incentive systems remain unchanged, managers adjust reported subsidiary profits in ways that favor their personal objectives.

Multinational corporations have several options to address these internal coordination problems. One approach is to centralize transfer pricing decisions, thereby bypassing local managerial opposition (Baldenius et al., 2004; Blouin et al., 2018; Kohlhase & Wielhouwer, 2022).⁶ However, centralization can reduce flexibility, increase local disputes with tax authorities, and generate coordination burdens (Baersch et al., 2023), and does not solve the problem of subsidiary managers withholding superior information (Kohlhase & Wielhouwer, 2022). A second option is to implement a two-book system, where transfer prices are decoupled for tax and managerial purposes (Baldenius et al., 2004). However, several studies highlight the costs of having two sets of books, for example, because it does not allow for a strategic use of the observable transfer price (Duerr & Goex, 2011) and may make tax authorities suspicious (Baldenius et al., 2004; Nielsen and Raimondos-Møller, 2012).⁷ Using two sets of books may even be illegal in some countries (Nielsen et al., 2008). Thus, it is not surprising that about 80 percent of multinational corporations use a single-book transfer pricing system, as shown by surveys conducted by EY

⁶ The delegation of transfer pricing decisions increases with lower tax rate differentials (Chen et al., 2015) and when internal coordination conflicts are absent (Baersch et al., 2023).

⁷ This relationship should, at least, hold when the firm operates in a market with a small number of competitors and uniform products.

(2003) and Baersch et al. (2002). A third approach is to adjust subsidiary-level compensation, for example by linking rewards to group-level outcomes or flexibly modifying bonus schemes to reflect central tax planning decisions (Roth & O'Donnell, 1996; Oxley & Pandher, 2016; Klassen & Valle Ruiz, 2022; Ortmann & Schindler, 2022).⁸ However, these contracts are often too complex or rigid for practical use (Baiman, 1990; Fey & Furu, 2008).

Vertical manager interlocks and corporate tax avoidance

As an alternative to these approaches, we consider vertical manager interlocks (VMIs)—a structural governance mechanism whereby a manager from headquarters also holds a formal managerial position in a subsidiary of the same multinational corporation. VMIs are widely used in practice: 65 percent of multinational clients surveyed by Deloitte (2013) report using VMIs in some form. In contrast to horizontal interlocks across independent firms—which may raise antitrust concerns—VMIs within the same corporate group are generally unregulated and legally permissible (Thepot et al., 2016; Deloitte, 2016). VMIs are especially prevalent in emerging markets like China, where they are used to maintain control over listed subsidiaries (Chen & Yang, 2021), but their adoption is also common in developed economies.

We expect VMIs to mitigate internal agency conflicts through two key mechanisms. First, they align incentives by installing a headquarters-affiliated individual within the subsidiary's management team—someone whose compensation and decision rights are more closely tied to group-level outcomes. Second, they improve internal information flows, since the interlocked manager serves as a conduit for transmitting information between levels of the organization. Compared to centralization or complex compensation contracts, VMIs may offer a lower-cost solution that preserves flexibility while still enhancing control. While VMIs are not without

⁸ In that case, the relative importance of global over local performance measures should increase with the level of decision-making authority (Wulf, 2007).

downsides—including travel costs, coordination burdens, and potential cultural frictions—they may offer a more efficient trade-off between centralized control and subsidiary autonomy.

We posit that if VMIs are motivated—at least in part—by tax planning considerations, they should be more prevalent in settings where profit shifting potential is high and agency frictions are likely to arise. Specifically, we expect them to occur more frequently in multinational corporations with greater intra-group tax rate differentials and in high-tax subsidiaries, where resistance to profit shifting is most acute.

***H1:** Vertical manager interlocks are more likely in multinational corporations with a greater potential for profit shifting and foreign subsidiaries with a high statutory tax rate.*

If VMIs are effective in mitigating internal agency conflicts, they should also be associated with improved tax outcomes, particularly when applied to high-friction settings. However, the existence of VMIs does not guarantee success. Interlocks may be formalities, or managers may lack sufficient time, influence, or capacity to meaningfully affect tax planning. Moreover, VMIs installed in low-tax subsidiaries—where local managers already benefit from incoming profits—may offer less marginal value.

***H2:** Multinational corporations with a high share of vertical manager interlocks have, ceteris paribus, a lower GAAP ETR. This relationship is stronger when vertical manager interlocks are implemented in high-tax subsidiaries.*

Finally, we expect the effectiveness of VMIs to differ by tax planning channel. Profit shifting via transfer pricing or licensing requires detailed subsidiary-level engagement and often directly affects internal performance measures. By contrast, debt shifting decisions are typically centralized and not subject to the same local incentive dynamics. Analytical work by Ortmann & Schindler (2022), supported by empirical evidence (Heckemeyer & Overesch, 2017), suggests that agency frictions are more relevant for intangible-related profit shifting than for debt-based

strategies. Accordingly, we expect VMIs to be particularly relevant for transfer pricing, but not necessarily for debt allocation.

***H3:** The use of vertical manager interlocks enhances the effectiveness of profit shifting via transfer pricing and has an ambiguous effect on debt shifting.*

III. EMPIRICAL IDENTIFICATION

We begin our empirical analysis by examining whether multinational corporations install VMIs for tax-motivated purposes. According to Hypothesis 1, this should be the case if VMIs are more prevalent in multinational corporations with greater potential for tax-motivated profit shifting. We estimate the following specification using financial and managerial data aggregated at the level of each multinational corporation j .

$$Avg_VMI_j = \beta_0 + \beta_1 tap_j + \beta_2 \Phi_j + \beta_3 \eta_j + \varepsilon_j \quad (1)$$

Our dependent variable, Avg_VMI_j , captures the extent to which multinational corporation j installs VMIs for managing its subsidiaries. It is calculated as the group-wide average share of VMIs in total managers per subsidiary. The explanatory variable of main interest is tap_j , which reflects the multinational's potential for profit shifting. We follow prior studies and use the standard deviation of statutory tax rates or the difference between the minimum and maximum statutory tax rate within the multinational corporation to evaluate profit shifting potential (Moen et al., 2011). According to Hypothesis 1, we expect a positive association between VMI usage and profit shifting potential and hence a positive coefficient for tap_j . We include a comprehensive set of firm-specific controls (Φ_j) in order to control for other determinants of tax planning such as the debt-to-asset ratio ($DebtRatio_j$), intangible asset intensity (Int_j), firm size and employees ($FixedAssets_j$ and $Employees_j$) as well as the international dispersion of the multinational corporation ($No_Countries_j$ and $No_Subsidiaries_j$). In addition, we control for industry-specific heterogeneity and firm fixed effects (η_j).

Equation (1) may be biased by unobservable characteristics at the multinational corporation level. To address this concern, we estimate an alternative specification (Equation (2)) that examines the allocation of VMIs across subsidiaries within a multinational. This allows us to assess whether VMIs are more frequently assigned to those subsidiaries where profit shifting frictions are expected to be most severe—i.e., high-tax jurisdictions.

$$Scaled_VMI_i = \beta_0 + \beta_1 hightax_i + \beta_2 \Psi_i + \beta_3 x_c + \beta_4 \lambda_{cj} + \beta_5 \gamma_j + \varepsilon_i \quad (2)$$

We use the subsidiary-level share of vertical manager interlocks (*Scaled_VMI_i*) as the dependent variable. It is defined as the number of VMIs employed by subsidiary *i* scaled by the total number of managers of that subsidiary. We test Hypothesis 1 by including *hightax_i*, a binary variable that indicates whether the statutory tax rate of subsidiary *i* is above the group-wide asset-weighted average of statutory tax rates. In additional tests, we refer directly to the tax rate differential as a continuous variable. Hypothesis 1 predicts a positive coefficient for β_1 .

Variation in *hightax_i* can either stem from the average tax rate of the multinational corporation or the subsidiary's tax rate. Consequently, including both firm and subsidiary country fixed effects simultaneously is not feasible. In our main specification, we include firm fixed effects (γ_j) and a comprehensive set of subsidiary-level (Ψ_i), subsidiary country-level (x_c), and firm-subsidiary country-level (λ_{cj}) controls (a full list can be found in Tables 1 and 2). We test the robustness of our findings by using subsidiary country and firm industry fixed effects (instead of subsidiary country-level controls) and firm-level controls (instead of firm fixed effects) in alternative specifications.

Hypotheses 2 and 3 relate to the effectiveness of VMI structures in alleviating tax avoidance. Again, we test these hypotheses using data aggregated at the multinational corporation level (Hypothesis 2) and data at the subsidiary level (Hypothesis 3). We estimate Equation (3) in order to test Hypothesis 2.

$$ETR_j = \beta_0 + \beta_1 Avg_VMI_j + \beta_2 \Phi_j + \beta_3 \eta_j + \varepsilon_j \quad (3)$$

The dependent variable, ETR_j , is defined as the one-year or three-year GAAP effective tax rate of multinational j . This measure serves as our proxy for tax avoidance effectiveness. The primary independent variable is Avg_VMI_j , the group-wide share of vertical manager interlocks. Hypothesis 2 predicts that more intense use of VMIs is associated with lower effective tax rates and, thus, a negative coefficient for β_1 . We estimate additional specifications and differentiate between VMIs in high-tax and low-tax subsidiaries. This allows us to investigate to what extent the relevance of an internal agency conflict for multinational corporations' tax avoidance is indeed confined to high-tax subsidiaries.

The cross-sectional nature of our data prevents us from incorporating firm fixed effects. We, therefore, apply, again, a comprehensive set of firm-specific controls (Φ_j), including the debt-to-asset ratio, the intensity of intangible fixed assets, and various variables that control for the size and use of production factors as well as the profitability of the multinational corporation.⁹ Since GAAP ETRs depend largely on the location of foreign subsidiaries and applicable statutory tax rates, we control for the asset-weighted average of statutory tax rates per multinational corporation. Additionally, we include industry fixed effects (η_j). A full list of control variables is provided in Table 1, and descriptives are presented in Table 3. To address remaining concerns that our estimates may be biased through unobserved characteristics of the multinational corporation, we re-estimate Equation (3) based on matched samples of multinational corporations as a robustness test.

We test the effectiveness of VMI usage for improving tax planning also based on subsidiary-level data. Since multinational corporations apply conforming and non-conforming tax avoidance, we do not refer to subsidiary-level effective tax rates but rather investigate the use of two specific profit-shifting channels: transfer pricing and debt finance. This additional analysis has

⁹ Again, all of these MNC specific variables are included in terms of their natural logarithm.

two particular advantages over the preceding examination of Hypothesis 2. First, we are able to analyze the implications of VMI usage for the effectiveness of multinational corporations' tax planning while controlling for (observable and unobservable) multinational corporation characteristics via fixed effects. Second, it allows us to test the analytical prediction by Ortmann & Schindler (2022) that the internal agency conflict is particularly relevant for the transfer pricing channel of profit shifting (instead of the debt shifting channel; see Hypothesis 3).

Hypothesis 3 is tested based on the following regression model.

$$\lambda_i = \beta_0 + \beta_1 C_i + \beta_2 Scaled_VMI_i + \beta_3 C_i * Scaled_VMI_i + \beta_4 \Psi_i + \beta_5 x_c + \beta_6 \gamma_j + \varepsilon_i \quad (4)$$

Following De Simone et al. (2017) and Huizinga et al. (2016), we use the natural logarithm of return on assets (EBIT divided by total assets, Ln_ROA_i) and the debt-to-asset ratio (total debt divided by total assets, $DebtRatio_i$) as our dependent variable (λ_i), respectively. Following Huizinga & Laeven (2008) and Huizinga et al. (2016), C_i represents the capital-weighted differential tax rate of the subsidiary relative to all other subsidiaries of the multinational corporation. Positive values of C_i imply that multinational corporations have an incentive to shift profits out of country i . To test Hypothesis 3, we include $Scaled_VMI_i$ as well as the interaction of C_i and $Scaled_VMI_i$. Following Schindler & Ortmann (2022), we expect a negative and statistically significant coefficient for this interaction if return on assets is used as the dependent variable and no similar effect for the debt-to-asset ratio. In line with De Simone et al. (2017) and Huizinga et al. (2016), we include subsidiary- (Ψ_i) and country-level controls (x_c) as well as firm fixed effects (γ_j).

IV. DATA

Database and Sample Selection

We base our analysis on management, shareholder, and unconsolidated financial information obtained from the AMADEUS database for the headquarters and 21,365 foreign European subsidiaries of 6,567 multinational corporations. The dataset provides standardized

financial statements in AMADEUS format for the period 2010 to 2014. In addition, we use detailed manager-level data provided separately for each headquarters and subsidiary, including a unique manager identifier, the job description, and the standardized level of decision-making power. This information is provided in our dataset only for the year 2014. Finally, we rely on AMADEUS ownership data to match multinational headquarters with their European subsidiaries based on ultimate ownership links.

We use this information to construct two unique datasets. For our subsidiary-level analysis (sample 1), we refer directly to the subsidiary-level information for all European subsidiaries that are held (directly or indirectly) to at least 50 percent by a foreign headquarter. We restrict our sample to active firms and firms in the legal form of a private or public limited company. We exclude financial and insurance companies and companies with an unknown industry, as these firms may be subject to industry-specific tax or accounting regulations. We also drop subsidiaries with insufficient financial or management information. Summary statistics for the resulting sample, which is used for estimating Equations (2) and (4)¹⁰, are reported in Table 2 in the Appendix.

Sample 2, used to test Hypotheses 1 and 2, results from a similar selection process but consists of data aggregated at the level of the multinational corporation. To this end, we select all (domestic and foreign) subsidiaries with the required financial, industry, and management information. We then aggregate accounting information multinational corporation-wise at the level of the headquarter (i.e., the ultimate parent company). Finally, we drop multinational corporations with a negative tax expense or negative EBIT. Again, summary statistics for the resulting sample can be found in Table 3 in the Appendix.

¹⁰ For estimating Equations (4), we only consider MNCs with at least five (domestic or foreign) subsidiaries.

Construction of the VMI variable

Scaled_VMI_i and *Avg_VMI_j* are determined according to the following four-step procedure. In a first step, we collect all headquarter managers with their unique identifiers for each multinational corporation in our sample. In the second step, we identify all relevant managers of each foreign subsidiary for these multinational corporations. We only consider managers with positions broadly related to tax issues based on the AMADEUS variable *dmctypeofposition*.¹¹ We further require relevant managers to hold a position with a reasonable decision-making power in the subsidiary, which we assume for C-level employees as well as employees with a higher management position (Deloitte, 2016).¹² In step three, we match the two sets of managers in order to identify vertical manager interlocks within multinational corporations. Lastly, we determine *Scaled_VMI_i* by scaling the number of VMIs by the overall number of relevant managers per foreign subsidiary. *Avg_VMI_j* is then calculated for each multinational corporation as the group-wide average of *Scaled_VMI_i*.

V. EMPIRICAL RESULTS

The use of VMIs by European multinational corporations

Empirical evidence for the use of VMIs by European multinationals is scarce. Therefore, we begin our empirical analysis with descriptives on the use of this management structure in our data (Table 4). Overall, 23.21 percent of multinational corporations in our sample use this

¹¹ We assume this to be the case for the following management positions and department associations: Administrative Department, Advisory Board, Branch Officer, Executive Board, Executive Committee (Board), Finance and Accounting, Proxy, Senior Manager, and Sales.

¹² Bureau van Dijk uses a four dimensional scale to identify the decision making power of an employee. Level 1 refers to C-level employees, level 2 indicates executives and higher management, level 3 represents managers and level 4 corresponds to employees of the respective department. Hence we are using level 1 and level 2 managers for our analysis. Due to national regulations the number of board members varies extensively within Europe. Some countries enact a mandatory two-tier board structure, e.g. Austria, while others such as Spain oblige to adopt a single-tier board and lastly in countries like France and Italy companies may generally adopt either structure (Gerner-Beuerle and Schuster 2014). We, therefore, exclude managers whose job description indicates working as a Member of the Board or as Supervisory Board Members of the subsidiary.

management structure and have implemented in their subsidiaries at least one VMI. The prevalence is thus somewhat smaller than that observed by Wang et al. (2022) in a similar analysis for Chinese firms (36.4 percent) and that reported in a global survey by Deloitte (2013) for large MNCs (65 percent). However, it clearly underlines the practical relevance of this management structure.

Multinational corporations with at least one VMI typically use this structure multiple times. On average, each of these multinational corporations operates VMIs in 1.8 different subsidiaries, with a maximum number of 5. VMI usage is considerably more prevalent for publicly-listed multinational corporations, multinational corporations with more subsidiaries, and large multinational corporations (> € 750m in sales).

Motives for the use of VMIs

VMIs can help headquarters assert their economic interests in foreign affiliates by improving knowledge sharing within multinational corporations and solving internal agency problems that may arise when the preferences of headquarters and subsidiary managers are not perfectly aligned. These benefits of VMIs are not limited to tax issues. We, therefore, first examine whether the use of VMIs is (partly) motivated by tax considerations. As we cannot directly observe managers' goals and motives, we take an indirect approach and analyze whether the use of VMIs correlates positively with shifting potential (Hypothesis 1).

Table 5 analyzes this question by estimating Equation (1) based on firm-level data aggregated at the level of the multinational corporation. The dependent variable *Avg_VMI* captures the group-wide share of VMIs. In column 1, we analyze only the non-tax determinants of VMI usage. We find that VMIs are more common in multinational corporations with a higher number of subsidiaries and a lower degree of international dispersion. In columns 2 to 4, we add three different measures for tax rate differentials within multinational corporations (*sd_staxr*,

minmax_staxr, and *minmax_dummy*¹³), which aim to proxy profit shifting potential. As predicted by Hypothesis 1, we estimate positive and statistically significant coefficients on all three variables. The sharp increase in the adjusted R² and the size of the coefficient estimates underscore that tax considerations are a relevant determinant of VMI use. A one standard deviation increase in the respective tax rate differential measure is associated with an increase in VMI equivalent to 24 percent (column 2) to 144 percent (column 3) of the sample mean.

We use a second identification strategy that examines the allocation of VMIs within multinational corporations based on subsidiary-level data. Hypothesis 1 predicts that the frequency of VMIs increases the more the nominal tax rate of the subsidiary exceeds the average of the multinational corporation. This prediction is based on the assumption that the internal agency conflict prevents particularly managers of high-tax subsidiaries from following the headquarters' guidelines on tax-motivated profit shifting.

Figure 1 illustrates the relationship between the frequency of VMIs and the difference between the tax rate of the subsidiary and the asset-weighted tax rate of the multinational corporation. The figure shows a partly U-shaped pattern: VMIs are most common in subsidiaries with substantial tax rate differences, particularly in high-tax jurisdictions. This is consistent with our hypothesis that internal agency conflicts are more severe when profit shifting reduces local performance metrics, and that VMIs are deployed to mitigate such conflicts. While the relationship is also increasing for subsidiaries with moderately below-average tax rates (*Taxdiff* between -10 and 0), the slope flattens for more extreme low-tax cases (*Taxdiff* < -10). This asymmetry suggests that tax planning may not be the only reason for installing VMIs, especially in very low-tax countries. Overall, the figure provides descriptive support for Hypothesis 1, illustrating that the

¹³ *minmax_dummy* is an indicator variable taking the value of one if the multinational corporation's difference between the maximum and minimum statutory tax rate is above the sample mean and zero otherwise.

allocation of VMIs is not random but varies systematically with tax rate differentials. It highlights that multinational corporations appear to respond strategically to internal frictions by deploying VMIs more frequently in subsidiaries where the incentive misalignment is greatest. At the same time, the flattening of the curve on the far left tail suggests that tax considerations are not the sole driver of interlock formation, and that VMI usage may also serve broader governance or managerial purposes.

We complement Figure 1 with a regression analysis of the subsidiary-level determinants of VMI allocation within multinational corporations (see Tables 6 and 7). The dependent variable is the subsidiary-specific share of VMIs (*Scaled_VMI_i*). In Table 6, we estimate Equation (2) to investigate whether the frequency of VMIs is higher for the high-tax segment of subsidiaries. The explanatory variable *hightax_i* indicates whether the tax rate of subsidiary *i* is above the asset-weighted MNC average (*hightax_i*=1) or not. Again, both non-tax factors and the subsidiary's tax rate play a role. In column 1 of Table 6, we analyze the non-tax determinants. We find that the frequency of VMI increases significantly when the distance between the headquarters and the subsidiary is smaller and when both countries share a common language. The significantly negative coefficient for *Employees_i* may indicate that subsidiaries with more employees, on average, are more autonomous. Including *hightax_i* in the regression equation in column 2 increases the overall explanatory power of the model by about ten percent. The frequency of VMIs is 1.1 percentage points higher in the high-tax segment of subsidiaries, which corresponds to 24 percent of the sample average of *Scaled_VMI_i*. Both results underscore the importance of tax considerations in this decision.

The regression results reported in columns 1 and 2 of Table 6 are based on a model with firm fixed effects. Including firm fixed effects allows us to control for unobserved group characteristics but also filters out some of the variation in *hightax_i*. We, therefore, test the

robustness of our results and report additional specifications that include subsidiary country or firm industry fixed effects and firm-level controls in columns 3 and 4. Both the magnitude and the significance of the coefficient for *hightax_i* increase.

We now examine whether the use of VMIs depends not only on the sign but also on the magnitude of the tax rate differential. To do so, we split our sample into a high-tax and low-tax segment of subsidiaries and run separate regressions of Equation (2) for both subsamples. We now capture the tax incentive by a continuous variable defined as the difference between the subsidiary's tax rate and the multinational corporation-wide weighted average (*taxdiff_i*). Hypothesis 1 predicts a positive effect for *taxdiff_i* in the high-tax segment of subsidiaries and an ambiguous effect for the low-tax subsample. Results reported in Table 7 confirm this prediction. In column 1 (high-tax segment) *Scaled_VMI_i* correlates significantly positive with *taxdiff_i*. A one percentage point increase in *taxdiff_i* translates into a 0.3 percentage points increase in *Scaled_VMI_i*, which corresponds to 5.5 percent of the sample mean. We find no similar effect in the low-tax segment of subsidiaries.

Previous research has shown that multinational corporations respond with their transfer pricing to differences between the subsidiary's tax rate and the multinational corporation's average (e.g., Huizinga & Laeven, 2008). Tax planning strategies involving financial centers or tax haven affiliates may respond more to the lowest tax rate within the multinational corporation (Moen et al., 2011). The inclusion of firm fixed effects in Table 8 does not allow us to compare the relevance of these two tax rate differentials. We have tested for the relevance of the difference to the minimum tax rate of the multinational corporation in further (untabulated) regressions that disregard firm fixed effects but instead consider subsidiary country and firm industry fixed effects. According to this analysis, the decision for VMI usage is significantly influenced by the average tax rate of the multinational corporation but not the minimum tax rate. This outcome is consistent

with the predictions of Ortmann & Schindler (2022) that the internal agency conflict influences transfer pricing decisions and the location of intangibles rather than internal debt shifting.¹⁴

Robustness tests

We test the robustness of our results in further untabulated regressions. So far, the definitions of *hightax_i* and *taxdiff_i* were based on an asset-weighted average of tax rates. We have tested the robustness of our results to this definition by repeating the main regressions from Table 6 (column 2) and Table 7 (column 1) using an unweighted definition of the average tax rate. The coefficients for *hightax_i* and *taxdiff_i* remain statistically significant and even increase slightly in magnitude.

A second robustness test concerns the distribution of the dependent variable and the type of regression. So far, we defined *Scaled_VMI_i* as the ratio of VMIs to the total number of relevant subsidiary managers and used OLS regressions. As a robustness test we re-estimate column 2 of Table 6 but use a probit regression based on a binary classification of subsidiary-level VMI usage or a count data specification (negative binomial model) instead. Both robustness tests confirm our baseline findings with statistical significance.

The use of VMIs and effective tax rates

Our results in the previous sections have documented that the use of VMIs is common practice among European multinational corporations and that the use of VMIs is significantly correlated with the potential for tax planning, both between and within multinational corporations. In this section, we analyze whether the use of VMIs is associated with improved tax outcomes for the multinational corporation.

¹⁴ We further investigate the predictions of Ortmann & Schindler (2022) concerning transfer pricing and debt shifting in Table 15.

In Tables 8 and 9, we analyze this question using data aggregated at the level of the multinational corporation and test the prediction from Hypothesis 2 that a more intense use of VMIs is associated with a lower effective tax rate of the multinational corporation. The dependent variable in Table 8 is the one-year or three-year GAAP ETR. The explanatory variable of main interest is Avg_VMI_j , the group-wide share of VMIs. Consistent with Hypothesis 2, we find negative and statistically significant coefficients for Avg_VMI_j for both definitions of the effective tax rate considered. These coefficients also indicate an economically relevant effect size. A one standard deviation increase in Avg_VMI_j is associated with a 1.2 percentage point reduction in the three-year GAAP ETR. This reduction corresponds to almost 5 percent of the average three-year GAAP ETR.¹⁵

Above we presented evidence that multinational corporations prefer VMI in high-tax subsidiaries. This observation is consistent with Hypothesis 1, as the internal principal-agent conflict regarding tax-motivated profit shifting is particularly relevant here. On the other hand, any VMI (in high-tax or low-tax subsidiaries) should improve knowledge sharing within multinational corporations, hereby enhancing tax planning efficiency. Therefore, we investigate in Table 9 whether the positive impact of VMI on effective tax rates is limited to VMIs in high-tax subsidiaries. We repeat the regressions from Table 8, considering separately VMIs in high-tax subsidiaries (columns 1 and 3) and VMIs in low-tax subsidiaries (columns 2 and 4).¹⁶ We estimate negative coefficients for both categories of VMIs. However, the coefficient estimated for VMIs in high-tax subsidiaries is more than 20 percent higher and also more significant. Nevertheless, the positive impact of VMIs on tax planning does not seem to be limited to high-tax subsidiaries.

¹⁵ In untabulated analyses, we test the robustness of our findings to including proxies for internal information quality (earnings announcement speed and restatements, Gallemore & Labro, 2015) and find qualitatively similar inferences.

¹⁶ This procedure yields two distinct samples, one only consisting of subsidiaries with above MNC-wide average statutory tax rate and the other one with a statutory tax rate below the MNC-wide average.

Multinational corporations with and without VMIs may differ in terms of their overall governance mechanisms or other unobservable characteristics, which could bias our findings. Therefore, we validate our findings by presenting additional regression results based on different matched samples of multinational corporations. We match the two groups of multinational corporations according to their potential to shift profits¹⁷ using various matching techniques¹⁸ and re-estimate the regressions from Table 8. Respective results are reported in Table 10.¹⁹ The coefficient estimates for Avg_VMI_i are negative in all specifications, with five out of six being statistically significant at least at the ten percent confidence interval.

The use of VMIs and profit shifting channels

Lastly, we test the implications of VMIs for tax planning based on subsidiary-level data (Table 11).²⁰ This allows us to ensure that our results are not biased by unobserved characteristics of the multinational corporation. It also allows us to compare the relevance of VMIs for different profit shifting channels. We test Hypothesis 3, which, based on the analytical model of Ortman & Schindler (2022), predicts that the internal agency conflict is more relevant for the transfer pricing channel than for the debt shifting channel.

In columns 1 to 4 of Table 11, we examine the impact of VMIs on the transfer pricing channel based on the empirical model first used by Huizinga & Laeven (2008). Following De Simone et al. (2017), we define the dependent variable as the natural logarithm of return on assets,

¹⁷ We use variables such as total assets, EBIT scaled by total assets, leverage, r&d expenses scaled by total assets, and intangibles scaled by total assets to capture the profit shifting potential. See Overesch et al. (2020) for a similar approach.

¹⁸ By utilizing various matching techniques and parameters, along with unmatched regression results, we adhere to Leamer's (1983) concern that findings may be influenced by a specific research design.

¹⁹ Line 1 of Table 14 displays results for a one-to-one propensity score matching without replacement, utilizing a caliper set to 0.2 times the pooled standard deviation of the logit of the propensity score, as is customary in the accounting literature (Shipman et al., 2017). Line 2 presents the results of similar propensity score matchings, but use a one-to-three matching with replacement. Line 4 reports the outcomes of covariate matching utilizing one-to-one nearest neighbor.

²⁰ In this regard, we only consider international tax planning and abstain from analyzing effects on local tax planning (Beuselinck & Pierk, 2022).

while tax incentives for profit shifting are captured by the measure C_i . C_i is the capital-weighted average of the tax rate differentials between the subsidiary and all other subsidiaries within the multinational corporation (Huizinga & Laeven, 2008).²¹ High-tax subsidiaries are characterized by high values of C_i . We extend the model of Huizinga & Laeven (2008) and include VMI_i (one_VMI_i ²²) as well as the interactions of C_i and VMI_i (C_i and one_VMI_i) in the regression equation in columns 2 to 4 of Table 11. In columns 5 to 8, we follow Huizinga et al. (2008) and apply a similar regression model for the debt-shifting channel of profit shifting. Here, the dependent variable is the debt-equity ratio of the subsidiary.

The baseline effect of C_i on return and leverage in our regressions confirms the findings of Huizinga & Laeven (2008) and Huizinga et al. (2016). We find a significant and negative correlation between C_i and the subsidiary's return on assets and a significant positive correlation between C_i and the subsidiary's leverage ratio. However, differences between the two profit shifting channels emerge when it comes to the impact of VMI use. As predicted by Ortmann & Schindler (2022) and in our Hypothesis 3, our results show a stronger relationship between C_i and ROA_i when the subsidiary has more VMIs or at least one VMI. In specification 2 of Table 11, we estimate coefficients of -2.40 for VMI_i and -2.19 for $C\#VMI_i$. These coefficients imply that, compared to the baseline effect, an increase in VMI_i by one standard deviation (0.17) is associated with a 15.5 percent higher sensitivity of return on assets to C_i .²³ The results in column 4 of Table 11 indicate that the extensive margin of this effect is more relevant than the intensive margin. In contrast, we do not find a similar effect of VMIs for the debt-shifting channel.

²¹ C is calculated using the following formula: $C_i = \frac{\sum_{j \neq i}^n K_j(t_i - t_j)}{\sum_{j=1}^n K_j}$, with n countries, K_j being the economic activity in country j using capital as a proxy, and t representing the statutory tax rate of countries i and j .

²² One_VMI_i indicates whether a subsidiary employs at least one VMI. This allows us to compare the intensive and the extensive margin of the effect.

²³ $(-2.1941 * 0.17) / -2.4004$.

VI. CONCLUSION

Using Vertical Manager Interlocks to manage subsidiaries is common among multinational corporations. In particular, VMIs improve the exchange of information between headquarters managers and subsidiary managers and help mitigate internal agency conflicts. In our European MNCs sample, 67.9 percent of all listed multinational corporations and 26 percent of all large multinational corporations (with sales above € 750 million) use this management structure.

We analyze to what extent the use of VMIs is motivated by tax considerations and whether it helps multinational corporations increase tax planning efficiency. We show that VMIs are significantly more common in multinational corporations with a higher potential for profit shifting, as indicated by larger tax rate differentials. Tax considerations also seem to play a role in allocating VMIs within multinational corporations. The frequency of VMIs is 1.1 percentage points higher in the high-tax segment of subsidiaries, corresponding to 24 percent of the sample average. We also find that a more intensive use of VMIs is associated with lower GAAP effective tax rates and a stronger correlation between return on assets and tax rate differentials at the foreign subsidiary level. We find no similar effect for the debt-shifting channel of profit shifting.

Our results underscore the importance of internal agency conflicts for tax avoidance in multinational corporations. In doing so, we contribute to a recent strand of literature that analyzes this relationship and the implications of potential solutions adopted by firms. We emphasize the importance of the management structure as an alternative to solving the internal agency conflict through the design of employee compensation.

We acknowledge that our study has some limitations. First, our analysis is limited to European subsidiaries and, thus, to a specific part of multinational corporations. However, we have no reason to believe that this limitation biases our results. Second, the available management information is cross-sectional in nature. This limits our ability to identify causal relationships. We

address this concern by analyzing the effects at both the multinational corporation and subsidiary levels, allowing us to control for unobservable multinational corporation characteristics and by presenting results also for a matched sample of multinational corporations. Our results are robust across these different settings.

REFERENCES

- Abernethy, M. A., Bouwens, J., Hofmann, C., & van Lent, L. (2022). Altruism, social norms, and incentive contract design. *Review of Accounting Studies* 28, 570-614. <https://doi.org/10.1007/s11142-021-09649-x>
- Allison, P. D., & Waterman, R. P. (2002). Fixed-Effects Negative Binomial Regression Models. *Sociological Methodology* 32, 247-265. <https://doi.org/10.1111/1467-9531.00117>
- Amberger, H., Markle, K., & Samuel, D. M. P. (2021). Repatriation Taxes, Internal Agency Conflicts, and Subsidiary-level Investment Efficiency. *The Accounting Review* 96(4), 1-25. <https://doi.org/10.2308/TAR-2019-0259>
- Armstrong, C. S., Blouin, J. L., & Larcker, D. F. (2012). The incentives for tax planning. *Journal of Accounting and Economics* 53(1), 391-411. <https://doi.org/10.1016/j.jacceco.2011.04.001>
- Baersch, S.-E., Heckemeyer, J., & Olbert, M. (2023). Do firms with a centralized transfer pricing authority have more tax disputes and internal coordination conflicts? *Journal of Business Economics* 8, 1415-1450. <https://doi.org/10.1007/s11573-023-01146-8>
- Baiman, S. (1990) Agency research in managerial accounting: A second look. *Accounting, Organizations, and Society* 15(4), 341-371.
- Baldenius, T., Melumad, N. D., & Reichelstein, S. (2004). Integrating Managerial and Tax Objectives in Transfer Pricing. *The Accounting Review* 79(3), 591-615. <https://doi.org/10.2308/accr.2004.79.3.591>
- Beuselinck, C., & Pierk, J. (2022). On the dynamics between local and international tax planning in multinational corporations. *Review of Accounting Studies*, forthcoming. <https://doi.org/10.1007/s11142-022-09731-y>
- Blouin, J. L., Robinson, L. A. , & Seidman, J. K. (2018). Conflicting Transfer Pricing Incentives and the Role of Coordination. *Contemporary Accounting Research* 35(1), 87-116. <https://doi.org/10.1111/1911-3846.12375>
- Brown J. L., & Drake, K. D. (2014). Network Ties Among Low-Tax Firms. *The Accounting Review* 89(2), 483-510. <https://doi.org/10.2308/accr-50648>
- Chen, C. X., Chen, S., Pan, F., & Wang, Y. (2015). Determinants and consequences of transfer pricing autonomy: An empirical investigation. *Journal of Management Accounting Research* 27(2), 225-259. <https://doi.org/10.2308/jmar-50927>

- Chen, K.-P., & Chu, C. Y. C. (2005). Internal Control versus External Manipulation: A Model of Corporate Income Tax Evasion. *The RAND Journal of Economics* 36(1), 151-164.
- Chen X., & Yang, C. (2021). Vertical interlock and the value of cash holdings. *Accounting & Finance* 61(1), 561-593. <https://doi.org/10.1111/acfi.12587>
- Crocker, K. J., & Slemrod, J. (2005). Corporate tax evasion with agency costs. *Journal of Public Economics* 89(9-10), 1593-1610. <https://doi.org/10.1016/j.jpubeco.2004.08.003>
- Delis, F., Delis, M. D., Karavitis, P. I., & Klassen, K. J. (2021). Corporate Governance and Profit Shifting: The Role of the Audit Committee. *European Accounting Review*, forthcoming. <https://doi.org/10.1080/09638180.2021.2003216>
- Deloitte Touche Tohmatsu Ltd. (2013). Governance of subsidiaries: A survey of global companies.
- Deloitte Touche Tohmatsu Ltd. (2016). On the board's agenda: Governance in a multidimensional environment.
- Desai, M. A., & Dharmapala, D. (2006). Corporate tax avoidance and high-powered incentives. *Journal of Financial Economics* 79(1), 145-179. <https://doi.org/10.1016/j.jfineco.2005.02.002>
- De Simone, L., Klassen, K. J., & Seidman, J. K. (2017). Unprofitable Affiliates and Income Shifting Behavior. *The Accounting Review* 92(3), 113-136. <https://doi.org/10.2308/accr-51555>
- Duerr, O. M., & Goex, R. F. (2011). Strategic Incentives for Keeping One Set of Books in International Transfer Pricing. *Journal of Economics & Management Strategy* 20(1), 269-298. <https://doi.org/10.1111/j.1530-9134.2010.00289.x>
- Duerr, O. M., Nisch, M., & Rohlfing-Bastian, A. (2020). Incentives in optimally sized teams for projects with uncertain returns. *Review of Accounting Studies* 25, 313-341. <https://doi.org/10.1007/s11142-019-09529-5>
- Dyreng, S. D., Hanlon, M., & Maydew, E. L. (2008). Long-Run Corporate Tax Avoidance. *The Accounting Review* 83(1), 61-82. <https://doi.org/10.2308/accr.2008.83.1.61>
- Dyreng, S. D., & Maydew, E. L. (2018). Virtual Issue on Tax Research. *Journal of Accounting Research*.
- EY. (2003). Transfer Pricing 2003 Global Survey, Ernst & Young: EYGM Limited, EYGM No. 000372.
- Feltham, G. A., & Hofmann, C. (2012). Information suppression in multi-agent contracting. *Review of Accounting Studies* 17, 254-278. <https://doi.org/10.1007/s11142-011-9175-2>

- Fey, C. F., & Furu, P. (2008). Top management incentive compensation and knowledge sharing in multinational corporations. *Strategic Management Journal* 29(12), 1301-1323. <https://doi.org/10.1002/smj.712>
- Gaertner, F. B. (2014). CEO after-tax compensation incentives and corporate tax avoidance. *Contemporary Accounting Research* 31(4), 1077-1102. <https://doi.org/10.1111/1911-3846.12058>
- Gallemore, J., & Labro, E. (2015). The importance of the internal information environment for tax avoidance. *Journal of Accounting and Economics* 60(1), 149-167. <https://doi.org/10.1016/j.jacceco.2014.09.005>
- Graham, J. R. (1996). Debt and the marginal tax rate. *Journal of Financial Economics* 41(1), 41-73. [https://doi.org/10.1016/0304-405X\(95\)00857-B](https://doi.org/10.1016/0304-405X(95)00857-B)
- Hanlon, M. & Heitzman, S. (2010). A review of tax research. *Journal of Accounting and Economics* 50(2-3), 127-178. <https://doi.org/10.1016/j.jacceco.2010.09.002>
- Hausman, J., Bronwyn, H. H., & Griliches, Z. (1984). Econometric Models for Count Data with an Application to the Patents-R&D Relationship. *Econometrica* 52, 909-938.
- Heckemeyer, J., & Overesch, M. (2017). Multinationals' Profit Response to Tax Differentials: Effect Size and Shifting Channels. *Canadian Journal of Economics* 50, 965-994. <https://doi.org/10.1111/caje.12283>
- Hoenen, A. K., & Kostova, T. (2015). Utilizing the broader agency perspective for studying headquarters-subsidiary relations in multinational companies. *Journal of International Business Studies* 43, 104-113. <https://doi.org/10.1057/jibs.2014.31>
- Hu, J., Li, S., & Shevlin, T. (2021). How does the market for corporate control impact tax avoidance? Evidence from international M&A laws. *Review of Accounting Studies* 28, 340-383. <https://doi.org/10.1007/s11142-021-09644-2>
- Huizinga, H., & Laeven, L. (2008). International profit shifting within multinationals: A multi-country perspective. *Journal of Public Economics* 92(5-6), 1164-1182. <https://doi.org/10.1016/j.jpubeco.2007.11.002>
- Huizinga, H., Laeven, L., & Nicodeme, G. (2016). Capital structure and international debt shifting. *Journal of Financial Economics* 88(1), 80-118. <https://doi.org/10.1016/j.jfineco.2007.05.006>

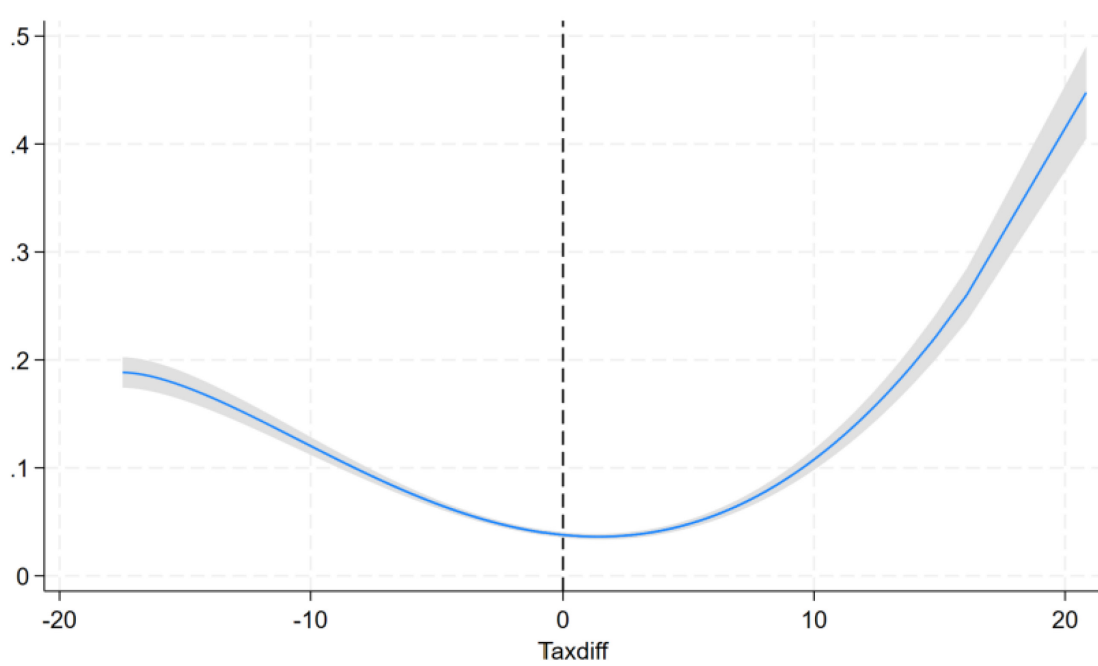
- Jacob, M., Rohlfing-Bastian, A., & Sandner, K. (2021). Why do not all firms engage in tax avoidance? *Review of Managerial Science* 15, 459-495. <https://doi.org/10.1007/s11846-019-00346-3>
- Jensen, M. C. & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3(4), 305-360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- Klassen, K. J. & Valle Ruiz, C. (2022). The Effect of Changes in Income Shifting on Affiliate Managers' Internal Reporting Decisions. *Contemporary Accounting Research*, forthcoming. <https://doi.org/10.1111/1911-3846.12783>
- Koch, R., & Scheider, T. B. (2022). *The Heterogeneous Relationship between Tax Avoidance and Firm Value*. Working Paper.
- Kohlhase, S., & Wielhouwer, J. L. (2022). Tax and tariff planning through transfer prices: The role of the head office and business unit. *Journal of Accounting and Economics* 75(2-3), 101568. <https://doi.org/10.1016/j.jacceco.2022.101568>
- Kostova, T., Nell, P. C., & Hoenen, A. K. (2018). Understanding agency problems in headquarters-subsidiary relationships in multinational corporations: A contextualized model. *Journal of Management* 44(7), 2611-2637. <https://doi.org/10.1177/0149206316648383>
- Kubick, T. R., Li, Y., & Robinson, J. R. (2020). Tax-savvy executives. *Review of Accounting Studies* 25, 1301-1343. <https://doi.org/10.1007/s11142-020-09543-y>
- Leamer, E. E. (1983). Let's take the con out of econometrics. *American Economics Review* 73(1), 31-43.
- Li, Q., Maydew, E. L., Willis, R. H., & Yu, L. (2022). Taxes and director independence: evidence from board reforms worldwide. *Review of Accounting Studies* 28, 910-957. <https://doi.org/10.1007/s11142-021-09660-2>
- Luo, L. Ma, M. S., O. T. C., & Xie, H. (2023). Tax avoidance and firm value: does qualitative disclosure in the tax footnote matter? *Review of Accounting Studies*, forthcoming. <https://doi.org/10.1007/s11142-023-09773-w>
- Mazzola E., Perrone, G., & Kamuriwo, D. S. (2016). The interaction between inter-firm and interlocking directorate networks on firm's new product development outcomes. *Journal of Business Research* 69(2), 672-682. <https://doi.org/10.1016/j.jbusres.2015.08.033>

- Meridian. (2018). Trends and developments in executive compensation. Available at: <http://www.meridiancp.com/wp-content/uploads/2018-Trends-and-Developments-in-Executive-Compensation.pdf>
- Moen, J., Schindler, D., Schjelderup, G., & Tropina, J. (2011). *International Debt Shifting: Do Multinationals Shift Internal or External Debt?* CESifo Working Paper No. 3519.
- Na, K., & Yan, W. (2022). Languages and corporate tax avoidance. *Review of Accounting Studies* 27, 148-184. <https://doi.org/10.1007/s11142-021-09596-7>
- Nielsen, S. B., & Raimondos-Møller, P. (2012). Multiple Roles of Transfer Prices: One vs. Two Books. In: Schoen, W., & Konrad, K. A. (Eds.), *Fundamentals of International Transfer Pricing in Law and Economics*.
- Nielsen, S. B., Raimondos-Møller, P., & Schjelderup, G. (2008). Taxes and Decision Rights in Multinationals. *Journal of Public Economic Theory* 10(2), 245-258. <https://doi.org/10.1111/j.1467-9779.2008.00360.x>
- O'Donnell, S. (1999). Compensation design as a tool for implementing foreign subsidiary strategy. *Management International Review* 39(2), 149-165.
- Ortmann, R., & Schindler, D. (2022). *Income Shifting and Management Incentives*. Working Paper.
- Overesch, M., Schenkelberg, S., & Wamser, G. (2020). Do US firms avoid more taxes than their European Peers? On firm characteristics, profit shifting opportunities, and tax legislation as determinants of tax differentials, *National Tax Journal* 73, 361-400. <https://doi.org/10.17310/ntj.2020.2.03>
- Oxley, J., & Pandher, G. (2016). Equity-based incentives and collaboration in the modern multibusiness firm. *Strategic Management Journal* 37(7), 1379-1394. <https://doi.org/10.1002/smj.2392>
- Phillips, J. D. (2003). Corporate tax-planning effectiveness: the role of compensation-based incentives. *The Accounting Review* 78(3), 847-874. <https://doi.org/10.2308/accr.2003.78.3.847>
- PwC. (2010). Cashow Excellence. Studie zu Cashow-Planung und -Reporting als Grundlage einer cash-orientierten Unternehmenssteuerung. Available at: https://www.pwc.de/de/_nanzierung/assets/studie_cashow_excellence_101117_screen.pdf.
- Reineke, R., Weiskirchner-Merten, K., & Wielenberg, S. (2022). When do Firms Use One Set of Books in an International Tax Compliance Game? *Review of Accounting Studies* 25, 1856-1885. <https://doi.org/10.1007/s11142-021-09667-9>

- Roth, K., & O'Donnell, S. (1996). Foreign subsidiary compensation strategy: An agency theory perspective. *Academy of Management Journal* 39(3), 678-703.
<https://doi.org/10.2307/256659>
- Scharfstein, D. S. & Stein, J. C. (2000). The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment. *The Journal of Finance* 55(6), 2537-2564.
<https://doi.org/10.1111/0022-1082.00299>
- Shipman, J. E., Swanquist, Q. T., & Whited, R. L. (2017). Propensity Score Matching in Accounting. *The Accounting Review* 92(1), 213-244. <https://doi.org/10.2308/accr-51449>
- Smith, M. (2002). Tax and incentive trade-offs in multinational transfer pricing. *Journal of Accounting, Auditing and Finance* 17(3), 209-236.
<https://doi.org/10.1177/0148558X0201700302>
- Stein, J. C. (2003). *Agency, Information and Corporate Investment*. In: Constantinides, G. M., Harris, M., & Stulz, R. M. (Eds.), *Handbook of the Economics of Finance*.
- Stevens, D. E., & Thevaranjan, A. (2010). A moral solution to the moral hazard problem. *Accounting, Organizations and Society* 35(1), 125-139.
<https://doi.org/10.1016/j.aos.2009.01.008>
- Vaysman, I. (1996). A model of cost-based transfer pricing. *Review of Accounting Studies* 1, 73-108. <https://doi.org/10.1007/BF00565413>
- Wang, X., Xu, Y., Zhang, L., & Zheng, G. (2022). Subsidiary Governance and Corporate Tax Planning: The Effect of Parent-Subsidiary Common Directors and Officers. *Journal of Management Accounting Research* 34(3), 179-197. <https://doi.org/10.2308/JMAR-2019-510>
- Weisbach, D. A. (2002). An Economic Analysis of Anti-Tax-Avoidance Doctrines. *American Law and Economics Review* 4(1), 88-115. <https://doi.org/10.1093/aler/4.1.88>
- Wu, L., Jin, F., & Hitt, L. M. (2017). Are All Spillovers Created Equal? A Network Perspective on Information Technology Labor Movements. *Management Science* 64(7), 3168-3186.
<https://doi.org/10.1287/mnsc.2017.2778>
- Wulf, J. (2007). Authority, Risk, and Performance Incentives: Evidence from Division Manager Positions inside Firms. *The Journal of Industrial Economics* 55(1), 169-196.
<https://doi.org/10.1111/j.1467-6451.2007.00307.x>

Appendix

FIGURE 1
Use of VMI across the taxdiff distribution



Notes: This figure displays the average usage of VMIs in subsidiaries across the tax differential distribution. On the horizontal axes *Taxdiff* is displayed. It is the tax differential between the statutory tax rate of subsidiary *i* and the multinational corporation-wide asset-weighted average of statutory tax rates. *Scaled VMI* is presented at the vertical axes and is the number of employees with an additional position at the headquarter scaled by the number of the subsidiary's employees.

TABLE 1
Definition of Variables

Variables	Definition
Equation 1	
<i>Avg_VMI</i>	Multinational corporation -wide average proportion of VMIs per subsidiary.
<i>SD_staxr</i>	Standard deviation of statutory tax rate of multinational corporation's operating countries.
<i>minmax_staxr</i>	Difference between the maximum and minimum statutory tax rate within the multinational corporation.
<i>minmax_dummy</i>	Indicator variable taking the value of one if the multinational corporation's difference between the maximum and minimum statutory tax rate is above the sample mean and zero otherwise.
<i>DebtRatio</i>	Natural logarithm of the ratio of multinational corporation's debt to total assets.
<i>Int</i>	Intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level.
<i>Employees</i>	Natural logarithm of multinational corporation's number of employees.
<i>FixedAssets</i>	Natural logarithm of total assets.
<i>No_Countries</i>	Number of countries the multinational corporation is operating in.
<i>No_Subs</i>	Natural logarithm of the number of subsidiaries of the multinational corporation.
Equation 2	
<i>Scaled_VMI</i>	Number of managers of subsidiary i with co-positions at the headquarter of multinational corporation j, scaled by the total number of managers employed in that subsidiary.
<i>VMI (counts)</i>	Number of managers of subsidiary i with co-positions at the headquarter of multinational corporation j.
<i>VMI (indicator)</i>	Indicator variable that takes the value of one if at least one VMI is present in the respective subsidiary and zero otherwise.
<i>hightax</i>	Indicator variable that indicates whether the statutory tax rate of subsidiary i is above the multinational corporation-wide asset-weighted average of statutory tax rates.
<i>taxdiff (weighted)</i>	Tax differential between the statutory tax rate of subsidiary i and the multinational corporation-wide asset-weighted average of statutory tax rates.
<i>taxdiff (unweighted)</i>	Tax differential between the statutory tax rate of subsidiary i and the multinational corporation-wide average of statutory tax rates.
<i>taxdiff_2</i>	Tax differential between the subsidiary's statutory tax rate and the multinational corporation's lowest statutory tax rate.
Subsidiary-level	
<i>Int</i>	Intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level.
<i>Employees</i>	Natural logarithm of subsidiary's number of employees.
<i>FixedAssets</i>	Natural logarithm of fixed assets.
<i>FirmAge</i>	Natural logarithm of the firms age, measured as 2014 minus the year of incorporation.
<i>Distance</i>	Capturing the distance between the headquarter country's capital and the subsidiary country's capital. Data from the CEPII Database.
<i>Language</i>	Indicator variable taking one if the headquarter and subsidiary country share a common language and zero otherwise. Data from the CEPII Database.
<i>DebtRatio</i>	Natural logarithm of the ratio of the subsidiary's debt to total assets.
MNC-level	

<i>Int</i>	Intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level.
<i>Employees</i>	Natural logarithm of MNC number of employees.
<i>FixedAssets</i>	Natural logarithm of fixed assets.
<i>No_Subs</i>	Natural logarithm of the number of subsidiaries of an multinational corporation.
<i>No_Countries</i>	Number of countries an multinational corporation is operating in.
Country-level	
<i>GDPgrowth</i>	Change in GPD calculated as GDP in 2014 less GDP in 2013, scaled by GDP in 2013. Data from the International Monetary Fund.
<i>GDP</i>	natural logarithm of the gross domestic product of the subsidiary's country. Data from the International Monetary Fund.
<i>GDPperCapita</i>	Natural logarithm of the subsidiary country's GDP per capita. Data from the International Monetary Fund.
<i>CorruptionIndex</i>	Subsidiary country's corruption index value for 2014. Data from Transparency International.
<i>UnemploymentRate</i>	Subsidiary country's unemployment rate. Data from the International Monetary Fund.
<i>No_Subs_Country</i>	Natural logarithm of the multinational corporation's total number of subsidiaries in subsidiary i's country.

Equation 3

<i>Avg_VMI</i>	Multinational corporation-wide average proportion of VMIs per subsidiary.
<i>Avg_VMI (hightax)</i>	Multinational corporation-wide average proportion of VMIs in high-taxed subsidiaries.
<i>Avg_VMI (lowtax)</i>	Multinational corporation-wide average proportion of VMIs in low-taxed subsidiaries.
<i>GAAP ETR</i>	One-year GAAP effective tax rate, calculated as multinational corporation's tax expense over three years divided by pre-tax income over the same period. Observations with a negative denominator are dropped from the sample.
<i>3Y GAAP ETR</i>	Three-year average GAAP effective tax rate, calculated as the sum of a multinational corporation's tax expense over three years divided by the sum of its total pre-tax income over the same period. Observations with a negative denominator are dropped from the sample.
<i>DebtRatio</i>	Debt scaled by total assets.
<i>Int</i>	Intangible assets scaled by total assets.
<i>Employees</i>	Number of employees.
<i>AssetsFixed</i>	Natural logarithm of fixed assets.
<i>EBIT</i>	Earnings before interest and taxes.
<i>No_Subs</i>	Number of subsidiaries.
<i>Sales</i>	Natural logarithm of sales.
<i>Average STAXR</i>	Asset-weighted average tax rate across all countries the multinational corporation is operating in.

Equation 4

<i>Ln_ROA</i>	Natural logarithm of return on assets, where return on assets is calculated as EBIT scaled by total assets. EBIT is earnings before interest and taxes.
<i>DebtRatio</i>	Ratio of subsidiary total liabilities to subsidiary total assets (financial leverage).
<i>C</i>	The capital-weighted differential statutory tax rate between the affiliate and all related affiliates in the same multinational corporation.

<i>Scaled_VMI</i>	Number of managers of subsidiary <i>i</i> with co-positions at the headquarter of multinational corporation <i>j</i> , scaled by the total number of managers employed in that subsidiary.
<i>one_VMI</i>	Indicator variable taking the value of one if at least in one subsidiary of the multinational corporation a VMI is present.
<i>TangibleAssets</i>	Natural logarithm of tangible assets.
<i>EmployeeCosts</i>	Natural logarithm of compensation expenses.
<i>IndustryROA</i>	Country-industry median return on assets.
<i>Age</i>	Natural logarithm of the firms age, measured as 2014 minus the year of incorporation.
<i>GDPgrowth</i>	Change in GDP calculated as GDP in 2014 less GDP in 2013, scaled by GDP in 2013.
<i>Tangibility</i>	Ratio of subsidiary fixed assets to subsidiary total asset.
<i>Sales</i>	Natural logarithm of sales.
<i>ROA</i>	Ratio of subsidiary earnings before interest, taxes, depreciation, and amortization to subsidiary total assets.
<i>CreditorRights</i>	Creditor rights is the index of country creditor rights from Djankov, McLiesh, and Shleifer (2007). Most recent data from 2002 is used.
<i>Inflation</i>	Annual percentage change in CPI of the subsidiary's host country. Data from the International Monetary Fund.
<i>Salesgrowth</i>	Median of the annual growth rate of subsidiary sales in a subsidiary's country and industry.

Table 2
Descriptive Statistics, Sample 1

VARIABLES	(1) N	(2) mean	(3) sd	(4) p5	(5) p95
<i>hightax</i>	21,365	0.2870	0.4524	0	1
<i>taxdiff (weighted)</i>	21,365	0.0403	4.083	-7.605	7.512
<i>taxdiff (unweighted)</i>	21,365	0.224	3.622	-6.464	6.887
<i>taxdiff_2</i>	21,365	4.473	6.187	0	17.33
<i>Scaled_VMI (OLS Regression)</i>	21,365	0.0419	0.170	0	0.333
<i>VMI (counts)</i>	21,365	0.100	0.392	0	5
<i>one_VMI (indicator)</i>	7,317	0.053	0.2249	0	1
<i>C</i>	7,317	0.0075	0.058	-0.099	0.096
<i>DebtRatio [percent]</i>	21,365	-0.702	0.992	-2.317	0.134
<i>Int [percent]</i>	21,365	0.0200	0.0647	0	0.124
<i>Employees [count]</i>	21,365	3.711	1.592	1.099	6.323
<i>FixedAssets [thousand €]</i>	21,365	6.589	2.809	1.792	11.14
<i>FirmAge [years]</i>	21,365	2.507	0.902	0.693	3.892
<i>Distance [in thousand km]</i>	21,365	7.390	1.145	5.570	9.138
<i>Language [binary values]</i>	21,365	0.126	0.332	0	1
<i>DebtRatio [percent]</i>	21,365	-0.672	0.785	-1.993	0.0706
<i>Int [percent]</i>	21,365	0.0202	0.0506	0	0.103
<i>Employees [count]</i>	21,365	5.461	2.510	1.609	9.740
<i>FixedAssets [thousand €]</i>	21,365	9.519	4.218	2.708	16.29
<i>No_Subs [count]</i>	21,365	1.408	1.551	0	4.277
<i>No_Countries [count]</i>	21,365	1.416	0.887	0.693	3.091
<i>GDPgrowth [percent]</i>	21,365	-0.00633	0.0474	-0.0895	0.0408
<i>GDP [thousand \$]</i>	21,365	9.918	2.465	7.616	13.69
<i>GDPperCapita [thousand \$]</i>	21,365	10.23	0.615	9.210	10.98
<i>CorruptionIndex</i>	21,365	8.811	5.010	5.008	24.44
<i>UnemploymentRate [percent]</i>	21,365	5.635	2.081	2.700	8.600
<i>No_Subs_Country</i>	21,365	0.489	0.845	0	2.303

Table 3
Descriptive Statistics, Sample 2

VARIABLES	(1) N	(2) mean	(3) sd	(4) p5	(5) p95
<i>SD_staxr</i>	6,567	0.859	1.998	0	5.826
<i>minmax_staxr</i>	6,567	4.654	6.307	0	17.33
<i>minmax_dummy</i>	6,567	0.389	0.488	0	1
<i>Avg_VMI</i>	6,592	0.0486	0.164	0	0.333
<i>Avg_VMI (hightax)</i>	2,283	0.067	0.184	0	0.5
<i>GAAP ETR [percent]</i>	6,592	0.249	0.247	0	0.611
<i>3Y GAAP ETR [percent]</i>	5,583	0.256	0.240	0	0.608
<i>GAAP ETR/Av STAXR [percent]</i>	6,592	0.985	0.962	0	2.230
<i>DebtRatio [percent]</i>	6,592	-0.648	0.633	-1.863	-0.00983
<i>Int [percent]</i>	6,592	0.0212	0.0535	0	0.117
<i>Employees [count]</i>	6,592	4.299	2.007	1.099	7.867
<i>AssetsFixed [thousand €]</i>	6,592	7.823	3.173	2.773	13.35
<i>EBIT [thousand €]</i>	6,592	6.806	2.316	3.258	10.93
<i>No_Subs [count]</i>	6,592	0.842	1.066	0	2.996
<i>Average STAXR [percent]</i>	6,592	0.250	0.0589	0.160	0.333
<i>Sales [thousand €]</i>	6,592	9.582	2.099	6.733	13.38

TABLE 4
Descriptives VMI

Panel A		
	Number	Percent
MNCs with at least one VMI	1,524	23.21%
of which subsidiaries with at least one VMI	1,613	28.22%
of which subsidiaries with one VMI	1,196	74.15%
of which subsidiaries with two VMI	320	19.84%
of which subsidiaries with three VMI	76	4.71%
of which subsidiaries with four VMI	19	1.18%
of which subsidiaries with five VMI	2	0.12%
Panel B		
	Share of MNCs using VMI	
Publicly-listed	67.89 %	
Non-publicly-listed	8.53 %	-59.36***
MNCs >€ 750m sales	26.13 %	
MNCs <€ 750m sales	2.7 %	-23.43***
	Number of subs	
MNCs with at least one VMI	10.67	
MNCs without VMI	3.30	-7.37***

Panel A of this table displays the distribution of VMIs within our sample. VMI is measured as an employee having a position at the head office as well as the respective subsidiary. Panel B of this table provides t-statistics on the difference in the usage of VMIs for listed vs. non-listed and larger vs. smaller multinational corporations as well as the number of subsidiaries for multinational corporations with and without a VMI structure.

TABLE 5
Tax motivated use of VMIs

Dependent variable: <i>Avg_VMI</i>	(1) OLS	(2) OLS	(3) OLS	(4) OLS
<i>DebtRatio</i>	-0.0009 (-0.33)	-0.0011 (-0.39)	0.0006 (0.20)	0.0016 (0.58)
<i>Int</i>	-0.0481 (-1.30)	-0.0460 (-1.24)	-0.0370 (-1.00)	-0.0358 (-0.99)
<i>Employees</i>	-0.0006 (-0.33)	-0.0009 (-0.49)	-0.0006 (-0.30)	-0.0005 (-0.28)
<i>FixedAssets</i>	-0.0022** (-1.96)	-0.0022* (-1.92)	-0.0019* (-1.67)	-0.0017 (-1.52)
<i>No_Subs</i>	0.0725*** (12.66)	0.0732*** (12.80)	0.0418*** (7.68)	0.0263*** (4.81)
<i>No_Countries</i>	-0.1186*** (-12.41)	-0.1339*** (-13.12)	-0.1706*** (-14.77)	-0.1184*** (-13.04)
<i>SD_staxr</i>		0.0056*** (4.27)		
<i>minmax_staxr</i>			0.0107*** (10.72)	
<i>minmax_dummy</i>				0.1278*** (13.69)
Industry FE	Yes	Yes	Yes	Yes
Country FE	No	No	No	No
Group FE	No	No	No	No
Sample	Full	Full	Full	Full
Observations	6,567	6,567	6,567	6,567
Adj. R-sq	0.0435	0.0452	0.0772	0.0945

This table presents the estimates of Equation (1) for the dependent variable *Avg_VMI*. *SD_staxr* represents the standard deviation of the multinational corporation's statutory tax rate. *minimax_staxr* is the maximum statutory tax rate less the minimum statutory tax rate of the respective multinational corporation. *minmax_dummy* represents an indicator variable taking the value of 1 if the multinational corporations *minmax_staxr* is above the average, 0 otherwise. We control for multinational corporation specifics by using *DebtRatio* representing the natural logarithm of the ratio of company's debt to total assets. *Int* representing the intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level. *Employees* is the natural logarithm of the multinational corporation's total number of employees. *FixedAssets* is the natural logarithm of fixed assets, *No_Countries* represents the number of countries an multinational corporation is working in and *No_Subs* is the natural logarithm of the number of subsidiaries of an multinational corporation. ***, ** and * label statistical significance at 1 %, 5 % and 10 % level, respectively. A constant is included but not reported. *t* statistics are given in the parentheses and standard errors are heteroscedasticity-robust and clustered at the country level.

TABLE 6
The use of VMIs in High-tax Subsidiaries

Dependent variable:	(1)	(2)	(3)	(4)
<i>Scaled_VMI</i>	OLS	OLS	OLS	OLS
<i>hightax</i>		0.0111*	0.0428***	0.0438***
		(1.76)	(4.55)	(5.16)
<i>DebtRatio (sub)</i>	0.0008	0.0006	0.0009	0.0007
	(0.33)	(0.23)	(0.38)	(0.41)
<i>Int (sub)</i>	-0.0023	-0.0039	-0.0264	-0.0264
	(-0.08)	(-0.13)	(-1.13)	(-1.13)
<i>Employees (sub)</i>	-0.0028*	-0.0027	-0.0052***	-0.0052***
	(-1.67)	(-1.59)	(-3.63)	(-3.63)
<i>FixedAssets (sub)</i>	0.0023***	0.0022**	-0.0021***	-0.0020***
	(2.69)	(2.62)	(-2.89)	(-2.72)
<i>FirmAge (sub)</i>	0.0013	0.0013	-0.0008	-0.0008
	(0.57)	(0.58)	(-0.53)	(-0.57)
<i>Language (sub)</i>	0.0164*	0.0168*	0.0259**	0.0265***
	(1.80)	(1.84)	(4.59)	(4.92)
<i>Distance (sub)</i>	-0.0116**	-0.0109*	-0.0257***	-0.0254***
	(-2.09)	(-1.95)	(-23.31)	(-22.99)
<i>DebtRatio (MNC)</i>			-0.0010	-0.0008
			(-0.49)	(-0.40)
<i>Int (MNC)</i>			0.0338	0.0370
			(1.04)	(1.14)
<i>Employees (MNC)</i>			0.0055***	0.0053***
			(3.46)	(3.37)
<i>FixedAssets (MNC)</i>			0.0034***	0.0035***
			(4.11)	(4.26)
<i>No_Countries (MNC)</i>			-0.0067	-0.0060
			(-1.40)	(-1.30)
<i>No_Subs (MNC)</i>			-0.0191***	-0.0199***
			(-4.93)	(-5.28)
<i>GDPgrowth</i>	0.4460***	0.2369***		0.3926***
	(11.06)	(2.77)		(9.77)
<i>GDP</i>	0.0033***	0.0020		0.0052***
	(4.19)	(1.59)		(6.40)
<i>GDPperCapita</i>	0.0157***	-0.0036		0.0003
	(3.19)	(-0.42)		(0.07)
<i>UnemploymentRate</i>	-0.0007***	-0.0009*		-0.0010***
	(-2.62)	(-1.71)		(-3.98)
<i>Corruption</i>	-0.0077***	-0.0038		-0.0059***
	(-4.41)	(-1.43)		(-3.42)
<i>No_Subs_Country</i>	-0.0106***	-0.0047	-0.0126***	-0.0122***
	(-4.42)	(-1.71)	(-5.03)	(-5.06)
Industry FE	No	No	Yes	Yes
Group FE	Yes	Yes	No	No
Country FE	No	No	Yes	No
Observations	21,365	21,365	21,365	21,365
Adj. R-sq	0.0106	0.0117	0.0555	0.0793

This table presents the estimates of Equation (2) for the dependent variable *Scaled_VMI*. *hightax* is an indicator variable taking the value 1 if the subsidiary's statutory tax rate is above the asset-weighted average statutory tax rate of the multinational corporation. For the subsidiary-level controls, *DebtRatio* represents the natural logarithm of the ratio of company's debt to total assets. *Int* represents the intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level. *Employees* is the natural logarithm of subsidiary's number of employees. *FixedAssets* is the natural logarithm of fixed assets and *FirmAge* is the natural logarithm of years between 2014 and the year of incorporation. The binary variable *Language* takes the value of one if the common official language in the parent and subsidiary country is identical or a commonly spoken language, with at least 9 % of the population speaking such language, is present in both countries; zero otherwise. *Distance* captures the distance between the parent and the subsidiary countries' capitals. Both are taken from the CEPII Database. *DebtRatio*, *Int*, *Employees*, and *FixedAssets* are calculated likewise for the group-level controls with respect to the multinational corporation. *No_Countries* represents the number of countries an multinational corporation is working in and *No_Subs* is the natural logarithm of the number of subsidiaries of an multinational corporation. *GDPgrowth* is the percentage change between GDP₂₀₁₃ and GDP₂₀₁₄. *GDP* is the natural logarithm of the gross domestic product of the subsidiary's country, *GDPperCapita* represents the natural logarithm of the country's GDP per capita, *UnemploymentRate* is the respective unemployment rate, and *Corruption* is the subsidiary country's corruption index value for 2014. *No_Subs_Country* is the natural logarithm of the multinational corporation's total number of subsidiaries in the subsidiary's country. ***, ** and * label statistical significance at 1 %, 5 % and 10 % level, respectively. A constant is included but not reported. *t* statistics are given in the parentheses and standard errors are heteroscedasticity-robust and clustered at the country level.

TABLE 7
The use of VMIs in High-tax Subsidiaries II

Dependent variable:	(1)	(2)
<i>Scaled VMI</i>	OLS	OLS
<i>taxdiff</i>	0.0033*** (3.81)	0.0016 (1.29)
<i>DebtRatio (sub)</i>	-0.0016 (-0.43)	-0.0007 (-0.23)
<i>Int (sub)</i>	0.0146 (0.38)	-0.0094 (-0.20)
<i>Employees (sub)</i>	-0.0043* (-1.79)	-0.0012 (-0.47)
<i>FixedAssets (sub)</i>	0.0027** (2.41)	0.0012 (0.89)
<i>FirmAge (sub)</i>	0.0012 (0.44)	0.0030 (0.72)
<i>Language (sub)</i>	0.0286** (2.44)	0.0288 (1.34)
<i>Distance (sub)</i>	-0.0030 (-0.40)	-0.0050 (-0.54)
Sample	High-taxed Subsidiaries	Low-taxed Subsidiaries
Industry FE	No	No
Group FE	Yes	Yes
Country FE	No	No
Country-level controls	Yes	Yes
Observations	6,131	15,234
Adj. R-sq	0.0203	0.0116

This table presents the estimates of Equation (2) for the dependent variable *Scaled VMI*. *taxdiff* is the subsidiary's statutory tax rate less the asset-weighted average statutory tax rate of the multinational corporation. For the subsidiary-level controls, *DebtRatio* represents the natural logarithm of the ratio of company's debt to total assets. *Int* represents the intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level. *Employees* is the natural logarithm of subsidiary's number of employees. *FixedAssets* is the natural logarithm of fixed assets and *FirmAge* is the natural logarithm of years between 2014 and the year of incorporation. The binary variable *Language* takes the value of one if the common official language in the parent and subsidiary country is identical or a commonly spoken language, with at least 9 % of the population speaking such language, is present in both countries; zero otherwise. *Distance* captures the distance between the parent and the subsidiary countries' capitals. Both are taken from the CEPII Database. The not reported control variables are the following. *DebtRatio*, *Int*, *Employees*, and *FixedAssets* are calculated likewise for the Group-level controls with respect to the multinational corporation. *No_Countries* represents the number of countries an multinational corporation is working in and *No_Subs* is the natural logarithm of the number of subsidiaries of an multinational corporation. *GDPgrowth* is the percentage change between GDP₂₀₁₃ and GDP₂₀₁₄. *GDP* is the natural logarithm of the gross domestic product of the subsidiary's country, *GDPperCapita* represents the natural logarithm of the country's GDP per capita, *UnemploymentRate* is the respective unemployment rate, and *Corruption* is the subsidiary country's corruption index value for 2014. *No_Subs_Country* is the natural logarithm of the multinational corporation's total number of subsidiaries in the subsidiary's country. ***, ** and * label statistical significance at 1 %, 5 % and 10 % level, respectively. A constant is included but not reported. *t* statistics are given in the parentheses and standard errors are heteroscedasticity-robust and clustered at the country level.

TABLE 8
The effect of VMI structures on ETR I

	(1) <i>GAAP ETR</i>	(2) <i>3 year GAAP ETR</i>
<i>Avg_VMI</i>	-0.0434* (-1.91)	-0.0632*** (-3.54)
<i>DebtRatio</i>	0.0401*** (7.35)	-0.0444*** (-6.47)
<i>Int</i>	0.5028*** (2.79)	0.3807*** (2.62)
<i>Employees</i>	0.0070* (1.92)	0.0136*** (4.42)
<i>FixedAssets</i>	0.0147*** (5.73)	0.0103*** (3.92)
<i>EBIT</i>	-0.0684*** (-13.52)	-0.0841*** (-13.10)
<i>No_Subs</i>	0.0047 (0.87)	0.0274*** (5.84)
<i>Sales</i>	0.0177*** (3.99)	0.0356*** (7.97)
<i>Average STAXR</i>	1.2867*** (19.49)	1.3624*** (21.16)
Industry FE	Yes	Yes
Sample	Full	Full
Observations	6,592	5,583
Adj. R-sq	0.1722	0.2319

This table presents the estimates of Equation (3) for variable *Avg_VMI*, where the dependent variables are the *GAAP ETR* and a *3 year GAAP ETR*. The *GAAP ETR* is the financial effective tax rate for 2014 defined as total tax expense scaled by pre-tax income, winsorized at the 1 % level. *Avg_VMI* is calculated as the total of *Scaled_VMI* divided by the multinational corporation's overall number of subsidiaries. *DebtRatio* is the natural logarithm of multinational corporation's debt to total assets. *Int* represents the intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level. *Employees* is the natural logarithm of multinational corporation's Number of employees. *FixedAssets* is the natural logarithm of multinational corporation's fixed assets. *EBIT* represents the logarithm of multinational corporation's earnings before interest, *No_Subs* is the natural logarithm of the number of subsidiaries of an multinational corporation, and tax and *Sales* represents the logarithm of multinational corporation's sales. *Average STAXR* represents the group's average statutory tax rate. ***, ** and * label statistical significance at 1 %, 5 % and 10 % level, respectively. A constant is included but not reported. *t* statistics are given in the parentheses and standard errors are heteroscedasticity robust.

TABLE 9
The effect of VMI structures on ETR II

	(1)	(2)	(3)	(4)
	<i>GAAP</i> <i>ETR</i>	<i>GAAP</i> <i>ETR</i>	<i>3 year</i> <i>GAAP</i> <i>ETR</i>	<i>3 year</i> <i>GAAP</i> <i>ETR</i>
<i>Avg_VMI</i> <i>(hightax)</i>	-0.0474**		-0.0704***	
	(-2.04)		(-3.05)	
<i>Avg_VMI</i> <i>(lowtax)</i>		-0.0376		-0.0577**
		(-1.53)		(-2.88)
<i>F-test</i>		-0.0098***		-0.0127***
Industry FE	Yes	Yes	Yes	Yes
Observations	2,283	4,309	2,157	3,426
Adj. R-sq	0.1785	0.1335	0.2286	0.2412

This table presents the estimates of Equation (3) for the variable *Avg_VMI (hightax)* and *Avg_VMI (lowtax)* where the dependent variables are the *GAAP ETR* and a *3 year GAAP ETR*. The *GAAP ETR* is the financial effective tax rate for 2014 defined as total tax expense scaled by pre-tax income, winsorized at the 1 % level. *Avg_VMI (hightax)* (*Avg_VMI (lowtax)*) is calculated as the total of *Scaled_VMI* in high-tax (low-tax) countries divided by the multinational corporation's overall number of subsidiaries. Nondisplayed controls are the following. *DebtRatio* is the natural logarithm of multinational corporation's debt to total assets. *Int* represents the intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level. *Employees* is the natural logarithm of multinational corporation's Number of employees. *FixedAssets* is the natural logarithm of multinational corporation's fixed assets. *EBIT* represents the logarithm of multinational corporation's earnings before interest and tax, *No_Subs* is the natural logarithm of the number of subsidiaries of an multinational corporation, and *Sales* represents the logarithm of multinational corporation's sales. *Average STAXR* represents the group's average statutory tax rate. ***, ** and * label statistical significance at 1 %, 5 % and 10 % level, respectively. A constant is included but not reported. t statistics are given in the parentheses and standard errors are heteroscedasticity robust.

TABLE 10
The effect of VMI structures on ETR (Robustness)

Coefficient estimates:	(1)	(2)
<i>Avg_VMI</i>	<i>GAAP ETR</i>	<i>3 year GAAP ETR</i>
Matching Characteristics		
<i>Size/ROA/Leverage/R&D/Intangibles</i>	-0.0735^{***}	-0.1103^{***}
(One-to-one Propensity Score Matching, Caliper)	(-1.99)	(-3.17)
<i>Size/ROA/Leverage/R&D/Intangibles</i>	-0.0560	-0.1049^{***}
(One-to-three Propensity Score Matching)	(-1.45)	(-2.83)
<i>Size/ROA/Leverage/R&D/Intangibles</i>	-0.0256[*]	-0.0335^{***}
(Covariate Matching One-to-one Nearest Neighbor with replacement)	(-1.80)	(-3.19)

This table presents double robust estimates for Equation (3) for the variable *Avg_VMI* where the dependent variables are the *GAAP ETR* and a *3 year GAAP ETR*. The *GAAP ETR* is the financial effective tax rate for 2014 defined as total tax expense scaled by pre-tax income, winsorized at the 1 % level. *Avg_VMI* is calculated as the total of *VMI* divided by the multinational corporation's overall number of subsidiaries. Non-displayed controls are the following. *DebtRatio* is the natural logarithm of multinational corporation's debt to total assets. *Int* represents the intensity of intangible assets, calculated as intangible assets scaled by total assets, winsorized at the 1 % level. *Employees* is the natural logarithm of multinational corporation's Number of employees. *FixedAssets* is the natural logarithm of multinational corporation's fixed assets. *EBIT* represents the logarithm of multinational corporation's earnings before interest and tax, *No_Subs* is the natural logarithm of the number of subsidiaries of an multinational corporation, and *Sales* represents the logarithm of multinational corporation's sales. The multinational corporation's are matched on the indicated characteristics. *Average STAXR* represents the group's average statutory tax rate. ^{***}, ^{**} and ^{*} label statistical significance at 1 %, 5 % and 10 % level, respectively. A constant is included but not reported. t statistics are given in the parentheses and standard errors are heteroscedasticity robust.

Table 11
Profit shifting via Transfer Pricing vs. Debt Shifting

	(1) <i>Ln_ROA</i>	(2) <i>Ln_ROA</i>	(3) <i>Ln_ROA</i>	(4) <i>Ln_ROA</i>	(5) <i>DebtRatio</i>	(6) <i>DebtRatio</i>	(7) <i>DebtRatio</i>	(8) <i>DebtRatio</i>
<i>C</i>	-2.4697*** (-5.91)	-2.4004*** (-5.76)	-2.0717*** (-4.10)	-2.0341*** (-4.04)	0.2347 (1.54)	0.2862* (1.86)	0.3587** (2.48)	0.3892** (2.54)
<i>Scaled_VMI</i>		0.2315 (1.61)		0.2308 (1.62)		0.1680 (1.48)		0.1686 (1.49)
<i>C# Scaled_VMI</i>		-2.1941* (-1.73)		-1.8242 (-1.45)		-2.1432 (-1.15)		-2.0454 (-1.10)
<i>C # one_VMI</i>			-1.3010* (-1.97)	-1.2411* (-1.91)			-0.4061* (-1.92)	-0.3473* (-1.83)
<i>TangibleAssets</i>	-0.1700*** (-9.56)	-0.1701*** (-9.53)	-0.1699*** (-9.51)	-0.1700*** (-9.49)				
<i>EmployeeCosts</i>	0.1966*** (6.76)	0.1962*** (6.70)	0.1964*** (6.75)	0.1960*** (6.69)				
<i>IndustryROA</i>	2.0490 (1.66)	2.0669 (1.68)	2.0363 (1.65)	2.0547 (1.68)				
<i>FirmAge</i>	-0.0797*** (-2.99)	-0.0790*** (-2.97)	-0.0784*** (-2.96)	-0.0777*** (-2.94)				
<i>GDPgrowth</i>	0.5751 (0.48)	0.5366 (0.45)	0.6002 (0.51)	0.5575 (0.47)				
<i>Tangibility</i>					-0.1846*** (-5.82)	-0.1850*** (-5.82)	-0.1843*** (-5.75)	-0.1848*** (-5.76)
<i>Sales</i>					0.0114* (1.83)	0.0110 (1.71)	0.0115* (1.84)	0.0110 (1.72)
<i>ROA</i>					-0.1809 (-1.26)	-0.1879 (-1.37)	-0.1819 (-1.27)	-0.1885 (-1.38)
<i>Creditor rights</i>					0.0026 (0.37)	0.0035 (0.51)	0.0028 (0.39)	0.0036 (0.52)
<i>Inflation</i>					-0.0000 (-0.50)	-0.0000 (-0.71)	-0.0000 (-0.50)	-0.0000 (-0.71)
<i>Salesgrowth</i>					0.2987 (1.40)	0.2866 (1.36)	0.2986 (1.39)	0.2867 (1.36)
Industry FE	No	No	No	No	No	No	No	No
Country FE	No	No	No	No	No	No	No	No
Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	At least 5 subs	At least 5 subs	At least 5 subs	At least 5 subs	At least 5 subs	At least 5 subs	At least 5 subs	At least 5 subs
Observations	7,317	7,317	7,317	7,317	6,969	6,969	6,969	6,969
Adj. R-sq	0.0890	0.0894	0.0895	0.0898	0.0134	0.0170	0.0138	0.0173

This table presents the estimates of Equation (4) for the variable *Scaled_VMI* where the dependent variables are the *Ln_ROA* and *DebtRatio*. Following De Simone et al. (2017), *Ln_ROA* is the natural logarithm of return on assets, measured as EBIT scaled by lagged total assets. *DebtRatio* is the subsidiary's total debt to total assets, as defined by Huizinga et al. (2008). *C* is the capital-weighted differential statutory tax rate between the affiliate and all related affiliates in the same multinational corporation. ***, ** and * label statistical significance at 1 %, 5 % and 10 % level, respectively. A constant is included but not reported. t statistics are given in the parentheses and standard errors are heteroscedasticity robust and clustered at the country level

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