Profit Shifting and Tax-Rate Uncertainty

Abstract

Using firm-level data for 1,084 parent firms in 24 countries and for 9,497 subsidiaries in 54 countries, we show that tax-motivated profit shifting is larger among subsidiaries in countries that have stable corporate tax rates over time. Our findings further suggest that firms move away from transfer pricing and toward intragroup debt shifting that has lower adjustment costs. Our results are robust to several identification methods and respecifications, and they highlight the important role of tax-rate uncertainty in the profit-shifting decision while pointing to an adjustment away from more costly transfer pricing and toward debt shifting.

Keywords: International taxation, profit shifting, transfer pricing, debt shifting, multinational firms, taxation uncertainty
JEL codes: F23, H25, H32, M41; M48

1. Introduction

There is a growing perception, informed by empirical evidence, that governments lose a significant amount of tax revenue to profit shifting within multinational enterprises (MNEs). Media reports provide multiple examples of alleged profit shifting among large, well-established corporations that transfer income from high-tax-rate countries to low-tax-rate countries in order to increase after-tax profits. The importance of this issue is highlighted in the 2012 Base Erosion and Profit Shifting (BEPS) project by the Organization for Economic Co-operation and Development (OECD) and the G20 countries to fight profit shifting.

In this study, we examine how tax-rate uncertainty in MNE host countries affects firms' profit-shifting behavior. Tax-motivated profit (or income) shifting involves two mechanisms that move income from high-tax jurisdictions to low-tax jurisdictions: transfer pricing and international debt shifting. Transfer pricing involves manipulating the prices of transactions within the MNE group. For example, to lower taxes, an MNE might charge artificially low prices for goods sold to a subsidiary in a low-tax country. Debt shifting (also called earnings stripping via interest in the United States) occurs when a group's company in a high-tax jurisdiction borrows from a group's lender in a low-tax jurisdiction. The borrower pays interest and deducts that interest in the high-tax jurisdiction, and the lender receives interest and recognizes taxable income in the low-tax jurisdiction.

We first hypothesize that profit-shifting activity is higher for MNE subsidiaries in low-tax countries with stable corporate tax rates (countries with low tax uncertainty) compared with those in low-tax countries that frequently change their corporate tax rates (countries with high tax uncertainty). The reasoning is that low-tax jurisdictions with stable tax rates increase the probability that an MNE benefits from profit-shifting activity. Empirical analysis of this hypothesis

is important to better identify countries that serve as hosts to profit-shifting flows and to determine the volume of these flows within such countries.

Second, given that higher tax-rate uncertainty implies additional costs for MNEs, we hypothesize that MNEs adopt tax-planning strategies that have relatively low costs. Hence, we hypothesize that when tax-rate uncertainty is high, MNEs shift away from costly forms of profit shifting (such as transfer pricing or relocation of intangible assets) and toward intra-group debt arrangements.

We use a panel dataset with a maximum of 1,084 parent firms from 24 countries and 9,497 subsidiaries in 54 countries from 2010 through 2013. We limit our analysis to the post-global financial crisis period to avoid contaminating our findings with developments during that period.[1] We measure tax-rate uncertainty using either changes in corporate tax rates or the volatility in those rates in subsidiary countries.

Our main empirical identification method builds on the difference-in-differences (DID) model introduced by Dharmapala and Riedel (2013). This model identifies the aggressiveness of profit shifting by examining earnings shocks at the parent-company level and their propagation toward subsidiaries. Specifically, the main premise is that an exogenous increase in a parent company's profits implies increased profit shifting to subsidiaries in low-tax-rate countries. We measure exogenous shocks to the parent company via a variable based on the pretax profits of other firms in the same industry and country (Bertrand et al., 2002). To ensure that we examine only true exogenous shocks, we restrict our empirical analysis to subsidiaries in industries (and countries) other than those of their parent companies.

[1] In fact, we show that profit shifting is significantly weaker during 2007–2009.

We split our sample between subsidiary countries that change their corporate tax rates during the previous three or four years (countries with high tax-rate uncertainty) and those that did not (countries with low tax-rate uncertainty). Our findings indicate significant profit shifting toward subsidiaries in countries with low tax uncertainty and insignificant profit shifting toward subsidiaries in countries with high tax uncertainty. Specifically, for parent firms experiencing an earnings shock of 10%, their subsidiaries in countries with low tax-rate uncertainty report an approximately 0.92% increase in earnings before taxes compared to countries with high tax-rate uncertainty. Moreover, our estimate of profit shifting toward countries with low tax-rate uncertainty is more than twice the equivalent effect in Dharmapala and Riedel (2013), who do not examine the effects of tax-rate uncertainty.

This baseline finding is robust to the identification of profit shifting using the so-called tax-differential approach in Hines and Rice (1994) and Huizinga and Laeven (2008) instead of the DID method. Furthermore, profit shifting is more aggressive when we measure tax-rate uncertainty using corporate tax-rate volatility or when using a forward-looking measure such as the Economic Policy Uncertainty Index (Baker et al., 2015). We also show that profit shifting is weak in countries with high tax-rate uncertainty even when tax rates decrease. Our explanation for this seemingly counterintuitive finding is that frequent tax changes in a subsidiary country make inaccurate predictions of tax benefits more likely and/or raise the possibility of an imminent tax-rate increase.

Importantly, when tax rates are uncertain, firms conduct profit shifting using methods they can adjust quickly and at low cost. In line with Dyreng and Markle (2016), we argue that transfer pricing is more costly because of several nonnegligible fixed and variable costs. For example, a company engaging in transfer pricing needs to invest in tax experts (McGuire et al., 2012) who in turn require additional administrative employees, which significantly increases the associated

expenses. Further, transfer pricing entails compliance costs, as countries negotiate and/or form bilateral agreements for tax cooperation. This pushes companies to hire executives with "know how" of the countries where major low-tax subsidiaries operate (e.g., Masulis et al., 2012). Firms also incur initial expenses for shared-cost agreements, which are related to the relocation of intangibles.

Given the costs of transfer pricing, our results might be due to adjustments, whereby MNEs use less costly intragroup debt shifting instead. Debt shifting is much less expensive in our setting, because when tax rates increase or fluctuate firms just repay their debt. Our findings are fully in line with the cost-adjustment findings in Dyreng and Markle (2016), given the strong and persistent effect that tax-rate uncertainty in low-tax subsidiary countries has on MNE intragroup debt shifting. This finding is also in line with recent literature that examines firms' trade-offs between tax benefits and costs (e.g., Hopland et al., 2018 Saunders-Scott, 2015; Nicolay et al., 2016).

Our results contribute to the profit-shifting literature in three ways. Primarily, our research is the first to examine how tax-rate uncertainty affects firms' profit-shifting behavior. We find that, on average, profit shifting is aggressive only as long as tax-rate uncertainty in subsidiaries' countries is low, reinforcing the view that efforts to reduce MNEs' profit shifting must focus on countries with stable corporate tax rates. Second, our findings provide a new explanation for the relatively low level of profit shifting in global samples without differentiation by country type. By focusing on tax-rate uncertainty, we obtain a much clearer perspective on the location and timing of profit-shifting volumes. In other words, once we generate a relatively level playing field in terms of tax-rate uncertainty in subsidiary countries, we find profit-shifting volumes that are substantially higher than in the current literature. Third, our study adds to the literature examining the substitutability of various tax-planning strategies to lower potential costs. We provide evidence

for a cost-adjustment mechanism, whereby MNEs respond to high tax-rate uncertainty by using intracompany debt shifting rather than transfer pricing, given that the former is easier and cheaper to adjust.

The remainder of this study is organized as follows. Section 2 summarizes existing literature and provides testable hypotheses. Section 3 discusses our empirical strategy and presents the data set. Section 4 discusses the empirical findings, and section 5 presents our conclusions.

2. Setting the context

2.1. Summary of the related literature and contribution of our study

The empirical literature documents that MNEs engage in tax-motivated profit shifting to subsidiaries in low-tax jurisdictions. In general, profit shifting includes transfer pricing (i.e., intragroup transactions), debt shifting (i.e., transferring intragroup debt), and intangibles (e.g., patents) relocation. In an influential study, Hines and Rice (1994) suggest that total reported subsidiary income has two parts: "true" income from production (labor and capital) and "shifted" income from profit-shifting activities. Thus, shifted income is not attributable to a subsidiary's own resources.

Since Hines and Rice's (1994) study, the literature has significantly advanced in terms of procedures used to identify profit shifting empirically; we outline here only the studies most closely related to our research.[2] Huizinga and Laeven (2008), for example, identify profit shifting by constructing a weighted tax difference that uses information for all of a multinational group's affiliates instead of the simple tax difference between parent and subsidiary firms in Hines and Rice (1994). This procedure accounts for the possibility of shifting income from a high-tax

[2] For a thorough review of the literature and empirical identification methods, see Dharmapala (2014).

subsidiary to a low-tax subsidiary, rather than generally shifting income from parent companies to subsidiaries. The results provide strong evidence of profit shifting. In turn, Dharmapala and Riedel (2013) identify profit shifting through exogenous industry shocks on the parent firm's earnings and the propagation of these shocks toward their subsidiaries (a DID model).[3]

A number of studies examine the aggressiveness of profit shifting using these two methods. For example, Dischinger and Riedel (2011) and Karkinsky and Riedel (2012) examine the tax-motivated shifting of intangible assets toward low-tax subsidiaries. They find that the lower a subsidiary's corporate tax rate is relative to other affiliates of a multinational group, the higher its intangible asset investment.

Importantly, a few recent studies examine the driving forces of profit shifting. Markle (2016), for instance, investigates how territorial and worldwide tax systems affect MNEs' decisions to shift taxable income abroad. He finds that multinationals subject to territorial tax regimes shift more income than those subject to worldwide tax regimes, but the change is not statistically different when the worldwide firms can defer repatriation of the shifted income. In addition, Klassen and Laplante (2012) use a panel of U.S. MNEs from 1988 through 2009 to examine the role of the regulatory cost of profit shifting. They show that U.S. MNEs become more active at shifting income as the regulatory costs of shifting decrease. Dharmapala and Hines (2009) link profit shifting with the quality of country-specific governance institutions and find that better-governed countries are much less likely to become tax havens. Sugathan and George (2015), using data from foreign subsidiaries operating in India from 2001 through 2010, also examine how the quality of institutions and corporate governance affect profit shifting.

[3] Many alternative approaches exist in the tax accounting literature. For example, Collins et al. (1998) use consolidated data and assume that the pretax rate of return on foreign sales is a function of the return on worldwide sales in the absence of income shifting. If, instead, the return on foreign sales is a function of tax incentives after controlling for the worldwide return on sales, then this is attributable to profit-shifting activity.

Dyreng and Markle (2016) examine the relation between the need for funding and the level of profit shifting for U.S. multinationals. They argue that several costs are associated with profit shifting and find that financially constrained U.S. multinationals shift less income from the United States to other countries than do their unconstrained peers. Given the worldwide tax system, U.S. multinationals have incentives to avoid repatriating their foreign earnings. Financially constrained multinationals incur high costs in borrowing from external capital markets: the higher the financial constraint, the higher the cost of funding. These firms are unable to defer repatriation of their foreign earnings and, therefore, they pay all the associated "participation" costs and reap significantly less (or even zero) benefits from profit shifting (because these profits will be taxed). In a nutshell, financially constrained firms in a worldwide tax system have less motivation to shift income toward low-tax jurisdictions.

Our study builds on Dyreng and Markle (2016) in the sense that there is a source of variation in profit shifting: instead of financial constraints, we examine the role of tax-rate uncertainty in the subsidiary's country. Further, and quite important, we distinguish between the two key forms of profit shifting: transfer pricing and debt shifting. Most if not all the costs of profit shifting are related to transfer pricing and not to debt shifting; thus, we highlight the possibility that firms adjust costs by using relatively cheap debt shifting in jurisdictions where tax uncertainty is high.[4] We provide more details on this issue in developing our second hypothesis below.

2.2. Hypotheses development

[4] Scholes et al. (2015) also suggest that the tax-uncertainty cost is nonnegligible for firms. Many corporations would reorganize their tax-planning strategies if they could be aware of a change. However, as they explicitly mention "…for most of them, the tax and nontax costs of the reorganization exceeded the tax benefits. If these firms knew when they first organized that the law would change in the future to favor partnerships, many of them might have organized as a partnership from the start…"

Ideally, profit shifting should be a value-enhancing activity for an MNE. MNEs would not engage in such activity if the expected gains did not exceed the expected tax administration costs, opportunity and transaction costs, and reputation costs, as well as possible court penalties. In addition to these costs, however, other risk factors are exogenous to MNE internal operations. In this study, we note that tax-rate uncertainty in a subsidiary's country negatively influences profit shifting to that subsidiary.

A parent company engaging in profit shifting is concerned about both the difference between its own tax rate and that of its subsidiary, as well as the next period's realized tax benefits.[5] However, tax-rate uncertainty varies among countries and across time. In turn, the frequency of changes and volatility in corporate tax rates increase uncertainty for an MNE (Edmiston et al., 2003; Edmiston, 2004). Jacob and Schütt (2015), working in a tax-avoidance framework, utilize the standard deviation of effective tax rates. In each case, higher tax-rate volatility is associated with increased risk of inaccurately predicting profit-shifting benefits, and such uncertainty is clearly costly for the MNE.

Even if an outcome favors MNEs (i.e., an unexpected tax reduction in the subsidiary's country), MNEs prefer predictability. There are three reasons. First, the parent company could shift more income and thus receive higher gains. Second, if firms anticipate a tax reduction in the next period, they could postpone shifting their income until the change occurs. Third, high volatility in tax rates could mean an increase in the next period. Such uncertainty increases the MNE's "cost" of profit shifting and thus has a negative effect on the tendency to shift taxable income. Based on the foregoing arguments, we formulate the following testable hypothesis:

[5] This argument is in line with Armstrong et al. (2015), who consider tax avoidance a risky investment with an uncertain outcome.

H_1: MNEs shift fewer profits to countries with high tax-rate uncertainty.

MNEs seek to reduce their global tax liabilities in several ways. In doing so, MNEs are likely to trade off the benefits of their tax-planning activities with the associated costs (Dyreng et al., 2016) and adjust their profit-shifting strategies accordingly. Profit shifting per se is not a costless process (e.g., Huizinga and Laeven, 2008), and not all profit-shifting strategies have the same cost.

Our second testable hypothesis is thus motivated by recent studies that examine the substitutability of various tax-planning strategies (e.g., Hopland et al., 2018; Saunders-Scott, 2015; Nicolay et al., 2016). According to this literature, when a cost increase affects an MNE's tax-planning strategy (e.g., stricter transfer-pricing regulations), the MNE replaces a high-cost income shifting strategy with a low-cost one. In our case, tax-rate uncertainty in a subsidiary country increases the cost of profit shifting for MNEs because it makes the final benefit more uncertain.

According to Dyreng and Markle (2016), transfer pricing can be particularly costly to set up and costly to unwind or change. A series of nonnegligible fixed and varying costs are associated with transfer pricing. First, a company engaging in transfer pricing almost usually needs tax experts (McGuire et al., 2012). In modern, large corporations these tax experts are associated with a number of administrative employees, and this generates significant total administrative costs. Further, transfer pricing risk entails compliance costs, and MNEs usually hire executives with the "know how" of the subsidiary countries (e.g., Masulis et al., 2012). Another cost closely related with the relocation of intangibles is the payment for shared-cost agreements.

These costs are much less associated with debt shifting. MNEs, as value-maximizing entities, first consider all the costs and benefits and then choose optimal tax-planning strategies.

This implies potential adjustment-cost mechanisms, whereby MNEs favor debt shifting over transfer pricing. That is, when tax rates are uncertain, firms favor debt shifting because they can just repay their debt and avoid the costs associated with transfer pricing. In the context of the foregoing theoretical arguments, we state our second testable hypothesis as follows:

H2: When uncertainty about tax rates increases and the cost of profit shifting increases, MNEs move away from transfer pricing and toward intragroup debt shifting that has lower adjustment costs.

3. Empirical strategy and data

3.1. Identifying profit shifting and the role of tax-rate uncertainty

To identify profit shifting, we rely mainly on the DID model from Dharmapala and Riedel (2013). The basic concept is to observe how an exogenous shock affects the parent's pretax and preshifting profit, $\tilde{\pi}_{pt}$. We consider subsidiaries of MNEs in low-tax-rate countries as the treatment group and those in high-tax-rate countries as the control group. We expect that an increase in parent companies' pretax and preshifting profits (i.e., a positive earnings shock) exerts a positive effect on the pretax profits of low-tax-rate subsidiaries relative to those of high-tax-rate subsidiaries.

The empirical model takes the following form:

$$log\pi_{it} = \varphi_i + \beta_1 log a_{it} + \beta_2 log\tilde{\pi}_{pt} + \beta_3\left(d_{it} \cdot log\tilde{\pi}_{pt}\right) + \beta_4 d_{it} + \beta_5 X_{it} + \rho_t + e_{it} \quad (1)$$

The dummy variable d_{it} is the DID identifier, which equals 1 if the subsidiary faces a lower corporate tax rate than the parent firm, and zero otherwise. In line with Dharmapala and Riedel (2013), we also control for subsidiary i's size, a_{it}, as well as a vector of time-varying subsidiary

and country characteristics, X_{it}. Finally, ρ_t is a set of fixed effects of different dimensions (i.e., subsidiary, year, industry-year, and country-year fixed effects), and *e* is the remainder disturbance. Below, we provide details on all variables in equation (1).

To construct $\tilde{\pi}_{pt}$, we follow Bertrand et al. (2002) and use the following system of equations:

$$\tilde{\pi}_{pt} = \tilde{p}_{pt} * \alpha_{pt} \quad (2)$$

$$\tilde{p}_{pt} = \sum_j \frac{\alpha_{jt}}{\sum_j \alpha_{jt}} * p_{jt}, p \neq j, \forall\, t \in \{1, \dots, T\} \quad (3)$$

In equations (2) and (3), α_{pt} denotes the total assets of subsidiary i's parent firm p, α_{jt} is the total assets of comparable parent firms j in year t, and $p_{jt} = \pi_{jt}/\alpha_{jt}$ denotes the comparable parents' pretax profit over total assets.[6]

A firm is comparable if it is in the same industry (i.e., has the same four-digit NACE code) and country in a given year as parent firm *p*. To construct the set of comparable firms, we use all national and multinational firms in Orbis for which information on profits and total assets is available (amounting to more than a million observations).[7] We keep the subsidiary-year combinations in our sample only if (i) each set of comparable firms includes at least 10 firms and (ii) the subsidiaries operate in different four-digit NACE industries than their parent companies. The first requirement increases our measure's accuracy by providing a sufficient level of information about each industry. The second requirement prevents industry shocks from driving the reported pretax profits of each subsidiary.

[6] Even though we have the variable for the true parent earnings, using $\tilde{\pi}_{pt}$ is necessary to exogenize the shocks and follow a valid DID approach. Importantly, the correlation between the true parent earnings and $\tilde{\pi}_{pt}$ is 0.85. The descriptive statistics of the two variables are also similar, with $\tilde{\pi}_{pt}$ exhibiting (as expected) somewhat larger variation. Using the true parent earnings, we obtain very similar results.

[7] To avoid the correlation that naturally arises if we include a firm itself in the calculation of its industry profitability and then use that industry's profitability to predict the firm's profit, we exclude the firm from the set of comparable firms.

Notably, as in Dharmapala and Riedel (2013), profit shifting is only derived from $\hat{\beta}_3$ and not from the total effect of $\tilde{\pi}_{pt}$. In other words, the coefficient $\hat{\beta}_2$ does not reflect income shifted to a subsidiary; it reflects a comovement between parent shocks and subsidiary profits. This comovement can be due, for example, to productivity linkages between parent and subsidiary profits. If tax-motivated profit shifting occurs, then we expect $\hat{\beta}_3$ to be positive.[8] This would imply that an increase in parent pretax and preshifting profits, $\Delta\tilde{\pi}_{pt}$, (i.e., a positive earnings shock) propagates asymmetrically toward low-tax subsidiaries rather than toward high-tax subsidiaries. In line with Sugathan and George (2015), however, we additionally use the statutory corporate tax-rate differences or the statutory tax rate in the parent or subsidiary countries instead of an indicator that separates low- and high-tax-rate subsidiaries.

An important identification choice comes from splitting the sample and estimating equation (1) twice for high and low levels of tax-rate uncertainty. The alternative would be to use a triple interaction term between the variables capturing profit shifting ($d_{it} \times log\tilde{\pi}_{it}$) and each measure of uncertainty.

We chose our approach for two reasons. First, a triple interaction might cloud inferences because of the considerable nonlinearity in the model (it might even require nonparametric econometrics). Second, a triple interaction affects only the slope of that specific independent variable, leaving all other slopes (on control variables and fixed effects) and the intercept constant. It is very likely, however, that we must interact other control variables with the uncertainty measure for robust identification to prevent the triple interaction from capturing other heterogeneous effects of tax-rate uncertainty and thus erroneously measuring profit shifting.

[8] Under an extreme scenario, β_3 could be negative. If for a certain period a large number of low-tax-rate subsidiaries are systematically located in countries with high tax-rat uncertainty (i.e., in countries with frequently changing corporate tax rates) and the corporate tax rate rises, then the MNE will see an increase in the "cost" of profit shifting.

Interacting all right-hand-side variables, including fixed effects, with the risk measure places further strain stemming from nonlinearity and multicollinearity.

We examine the sensitivity of our results when using the tax-differential approach to identify profit shifting. This approach, initially developed by Hines and Rice (1994) and refined by Huizinga and Laeven (2008), is also used widely in the empirical profit-shifting literature. Because we use the tax-differential approach only in our robustness tests, we provide details in the appendix.

3.2. Identifying debt shifting and the role of tax-rate uncertainty

Identifying the magnitude of debt shifting is a less direct process. No suitable database, including Orbis, provides data on within-MNE debt. Thus, as in the extant literature, we infer the size of debt shifting using the proportion of a parent MNE's leverage attributable to low-tax subsidiaries (e.g., Dharmapala and Riedel, 2013). To this end, instead of equation (1), we estimate the following specification:

$$Parent\ leverage_{pt} = \varphi_p + \gamma_1 log\alpha_{pt} + \gamma_2 log\tilde{\pi}_{pt} +$$

$$\gamma_3\left(f_{pt} \cdot log\tilde{\pi}_{pt}\right) + \gamma_4 f_{pt} + \gamma_5 X_{pt} + \rho_t + e_{pt}, \qquad (4)$$

where $Parent\ leverage_{pt} = (Total\ debt_{pt}/Total\ assets_{pt})$ and f_{pt} is the fraction of the parent's subsidiaries that are in countries with tax rates lower than those of the parent country at time t.

Apart from Dharmapala and Riedel (2013), this approach using f_{pt} is in line with Huizinga et al. (2008), who show that international debt shifting reflects the tax regimes of all countries in which the MNE operates, rather than only the bilateral tax-rate differences between subsidiary countries and parent countries.

Unlike in equation (1), we estimate equation (4) using data for parent firms. Similar to Dharmapala and Riedel (2013), we argue that a positive and significant coefficient on the interaction term *Fraction of low-tax subsidiaries* × *Parent profit* suggests that the higher the parent's earnings, the higher its debt-to-asset ratio if the parent has a large proportion of subsidiaries in countries with lower corporate tax rates than its own (i.e., significant debt shifting). The idea is that having controlled for factors such as parent earnings, parent total assets, and a large set of fixed effects (parent, year, parent industry, parent country, and country-pair fixed effects), a systematic influence of the fraction of low-tax-rate subsidiaries on parent leverage is attributable to internal strategic uses of debt. Similar to our analysis of profit shifting, we split the sample and estimate equation (4) twice for high and low levels of tax-rate uncertainty. Thus, a necessary condition for our second hypothesis is to identify statistically significant debt shifting for both high- and low-tax-uncertainty countries, while a sufficient condition is the debt shifting to be higher for the high tax-rate uncertainty country. The sufficient condition generates interest income in the countries that have relatively low tax rates but high tax-rate uncertainty.

Our main goal is to examine how tax-rate uncertainty affects profit shifting. The model of equations 1-3 (or that with equation 4) serves this goal by limiting endogeneity concerns and allowing us to exploit the continuous variation in the parent earnings measure instead of relying on infrequent and episodic changes in corporate tax rates. However, our model has two drawbacks. First, it measures debt shifting between a parent in a high-tax jurisdiction that borrows from a subsidiary in a low-tax jurisdiction. Thus, the test does not consider subsidiary-to-subsidiary borrowing or any other general intragroup debt shifting; data to examine such flows are unavailable. Second, as noted in the literature (e.g., Dowd et al., 2017; Tørsløv et al., 2018), even the most comprehensive databases in terms of international coverage (e.g., Orbis) have limited

coverage for tax havens. We should note, however, that both drawbacks create a more conservative profit-shifting estimation. We expect that, if anything, our results are stronger if our profit-shifting measure is more inclusive across these two dimensions-limitations in our data.[9]

3.3. Data

Our empirical analysis relies mainly on firm-level data from Orbis (i.e., unconsolidated data for parent and subsidiaries), which provides accounting data for national and multinational firms worldwide, as well as information on their ownership structure and links between parent companies and subsidiaries. A firm is defined as a subsidiary if another firm (i.e., the parent) owns more than 50% of its shares. The parent firms in our sample are the ultimate owners of multinational groups and have at least one subsidiary in another country.

A drawback to the Orbis data is that ownership structure is available only for the last reported year. In line with previous studies, this limitation is not a key concern, because the potential misclassification of parent/subsidiary connections would, if anything, bias our results toward zero (e.g., Budd et al., 2005).

To construct the instrument for true parent earnings $\tilde{\pi}_{pt}$ in equation (2), we use the parent firm's assets α_{pt}. Orbis and virtually any other database has very limited information on unconsolidated parent assets (see, e.g., Tørsløv et al., 2018). Thus, we begin with the parent's consolidated total assets and subtract the assets of all subsidiaries that are available in Orbis. This method is not perfect, because some subsidiaries might not be listed in Orbis; note, however, that the correlation between these unconsolidated assets and our measure is as high as 93% for the limited number of parent firms for which unconsolidated assets are available. Thus, we expect that

[9] Using a more inclusive profit-shifting measure probably comes at the cost of limiting causal claims.

α_{pt}in equation (2) is very close to true parent firm assets. If we exclude the profits of the consolidated parent firms, we might lose an important part of profit shifting.

The only part of these profits that should be excluded is that of subsidiary *i*. As discussed, however, for the weighted average industry profitability index $\tilde{p}_{pt}$ (i.e., the ROA of the parent industry) in equation (2), we use data for comparable firms; thus, we exclude the profits of subsidiary *i*. In turn, for α_{pt} in equation (2), we avoid double-counting the assets of subsidiary *i* in the parent's consolidated statement by subtracting the total assets of the subsidiary from those of the parent.

After dropping missing observations for our main variables, our sample includes 9,497 subsidiaries from 54 countries and 1,084 parent firms from 24 countries for 2010 through 2013. Excluding the period of the global financial crisis mitigates relevant effects on financial statements and income-shifting incentives. In table A1 of the appendix, we provide summary statistics for parent firms by country, and in table A2 we provide the equivalent information for subsidiaries.[10]

We formally define all variables in the empirical analysis in table 1 and provide the data sources. In line with previous studies (Dharmapala and Riedel, 2013; Markle, 2016), we measure subsidiary *i*'s profits at time *t* using the log of pretax earnings (i.e., earnings before taxes, or EBT). We use logs because of the high skewness of EBT (e.g., Hines and Rice, 1994; Dharmapala and Riedel, 2013; Markle, 2016). This practice also limits our sample to subsidiaries with positive earnings before taxes. EBT includes financial income and payments; it is thus suitable for detecting total profit shifting.

[Insert Table 1 about here]

[10] Note that these tables show the total number of all available parents and subsidiaries in our sample. Our estimations drop out singleton groups (because of the fixed effects used), however, and therefore the actual number of observations in each regression is smaller.

To construct variables *d* and *f* in equations (1) and (4), respectively, we use statutory tax rates. Our choice is theoretically justified, given that multinationals shift profits among subsidiaries that are already abroad and can take advantage of tax allowances in countries where they operate. Thus, the advantage of transferring a dollar of profit from a country with high tax uncertainty to a country with low tax uncertainty depends on differences in statutory rates (for a thorough discussion, see the appendix and Devereux and Maffini, 2007).

To split our sample into low-tax-uncertainty and high-tax-uncertainty countries, we first examine the frequency of changes in corporate tax rates. Edmiston et al. (2003) argue that "… frequent changes in tax law can generate uncertainty about the return on an investment in future periods. Ample examples of government capriciousness in the tax treatment of firms are available to support doubts of government credibility in maintaining any given tax policy." To this end, we separately estimate equation (1) for subsidiaries in countries where corporate tax rates change during the previous three years and for those in countries where corporate tax rates remain unchanged during the same period. Table A3 reports summary statistics for these two subgroups, and table A4 reports correlations among the main variables in this empirical study. We find many statistically significant correlations, but most generate a small coefficient.

We also examine the sensitivity of our estimations when defining tax-rate uncertainty with (i) stability of corporate tax rates over four years (instead of three) and (ii) volatility in tax rates, measured by the standard deviation of corporate tax rates over three years (e.g., see Edmiston, 2004). Because the aforementioned measures of fiscal policy uncertainty are ex ante measures, we also use a forward-looking measure of uncertainty, namely the Economic Policy Uncertainty (EPU) Index, to test our first hypothesis (e.g., Baker et al., 2015). Finally, we differentiate between upside and downside risk using equivalent upside and downside changes in tax rates.

Concerning the control variables in equation (1), we use the log of total assets as a measure of subsidiary size and a vector of time-varying subsidiary and country characteristics, X_{it}.[11] Specifically, we use financial leverage, the subsidiary country's population (to control for market size), and GDP per capita (to control for the level of economic development). Notably, we also use a number of different fixed effects in alternative specifications, including subsidiary, year, industry-year, and country-year fixed effects that control for time-invariant characteristics in subsidiary countries over time (e.g., effects common to all subsidiaries in Australia in 2011), as well as country-pair-year fixed effects that control for time-invariant characteristics in parent/subsidiary countries over time (e.g., effects common to all U.S. subsidiaries in Australia in 2011).[12,13]

As reported in table 2, the average parent firm in our sample has pretax profits of USD $2.9 billion and total assets of USD $38.6 billion; the average subsidiary has pretax profits of USD $26.5 million and total assets of USD $286.2 million. Note that a few very profitable firms drive the rather high mean value for parent profits relative to the literature, in which the median parent profit is USD $920 million. Furthermore, the average statutory corporate tax-rate difference between parent and subsidiary firms in our sample is 5.1% (the median is 2.7%), varying between

[11] Alternatively, we could use other control variables for firm size, such as the log of fixed assets, the log of intangible assets, or the number of employees. The results are quantitatively and qualitatively very similar.

[12] Regressions with multiple levels of fixed effects very often entail singleton groups (i.e., groups with only one observation). According to Correia (2015), "Keeping singleton groups in such regressions is not only computationally inefficient, but overstates the statistical significance of the regression coefficients and might lead to incorrect inference." Dropping singleton observations results in a different number of observations in our regressions, depending on the type of fixed effects we use.

[13] In using MNEs in our context, it is important to control for unobserved heterogeneity between the parent and the subsidiary countries. For instance, Tong and Reuer (2007) find that, among others, the cultural distance between the parent and the subsidiaries' countries crucially affects risk for an MNE. Moreover, Tschoegl (2002) finds that lack of cultural distance between parent and subsidiary countries, as determined by language, helps to explain the growth of bank networks worldwide. Using country-pair-year fixed effects allows us to control for such unobserved heterogeneity.

–22.2% and 39.54%. In total, 55% of the subsidiaries in our sample face lower corporate tax rates than their parents do.

[Insert Table 2 about here]

4. Empirical results

4.1. Profit shifting and tax-rate uncertainty

We report our baseline estimation results in table 3. Columns 1 through 4 report estimations for (subsidiary) countries with high tax-rate uncertainty; they show that profit-shifting activity is weak, especially when we use the more restrictive fixed-effects models. In contrast, profit shifting for countries with low tax-rate uncertainty (columns 5 through 8) is quite strong, irrespective of which fixed effects we use. The relevant Hausman tests of the difference of the coefficient estimates between the countries with low and high tax-rate uncertainty show that systematic differences in the coefficients exist even at the 1% level.

[Insert Table 3 about here]

The coefficient estimates in columns 5 through 8 are also quite strong compared with equivalent estimates in previous studies. Based on the model with the most demanding fixed effects (column 8), if a parent experiences an earnings shock of 10%, its subsidiaries with low tax-rate uncertainty will report approximately 0.92% higher profits than its subsidiaries with high tax-rate uncertainty. This estimate is considerably higher than the equivalent 0.44% in Dharmapala and Riedel (2013). Thus, in line with H1, our results are consistent with the crucial role that tax-rate uncertainty in subsidiary countries plays in limiting profit shifting. It also highlights that estimated profit-shifting flows are indeed higher when considering the role of tax-rate uncertainty. Along these lines, our results augment the list of tax-haven characteristics in Dharmapala and

Hines (2009). We find that in addition to small population size, affluence, and high-quality governance, potential tax havens importantly provide stable corporate tax rates.

We perform extensive sensitivity tests on these baseline results. First, given the evolution of the world economy toward services and intangible assets, it seems reasonable to assume that subsidiary asset type is related to profitability and location (i.e., low-tax-rate countries). Intangible assets are easier to relocate than are tangible ones (Karkinsky and Riedel, 2012), and the profit margins related to intangible assets are arguably easier to inflate via profit shifting. Thus, intangible assets might be an important omitted variable. To this end, we reestimate the specifications of table 3, including *Intangible fixed assets*. We report the results in columns 1 and 5 of table 4 for the countries with high and low tax-rate uncertainty, respectively. The results are qualitatively and quantitatively similar to the baseline results in table 3.[14]

[Insert Table 4 about here]

Further, in the baseline specifications, we use the dummy variable d_{it} to separate the control (low-tax-rate subsidiaries) group from the treatment (high-tax-rate subsidiaries) group. This indicator variable allows only for a test in levels, so we examine the robustness of our results with *Corporate tax difference*. We expect that the higher the tax difference, the greater the profit shifting (Sugathan and George, 2015). The results are in columns 2 (high tax-rate uncertainty) and 6 (low tax-rate uncertainty) of table 4. Clearly the coefficient on *Corporate tax difference* × *Parent profit* is higher and larger in the low-tax-uncertainty specification.

Specifically, our estimate shows that a 1% increase in the corporate tax rate difference between a parent and its subsidiary results in a 1.04 % increase in profit shifting. This result is

[14] An argument can be made to include intangible fixed assets in a triple interaction term with the variables capturing profit shifting, because this variable can be a cross-sectional determinant of the magnitude of income shifting to low-tax-rate affiliates. However, the triple interaction term is statistically insignificant and does not affect inference on the double interaction term.

consistent with Huizinga and Laeven (2008), who use cross-sectional data. Furthermore, our estimate is twice as high as those of Sugathan and George (2015) and Dischinger et al. (2013), both of whom use longitudinal data. In a nutshell, our results based on tax differentials are consistent with the baseline results in table 3, where we use earnings shocks, and they are larger than equivalent results in the literature. This finding further highlights the effect of tax-rate uncertainty in producing profit-shifting flows.

In the rest of table 4, we cluster standard errors by country-pair (columns 3 and 7) and by country (columns 4 and 8); the significance of our results is unaffected. In turn, in table A5 we use a four-year period of corporate tax stability (instead of the three-year period in the previous specifications). Our results are again consistent with table 3.

As a third measure of tax-rate uncertainty, we examine corporate tax-rate volatility in subsidiary countries. We define a subsidiary country as high (low) fiscal risk if its corporate tax-rate volatility is higher (lower) than our sample's mean value. Table 5 replicates our baseline results. Across all specifications, the subsidiary countries with low tax-rate volatility attract more profit shifting. Further, in table A6 we examine the Economic Policy Uncertainty Index as an ex post measure of uncertainty for subsidiary countries. As shown in table A4, this index is positively correlated with both the year-by-year tax rate change (41%) and three-year tax rate instability (31%). Clearly, this measure captures uncertainty more broadly compared to our baseline tax-rate-uncertainty measure, and it is thus left as a robustness test. Once again, the results are in line with the baseline numbers in table 3. Across all estimations, subsidiary countries with high economic-policy uncertainty and, thus a more uncertain future environment, host lower amounts of profit shifting. Importantly, our results concerning the role of tax-rate uncertainty in subsidiary countries

(either in terms of the frequency of tax changes or in terms of tax-rate volatility) are robust to using Huizinga and Laeven's (2008) tax-differential approach (results are in table A7).

[Insert Table 5 about here]

As we note in section 2, positive and negative changes in tax rates can affect profit shifting asymmetrically. In table 6 we examine such asymmetries by replicating our baseline results for high-tax-uncertainty countries. The estimate on the triple interaction (*Low-tax subsidiary x Parent profit x Downward tax change*) equals 0.018 for the case of at least one tax reduction within a three-year period (column 1 of table 6) and 0.010 for a tax reduction within a four-year period (column 2 of table 6). Even though these estimates have the expected positive sign (i.e., an increase of profit shifting due to a downward change in tax rate), they are not statistically significant at any conventional level. This result shows that what is important in our sample is an environment of low and stable tax rates and that results are not asymmetric between tax-rate increases and decreases. We must note, however, that identifying such heterogeneity requires a longer sample period, within which a decrease in tax rates exists for a relatively long time.[15]

[Insert Table 6 about here]

In a nutshell, our results in this section are consistent with our first hypothesis. We find aggressive tax-motivated profit shifting only to subsidiaries' countries that have stable corporate tax rates (low tax-rate uncertainty).

4.2. Debt shifting to countries with tax-rate uncertainty

In this section, we test our second hypothesis on the aggressiveness of the debt-shifting channel within countries with high or low tax-rate uncertainty. Table 7 reports the results from estimating

[15] When we use the tax-differential approach (see columns 7–8 of table A8), we obtain the same outcome: There is no evidence of asymmetric effects for upward or downward tax changes in high tax-rate uncertainty countries.

equation (4) in the same fashion as table 3. The coefficient on the interaction term *Fraction of low-tax subsidiaries* × *Parent profit* is positive and statistically significant across both high-tax-uncertainty countries (columns 1 through 4) and low-tax-uncertainty countries (columns 5 through 8). Thus, our findings suggest extended debt shifting irrespective of tax-rate uncertainty. In fact, the results in table 7 suggest that debt shifting in high-tax-uncertainty subsidiary countries is more aggressive than in low-tax-uncertainty countries. The latter gives MNEs the opportunity to generate interest income in countries with low taxes but high tax-rate uncertainty. In line with our theoretical priors, our findings suggest a cost-adjustment mechanism, whereby MNEs favor debt shifting in high tax-rate uncertainty countries compared to more expensive transfer pricing.

[Insert Table 7 about here]

Symmetrically with our analysis on our first hypothesis, we conduct several robustness tests. First, in columns 1 and 4 of table 8 we examine the role of a parent's intangible fixed assets. We find a small decrease in the estimates, but the results remain highly statistically and economically significant. In columns 2 and 5 we cluster the standard errors at the country-pair-year level, and in columns 3 and 6 we cluster at the country-year level. These results are in line with those of table 7: when subsidiary countries have high tax-rate uncertainty, MNEs prefer debt shifting to transfer pricing.

[Insert Table 8 about here]

In table 9, we examine whether debt shifting under high and low tax-rate uncertainty is persistent for the EU 28 countries (columns 1 and 5), high-income countries (columns 2 and 6), G7 countries (columns 3 and 7), and countries with low divergence between cash-flow rights and voting rights (columns 4 and 8). The results once again are in line with those of table 7. As a final test, we examine the effect of different measures of tax-rate uncertainty. We report the results in

table A8, using tax volatility, four-year tax rate stability (instead of the three-year baseline measure), and the EPU.

[Insert Table 9 about here]

In a nutshell, debt shifting remains equally, if not more, important in both high tax-rate uncertainty countries and low tax-rate uncertainty countries. Our findings are consistent with our second hypothesis: when high uncertainty over tax rates exists, MNEs avoid expensive transfer pricing and favor cheaper debt shifting.

5. Conclusions

In this research, we focus on uncertainty in corporate tax rates as an important determinant of profit shifting within MNEs. We use a large dataset for MNEs and a well-established DID approach, which examines how earnings shocks at the parent-firm level affect subsidiaries in different industries and countries.

We differentiate between high and low tax-rate uncertainty in subsidiary countries, and we find extended profit-shifting activity only in the latter case. Economically, the results show that a 10% increase in parent profits leads to a 0.92% increase in earnings before taxes for subsidiaries in low-tax-uncertainty countries.

In contrast, we find that debt shifting related to intragroup loans exhibits strong statistical significance even in high-tax-uncertainty countries. This essentially implies that MNEs shift away from transfer pricing and toward intracompany debt in high-tax-rate-uncertainty countries (a cost-adjustment mechanism). This probably occurs because transfer pricing is costly to setup or unwind when tax rates change, whereas debt shifting involves simply repaying the debt.

The implications and directions for future research are quite notable. First, to identify profit shifting, researchers and policymakers should focus on low-risk countries, especially regarding fiscal risk in subsidiary countries. Future research might also reveal how other types of risk, such as institutional risk, affect profit-shifting activity. Related to this aspect, any policy action to countervail profit shifting by MNEs should target low-tax-uncertainty countries. Based on our findings, the extent of other types of tax-avoidance practices resulting from the riskiness of subsidiaries' countries is also a fruitful direction for future research. According to our results, researchers seem to underestimate profit shifting because global samples of firms do not account for the immense cultural and economic differences among subsidiary countries. Future research might also refine our results in terms of debt shifting and its complementarity with targets other than profit or value maximization.

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Table 1: Variable definitions and sources

Name	Description	Data source
Dependent variables		
EBT	Subsidiary's pretax profits (in logs).	Orbis
Parent leverage	Parent's total debt/total assets.	Orbis
Explanatory variables		
Total assets	Subsidiary's total assets (in logs).	Orbis
Parent profit	$\tilde{\pi}_{it} = \tilde{p}_{jt}\alpha_{it}$, where $\tilde{\pi}_{it}$ denotes the parent's pretax and preshifting profit. It is the product of the asset weighted average profitability of all firms in the same four-digit NACE (French acronym for Statistical Classification of Economic Activities in the European Community) industry code in the same country and the parent's total asset stock (i.e., $\tilde{p}_j = \sum_j \frac{\alpha_j}{\sum_j \alpha_j} p_j$, $i \neq j$ and $p_j = \frac{\pi_j}{\alpha_j}$).	Orbis, OECD, KPMG, own calculations
Parent profit (real)	Parent real pretax profits	Orbis
Low-tax subsidiary	Equals 1 if the corporate tax rate in the subsidiary's country is lower than the one in the parent's country and zero otherwise.	OECD, KPMG, own calculations
Leverage	Subsidiary's total debt to total assets.	Orbis
Population	Subsidiary country's permanent residents (in logs).	World Bank
GDP per capita	Subsidiary country's gross domestic product per capita (in logs).	World Bank
Intangible fixed assets	Subsidiary's intangible fixed assets (in logs).	Orbis
Corporate tax difference	The difference between the maximum statutory corporate tax rate of the parent firm and the subsidiary: $t^{parent} - t^{subsidiary}$.	OECD, KPMG
Fraction of low-tax subsidiaries	The fraction of the parent's subsidiaries that are in a country with a lower tax rate than the parent's country in year *t.*	Orbis, OECD, KPMG, own calculations
Parent total assets	Parent's total assets (in logs).	Orbis
Parent population	Parent country's permanent residents (in logs).	World Bank
Parent GDP per capita	Parent country's gross domestic product per capita (in logs).	World Bank
High tax-rate uncertainty	Equals 1 if the corporate tax rate in the subsidiary's country changed at least once during the last three years and zero otherwise.	Orbis, OECD, KPMG, own calculations
High tax-rate uncertainty 2	Equals 1 if the corporate tax rate in the subsidiary's country changed at least once during the last four years and zero otherwise.	Orbis, OECD, KPMG, own calculations
Upward tax change	Equals 1 if $t_t^{subsidiary} > t_{t-1}^{subsidiary}$ and zero otherwise.	OECD, KPMG
Economic policy uncertainty	The Economic Policy Uncertainty Index (EPU). Higher values show higher uncertainty.	Policyuncertainty.com
Downward tax change	Equals 1 if $t_t^{subsidiary} < t_{t-1}^{subsidiary}$ and zero otherwise.	OECD, KPMG
Labor cost	Subsidiary's total labor cost (in logs).	Orbis
Unweighted tax difference	Calculated as $utd_{it} = \sum_j \frac{(\tau_{it} - \tau_{jt})}{N}$, $i \neq j, \forall t \in \{1, \dots, T\}$, where N is the total number of affiliates in the corporate group at time t and τ is the subsidiary country's statutory corporate tax rate.	OECD, KPMG, own calculations
Parent cash flows to assets	The ratio of the parent's cash flows to total assets.	Orbis
Parent working capital	Parent's net current assets, which equals current assets minus current liabilities.	Orbis
Parent current assets	Parent's current assets.	Orbis

Table 2: Summary statistics

The table reports the number of observations, mean, standard deviation, minimum, and maximum values of the main variables in the empirical analysis. The variables are defined in table 1. The monetary units are in thousands of U.S. dollars (current prices of 2005), and population is in thousands of individuals.

2010–2013	Obs.	Mean	Median	Std. Dev.	Skewness	Min.	Max.
Dependent variables							
EBT	23,431	26,494	3,734	209,759	45.80	0.000	17,000,000
Parent leverage	23,431	0.613	0.630	0.169	-0.321	0.026	1.661
Explanatory variables							
Total assets	23,431	286,198	40,153	1,674,789	20.86	10.27	73,600,000
Parent profit	23,431	2,903,262	920,343	5,094,438	3.719	0.308	51,100,000
Parent profit (real)	23,431	2,610,256	866,100	5,628,081	7.095	3.158	79,000,000
Low-tax subsidiary	23,431	0.550	1.000	0.498	-0.199	0.000	1.000
Leverage	23,431	0.607	0.616	0.408	30.37	-0.172	33.93
Population	23,431	86,908	62,766	203,770	5.812	323.0	1,357,380
GDP per capita	23,431	33.05	37.15	12.78	-0.685	1.032	81.85
Intangible fixed assets	22,772	24,613	56.59	377,890	46.91	-115,034	24,300,000
Corporate tax difference	23,431	0.051	0.027	0.072	0.551	-0.225	0.395
Fraction of low-tax subsidiaries	23,431	0.553	0.500	0.366	-0.072	0.000	1.000
Parent total assets	23,431	38,600,000	12,000,000	63,000,000	2.903	4.695	377,000,000
Parent population	23,422	137,617	80,622	117,828	1.398	4,560	1,350,695
Parent GDP per capita	23,422	39.58	39.47	6.350	-1.438	2.870	65.62
High tax-rate uncertainty	23,427	0.315	0.000	0.464	0.797	0.000	1.000
High tax-rate uncertainty 2	23,427	0.419	0.000	0.493	0.330	0.000	1.000
Economic policy uncertainty	17,796	186.9	177.7	60.84	0.390	89.13	305.4
Upward tax change	23,429	0.024	0.000	0.153	6.222	0.000	1.000
Downward tax change	23,429	0.190	0.000	0.392	1.583	0.000	1.000
Parent cash flows to assets	23,431	0.0003	0.000	0.003	6.833	-0.063	0.205
Parent working capital	23,431	2,801,947	689,079	7,052,089	3.154	-33,000,000	64,000,000
Parent current assets	23,431	15,000,000	4,990,500	23,900,000	2.825	2,015	150,000,000

Table 3: Profit shifting and tax-rate uncertainty

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $log\pi_{it} = \varphi_i + \beta_1 loga_{it} + \beta_2 log\tilde{\pi}_{pt} + \beta_3(d_{it} \cdot log\tilde{\pi}_{pt}) + \beta_4 d_{it} + \beta_5 X_{it} + \rho_t + e_{it}$, which is estimated with robust standard errors clustered by subsidiary. The observational units are multinational subsidiaries whose parent firms are in other countries. The dependent variable is the log of *EBT*, and $log\tilde{\pi}_{pt}$ reflects the parent's profit; all variables are defined in table 1. Tax-rate uncertainty is defined by a three-year period of corporate tax rate stability. In columns 1 to 4 we include countries with high tax-rate uncertainty, and in columns 5 to 8 we include countries with low tax-rate uncertainty. The lower part of the table indicates the type of fixed effects in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary's country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary country and the parent country. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Dependent: EBT	**High tax-rate uncertainty**				**Low tax-rate uncertainty**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Low-tax subsidiary × Parent profit	0.066**	0.045	0.046	0.013	0.093**	0.090**	0.090**	0.092**
	[1.980]	[1.202]	[1.211]	[0.399]	[2.353]	[2.175]	[2.128]	[2.107]
Low-tax subsidiary	-0.787*	-0.528	-0.532		-1.180**	-1.154**	-1.192**	
	[-1.798]	[-1.080]	[-1.063]		[-2.139]	[-1.995]	[-2.021]	
Parent profit	0.002	0.015	0.011	0.050	-0.061	-0.087**	-0.086**	-0.086*
	[0.039]	[0.296]	[0.220]	[0.970]	[-1.517]	[-2.008]	[-1.973]	[-1.842]
Total assets	0.561***	0.558***	0.558***	0.562***	0.798***	0.856***	0.856***	0.843***
	[6.485]	[6.249]	[6.230]	[6.470]	[11.404]	[13.607]	[12.909]	[12.864]
Leverage	-0.382	-0.319	-0.314	-0.302	-0.799***	-0.997***	-0.991***	-0.952***
	[-1.625]	[-1.526]	[-1.487]	[-1.502]	[-3.598]	[-4.858]	[-4.741]	[-4.530]
Population	2.108	1.239			0.872	1.605		
	[0.477]	[0.252]			[0.670]	[1.120]		
GDP per capita	1.927	1.846			1.551***	1.776***		
	[1.467]	[1.199]			[3.005]	[3.321]		
Observations	3,498	3,414	3,410	3,375	9,640	9,506	9,522	9,330
Number of subsidiaries	1,513	1,477	1,475	1,461	4,299	4,243	4,250	4,168
Adjusted *R*-squared	0.862	0.864	0.864	0.865	0.878	0.880	0.880	0.882
Subsidiary effects	√	√	√	√	√	√	√	√
Year effects	√	√	√	√	√	√	√	√
Industry-year effects	-	√	√	√	-	√	√	√
Country-year effects	-	-	√	-	-	-	√	-
Country-pair-year effects	-	-	-	√	-	-	-	√

Table 4: Profit shifting and tax-rate uncertainty: Sensitivity analysis

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $log\pi_{it} = \varphi_i + \beta_1 loga_{it} + \beta_2 log\tilde{\pi}_{pt} + \beta_3(d_{it} \cdot log\tilde{\pi}_{pt}) + \beta_4 d_{it} + \beta_5 X_{it} + \rho_t + e_{it}$. The observational units are multinational subsidiaries whose parent firms are in other countries. The dependent variable is the log of *EBT*, and $log\tilde{\pi}_{pt}$ reflects the parent's profit; all variables are defined in table 1. The standard errors are clustered by subsidiary in columns 1-2 and 5-6, by country-pair in columns 3 and 7, and by country in columns 4 and 8. In columns 1 to 4 we include the results for countries with high tax-rate uncertainty, and in columns 5 to 8 we include the results for countries with low tax-rate uncertainty. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary country and the parent country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	High tax-rate uncertainty countries				**Low tax-rate uncertainty countries**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Low-tax subsidiary ×	0.003		0.013	0.013	0.120**		0.092**	0.092**
Parent profit	[0.073]		[0.507]	[0.602]	[2.159]		[2.179]	[2.063]
Corporate tax difference		-0.219				1.042***		
× Parent profit		[-0.451]				[2.588]		
Logarithm of total assets	0.555***	0.559***	0.562***	0.562***	0.873***	0.856***	0.843***	0.843***
	[3.875]	[6.236]	[5.607]	[9.183]	[10.149]	[12.875]	[10.379]	[7.581]
Leverage	-1.291***	-0.315	-0.302	-0.302	-0.747***	-0.993***	-0.952***	-0.952***
	[-4.183]	[-1.485]	[-1.377]	[-1.245]	[-3.249]	[-4.744]	[-3.782]	[-2.920]
Parent profit	0.134*	0.045	0.050	0.050	-0.101*	-0.075*	-0.086*	-0.086**
	[1.889]	[0.870]	[1.228]	[1.119]	[-1.786]	[-1.861]	[-1.820]	[-2.311]
Intangible fixed assets	0.007				0.010			
	[0.217]				[0.656]			
Corporate tax difference		3.779				-12.981**		
		[0.557]				[-2.422]		
Observations	1,423	3,410	3,375	3,375	6,308	9,522	9,330	9,330
Number of subsidiaries	631	1,475	1,461	1,461	2,830	4,250	4,168	4,168
Adjusted *R*-squared	0.915	0.864	0.861	0.861	0.882	0.880	0.877	0.877
Subsidiary effects	√	√	√	√	√	√	√	√
Year effects	√	√	√	√	√	√	√	√
Industry-year effects	√	√	√	√	√	√	√	√
Country-year effects	-	√	-	-	-	√	-	-
Country-pair-year effects	√	-	√	√	√	-	√	√

Table 5: Profit shifting and tax-rate uncertainty measured by the corporate tax-rate volatility

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $log\pi_{it} = \varphi_i + \beta_1 loga_{it} + \beta_2 log\tilde{\pi}_{pt} + \beta_3(d_{it} \cdot log\tilde{\pi}_{pt}) + \beta_4 d_{it} + \beta_5 X_{it} + \rho_t + e_{it}$, with robust standard errors clustered by subsidiary. The observational units are multinational subsidiaries whose parent firms are in other countries. The dependent variable is the log of *EBT*, and $log\tilde{\pi}_{pt}$ reflects the parent's profit; all variables are defined in table 1. High tax-rate uncertainty is defined by high corporate tax-rate volatility. In columns 1 to 4 we include subsidiaries in countries with high corporate tax-rate volatility, and in columns 5 to 8 subsidiaries we include subsidiaries in countries with low corporate tax-rate volatility. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary country and the parent country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	High corporate tax-rate volatility				**Low corporate tax-rate volatility**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Low-tax subsidiary ×	0.065**	0.050	0.051	0.050	0.071**	0.069**	0.071**	0.058*
Parent profit	[2.190]	[1.569]	[1.553]	[1.578]	[2.238]	[2.060]	[2.056]	[1.647]
Total assets	0.641***	0.635***	0.636***	0.633***	0.809***	0.841***	0.844***	0.836***
	[9.267]	[9.238]	[9.056]	[8.959]	[12.718]	[12.880]	[12.277]	[12.326]
Leverage	-1.033***	-0.948***	-0.941***	-0.917***	-0.425**	-0.462**	-0.460**	-0.462***
	[-4.592]	[-4.624]	[-4.516]	[-4.280]	[-2.289]	[-2.106]	[-2.239]	[-2.772]
Low-tax subsidiary	-0.798**	-0.612	-0.597		-0.893**	-0.872*	-0.940**	
	[-2.008]	[-1.437]	[-1.343]		[-2.057]	[-1.923]	[-1.996]	
Parent profit	0.028	0.050	0.048	0.056	-0.057	-0.073*	-0.073*	-0.082*
	[0.639]	[1.049]	[0.986]	[1.119]	[-1.550]	[-1.780]	[-1.754]	[-1.756]
Population	3.385	3.870			1.166	1.989		
	[0.755]	[0.826]			[0.916]	[1.431]		
GDP per capita	-0.334	-0.264			2.129***	2.358***		
	[-0.344]	[-0.248]			[4.135]	[4.440]		
Observations	4,633	4,546	4,544	4,479	9,858	9,733	9,749	9,543
Number of subsidiaries	1,879	1,843	1,842	1,818	4,272	4,220	4,227	4,163
Adjusted *R*-squared	0.880	0.883	0.882	0.883	0.873	0.874	0.874	0.877
Subsidiary effects	√	√	√	√	√	√	√	√
Year effects	√	√	√	√	√	√	√	√
Industry-year effects	-	√	√	√	-	√	√	√
Country-year effects	-	-	√	-	-	-	√	-
Country-pair-year effects	-	-	-	√	-	-	-	√

Table 6: Upward and downward changes in corporate tax rates for high tax-uncertainty countries

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $log\pi_{it} = \varphi_i + \beta_1 log a_{it} + \beta_2 log\tilde{\pi}_{pt} + \beta_3\left(d_{it} \cdot log\tilde{\pi}_{pt}\right) + \beta_4 d_{it} + \beta_5 X_{it} + \rho_t + e_{it}$, with robust standard errors clustered by subsidiary. The observational units are multinational subsidiaries whose parent firms are in other countries. The dependent variable is the log of *EBT*, and $log\tilde{\pi}_{pt}$ reflects the parent's profit; all variables are defined in table 1. In column 1 we examine the effect of a decrease in subsidiary corporate tax rate in countries with a three-year tax-instability period. In column 2 we examine the effect of a decrease in subsidiary corporate tax rate in countries with a four-year tax-instability period. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary country and the parent country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Period: 2011–2013	**(1)**	**(2)**
Low-tax subsidiary × Parent profit × Downward tax change	0.018	0.010
	[0.221]	[0.194]
Low-tax subsidiary × Parent profit	0.006	0.013
	[0.111]	[0.283]
Total assets	0.552***	0.646***
	[6.411]	[7.467]
Leverage	-0.298	-0.325
	[-1.501]	[-1.634]
Parent profit	0.080	0.075
	[1.180]	[1.244]
Parent profit × Downward tax change	-0.027	-0.017
	[-0.405]	[-0.476]
Observations	3,413	4,216
Number of subsidiaries	1,480	1,855
Adjusted *R*-squared	0.869	0.867
Subsidiary effects	√	√
Year effects	√	√
Industry-year effects	√	√
Country-year effects	-	-
Country-pair-year effects	√	√

Table 7: Debt shifting and tax-rate uncertainty

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $Parent\ leverage_{pt} = \varphi_p + \gamma_1 log\alpha_{pt} + \gamma_2 log\tilde{\pi}_{pt} + \gamma_3(f_{pt} \cdot log\tilde{\pi}_{pt}) + \gamma_4 f_{pt} + \gamma_5 X_{pt} + \rho_t + e_{pt}$, estimated using standard errors clustered by subsidiary. The observational units are multinational parent firms. The dependent variable is parent leverage, $log\tilde{\pi}_{pt}$ reflects the parent's profit, and all variables are defined in table 1. In columns 1 to 4 we include countries with high tax-rate uncertainty, and in columns 5 to 8 we include countries with low tax-rate uncertainty. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary country and the parent country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	High tax-rate uncertainty				**Low tax-rate uncertainty**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Fraction of low-tax	0.021***	0.027***	0.028***	0.033***	0.015*	0.019***	0.016**	0.023***
subsidiaries × Parent profit	[2.952]	[3.415]	[3.457]	[4.015]	[1.659]	[2.635]	[2.219]	[3.823]
Parent total assets	0.031***	0.029***	0.031***	0.036***	0.042***	0.029***	0.024***	0.026***
	[3.517]	[3.217]	[3.654]	[3.676]	[2.731]	[3.023]	[2.681]	[3.362]
Fraction of low-tax	-0.250***	-0.333***	-0.339***	-0.424***	-0.176	-0.210**	-0.169*	-0.278***
subsidiaries	[-2.862]	[-3.505]	[-3.559]	[-4.151]	[-1.583]	[-2.337]	[-1.871]	[-3.673]
Parent profit	-0.017**	-0.017**	-0.018**	-0.023***	-0.005	0.002	0.004	-0.005
	[-2.349]	[-2.374]	[-2.515]	[-2.725]	[-0.454]	[0.256]	[0.630]	[-0.732]
Parent population	-0.123	-0.510*			-0.468**	-0.474**		
	[-0.386]	[-1.792]			[-1.972]	[-2.030]		
Parent GDP per capita	0.097	-0.014			0.049	-0.015		
	[0.631]	[-0.076]			[0.282]	[-0.089]		
Observations	5,258	5,246	5,243	5,187	12,101	12,094	12,083	11,868
Number of parent firms	681	676	677	673	673	670	670	662
Adjusted *R*-squared	0.972	0.975	0.975	0.975	0.973	0.980	0.980	0.983
Parent effects	√	√	√	√	√	√	√	√
Year effects	√	√	√	√	√	√	√	√
Parent industry-year effects	-	√	√	√	-	√	√	√
Parent country-year effects	-	-	√	-	-	-	√	-
Country-pair-year effects	-	-	-	√	-	-	-	√

Table 8: Debt shifting and tax-rate uncertainty: Sensitivity analysis

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $Parent\ leverage_{pt} = \varphi_p + \gamma_1 log\alpha_{pt} + \gamma_2 log\tilde{\pi}_{pt} + \gamma_3(f_{pt} \cdot log\tilde{\pi}_{pt}) + \gamma_4 f_{pt} + \gamma_5 X_{pt} + \rho_t + e_{pt}$. The observational units are multinational parent firms. The dependent variable is parent leverage, $log\tilde{\pi}_{pt}$ reflects the parent's profit, and all variables are defined in table 1. The standard errors are clustered by parent-year in columns 1 and 4, by country-pair in columns 2 and 5, and by parent country in columns 3 and 6. In columns 1 to 3 we include countries with high tax-rate uncertainty, and in columns 4 to 6 we include countries with low tax-rate uncertainty. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary country and the parent country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	High tax-rate uncertainty countries			**Low tax-rate uncertainty countries**		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Fraction of low-tax subsidiaries	0.016**	0.026***	0.026***	0.020***	0.024***	0.024***
× Parent profit	[2.130]	[3.233]	[3.778]	[2.814]	[4.638]	[4.913]
Parent total assets	0.024***	0.038***	0.038***	0.021***	0.037***	0.037***
	[3.190]	[3.402]	[8.170]	[2.857]	[4.168]	[4.278]
Parent profit	-0.016***	-0.023***	-0.023***	-0.010	-0.013***	-0.013**
	[-2.585]	[-2.947]	[-4.321]	[-1.500]	[-2.605]	[-2.589]
Fraction of low-tax subsidiaries	-0.194**	-0.309***	-0.309***	-0.218***	-0.283***	-0.283***
	[-2.127]	[-3.225]	[-3.655]	[-2.748]	[-4.765]	[-5.120]
Parent intangible fixed assets	0.040***			0.034***		
	[5.497]			[5.550]		
Observations	4,991	5,081	5,081	11,384	11,719	11,719
Number of parent firms	654	671	671	652	660	660
Adjusted R-squared	0.973	0.972	0.972	0.979	0.978	0.978
Parent effects	√	√	√	√	√	√
Year effects	√	√	√	√	√	√
Parent industry-year effects	√	√	√	√	√	√
Parent country-year effects	-	-	-	-	-	-
Country-pair-year effects	√	√	√	√	√	√

Table 9: Parents' leverage: Sensitivity analysis for cross-country heterogeneity

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $Parent\ leverage_{pt} = \varphi_p + \gamma_1 log\alpha_{pt} + \gamma_2 log\tilde{\pi}_{pt} + \gamma_3(f_{pt} \cdot log\tilde{\pi}_{pt}) + \gamma_4 f_{pt} + \gamma_5 X_{pt} + \rho_t + e_{pt}$, estimated using standard errors clustered by subsidiary. The observational units are multinational parent firms. The dependent variable is parent leverage, $log\tilde{\pi}_{pt}$ reflects the parent's profit, and all variables are defined in table 1. In columns 1 to 4 we include countries with high tax-rate uncertainty, and in columns 5 to 8 we include countries with low tax-rate uncertainty. In columns 1 and 5 we restrict our sample to the EU 28 countries, in columns 2 and 6 to the high-income countries, in columns 3 and 7 to the G7 countries, and in columns 4 and 8 to countries with a low degree of divergence between cash flow rights and voting rights. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the parent's country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary's country and the parent's country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent: Parent leverage	**High tax-rate uncertainty**				**Low tax-rate uncertainty**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fraction of low-tax subsidiaries × Parent profit	0.033***	0.033***	0.054***	0.048***	0.020***	0.021***	0.033***	0.025***
	[3.994]	[4.003]	[4.607]	[4.369]	[3.072]	[3.519]	[2.928]	[3.435]
Parent total assets	0.036***	0.036***	0.053***	0.042***	0.026***	0.026***	0.045***	0.020**
	[3.665]	[3.660]	[4.350]	[3.637]	[3.018]	[3.212]	[3.943]	[2.168]
Parent profit	-0.023***	-0.023***	-0.042***	-0.032***	-0.005	-0.004	-0.016*	-0.001
	[-2.710]	[-2.707]	[-3.670]	[-2.906]	[-0.716]	[-0.563]	[-1.691]	[-0.113]
Fraction of low-tax subsidiaries	-0.422***	-0.424***	-0.678***	-0.613***	-0.246***	-0.254***	-0.407***	-0.297***
	[-4.135]	[-4.147]	[-4.749]	[-4.594]	[-2.995]	[-3.291]	[-2.657]	[-3.294]
Observations	5,097	5,132	3,782	4,404	8,719	10,820	5,303	9,686
Number of parent firms	670	670	594	617	603	639	453	575
Adjusted *R*-squared	0.975	0.975	0.975	0.977	0.983	0.983	0.986	0.984
Parents effects	√	√	√	√	√	√	√	√
Year effects	√	√	√	√	√	√	√	√
Parent industry-year effects	√	√	√	√	√	√	√	√
Parent country-year effects	-	-	-	-	-	-	-	-
Country-pair-year effects	√	√	√	√	√	√	√	√

Appendix

This appendix is intended to be published online only. First, we briefly discuss why using statutory tax rates is optimal in our framework. Second, in tables A1 through A3 we provide detailed summary statistics, and in table A4 we provide a correlation matrix. Third, in the rest of the tables, we provide extensive sensitivity tests for the estimation results reported in the main text and discuss in detail the tax-differential approach used in some of these tests.

Using the statutory tax rate

To justify using the statutory tax rate to identify profit shifting, we follow Devereux and Maffini (2007). Firms make relevant decisions in four stages. First, they decide whether to produce domestically and export goods abroad or to produce goods abroad. To make this choice, management must assess each strategy's net post-tax income, taking into account the different forms of taxation (i.e., local government tax, repatriation tax, tariffs). This makes the effective average tax rate the best measure of tax rates.

If the company chooses to produce abroad, the second decision concerns the location, with similar criteria as the first decision. Thus, the effective average tax rate is once again the most appropriate tax measure for this decision. In turn, conditional on a particular location, the firm must decide how much to invest there. In this regard, management must weigh the investment's marginal benefit against its marginal cost. To reach a decision, the firm should measure how the tax affects the firm's cost of capital. This cost is determined by an effective marginal tax rate.

In the final stage, the multinational firm chooses the location of its profits. We can assume quite realistically that firms take advantage of any tax allowances in any country where they operate. Having done so, the advantage of transferring a dollar of profit from a high-tax country to a low-tax country must depend on differences in the statutory (and not the effective) tax rate.

Table A1: Information on parents by country

The table reports the number of parent firms by country, the number of subsidiaries these parent firms own, the number of parent firms in each country as a share of the total parent firms in our sample (e.g., Australia has 4/1,084 = 0.37% of our sample), the equivalent share for subsidiaries (e.g., Australia has 12/9,497 subsidiaries, or 0.13% of our sample), and how many subsidiaries each parent firm owns by country.

Country	Parents	Parents %	Subsidiaries	Subsidiaries %	Subsidiaries/ parents
Australia	4	0.37%	12	0.13%	3.00
Austria	3	0.28%	28	0.29%	9.33
Belgium	7	0.65%	99	1.04%	14.14
China	3	0.28%	13	0.14%	4.33
Denmark	5	0.46%	40	0.42%	8.00
Finland	13	1.20%	111	1.17%	8.54
France	65	6.00%	993	10.46%	15.28
Germany	73	6.73%	1,306	13.75%	17.89
Greece	3	0.28%	10	0.11%	3.33
Ireland	3	0.28%	26	0.27%	8.67
Israel	3	0.28%	5	0.05%	1.67
Italy	13	1.20%	129	1.36%	9.92
Japan	39	3.60%	1,401	14.75%	35.92
Netherlands	15	1.38%	124	1.31%	8.27
Norway	13	1.20%	58	0.61%	4.46
Poland	4	0.37%	33	0.35%	8.25
Portugal	2	0.18%	11	0.12%	5.50
Russian Federation	7	0.65%	90	0.95%	12.86
Spain	36	3.32%	384	4.04%	10.67
Sweden	38	3.51%	508	5.35%	13.37
Switzerland	1	0.09%	8	0.08%	8.00
Turkey	3	0.28%	7	0.07%	2.33
United Kingdom	319	29.43%	1,651	17.38%	5.18
United States	412	38.01%	2,450	25.80%	5.95
Total	**1,084**	**100,00%**	**9,497**	**100,00%**	**8.76**

Table A2: Information on subsidiaries by country

The table reports the number of total and foreign subsidiaries in each subsidiary country of our sample (e.g., Australia is home to 84 total subsidiaries in our sample, 83 of which are foreign subsidiaries), as well as their percentage relative to the total number of subsidiaries in our sample (e.g., 84 of the 9,497 subsidiaries, or 0.88% of the sample, are in Australia, and 83/84 or 98.81% are foreign subsidiaries).

Country	Total subs.	Percen-tage	Foreign subs.	Foreign/ total	Country	Total subs.	Percen-tage	Foreign subs.	Foreign/ total
Australia	84	0.88%	83	98.81%	Malta	4	0.04%	4	100.00%
Austria	187	1.97%	174	93.05%	Mexico	38	0.40%	38	100.00%
Bahamas	1	0.01%	1	100.00%	Netherlands	228	2.40%	225	98.68%
Belgium	330	3.47%	319	96.67%	Nicaragua	1	0.01%	1	100.00%
Bosnia & Herzegovina	3	0.03%	3	100.00%	Norway	161	1.70%	128	79.50%
Brazil	64	0.67%	64	100.00%	Panama	1	0.01%	1	100.00%
Bulgaria	27	0.28%	27	100.00%	Paraguay	1	0.01%	1	100.00%
Chile	8	0.08%	8	100.00%	Peru	12	0.13%	12	100.00%
China	317	3.34%	304	95.90%	Philippines	25	0.26%	25	100.00%
Colombia	8	0.08%	8	100.00%	Poland	268	2.82%	236	88.06%
Croatia	18	0.19%	18	100.00%	Portugal	97	1.02%	87	89.69%
Czech Republic	178	1.87%	178	100.00%	Republic of Korea	128	1.35%	128	100.00%
Denmark	115	1.21%	109	94.78%	Romania	94	0.99%	94	100.00%
Estonia	28	0.29%	28	100.00%	Russian Federation	229	2.41%	143	62.45%
Finland	141	1.48%	111	78.72%	Serbia	20	0.21%	20	100.00%
France	979	10.31%	568	58.02%	Singapore	10	0.11%	10	100.00%
Germany	1,064	11.20%	626	58.83%	Slovakia	68	0.72%	68	100.00%
Greece	63	0.66%	53	84.13%	Slovenia	18	0.19%	18	100.00%
Hungary	82	0.86%	82	100.00%	Spain	607	6.39%	399	65.73%
Iceland	1	0.01%	1	100.00%	Sweden	383	4.03%	225	58.75%
India	2	0.02%	2	100.00%	Switzerland	1	0.01%	1	100.00%
Ireland	109	1.15%	105	96.33%	Trinidad & Tobago	2	0.02%	2	100.00%
Italy	438	4.61%	359	81.96%	Turkey	4	0.04%	2	50.00%
Japan	827	8.71%	19	2.30%	Ukraine	24	0.25%	24	100.00%
Latvia	18	0.19%	18	100.00%	United Kingdom	1,944	20.47%	1,010	51.95%
Lithuania	16	0.17%	16	100.00%	United States	2	0.02%	0	0.00%
Luxembourg	17	0.18%	17	100.00%	Venezuela	2	0.02%	2	100.00%
Total						**9,497**		**6,205**	

Table A3: Summary statistics for high and low tax-uncertainty countries

The table reports the number of observations as well as the mean, standard deviation, minimum, and maximum of the main variables used in the empirical analysis for the countries with high and the low tax uncertainty. The variables are defined in table 1. The monetary units are thousands of U.S. dollars (current prices of 2005), and population is in thousands of individuals.

High tax-uncertainty countries							
Time period: 2011–2013	**Obs.**	**Mean**	**Median**	**Std. dev.**	**Skewness**	**Min.**	**Max.**
EBT	5,276	32,369	4,236	263,801	40.74	1.512	15,300,000
Parent leverage	5,276	0.598	0.603	0.181	0.115	0.073	1.661
Total assets	5,276	360,595	43,397	2,144,993	18.35	204.2	73,100,000
Parent profit	5,276	2,313,275	495,658	5,103,746	5.078	12.94	51,100,000
Parent profit (real)	5,276	2,344,000	465,995	6,493,215	7.568	3.158	79,000,000
Low-tax subsidiary	5,276	0.631	1.000	0.483	-0.542	0.000	1.000
Leverage	5,276	0.574	0.563	0.450	15.17	-0.114	14.58
Population	5,276	51,552	63,258	37,558	17.28	518.3	1,236,687
GDP per capita	5,276	37.06	39.80	9.370	-1.042	1.086	81.85
Intangible fixed assets	5,060	33,156	4.000	445,077	38.35	-4,389	24,300,000
Corporate tax difference	5,276	0.070	0.070	0.070	0.101	-0.160	0.241
Fraction of low-tax subsidiaries	5,276	0.560	0.625	0.414	-0.206	0.000	1.000
Parent total assets	5,276	26,300,000	5,957,281	49,700,000	3.443	144.1	377,000,000
Parent population	5,273	151,447	66,028	124,117	0.482	4,577	316,129
Parent GDP per capita	5,273	40.89	39.81	5.225	-1.266	6.923	65.62
Upward tax change	5,276	0.092	0.000	0.289	2.821	0.000	1.000
Downward tax change	5,276	0.807	1.000	0.395	-1.558	0.000	1.000
Parent cash flows to assets	5,276	0.000	0.000	0.004	31.01	-0.023	0.205

Low tax-uncertainty countries							
Variable	**Obs.**	**Mean**	**Median**	**Std. dev.**	**Skewness**	**Min.**	**Max.**
EBT	11,879	22,787	3,570	138,179	20.04	0.000	4,924,780
Parent leverage	11,879	0.619	0.639	0.159	-0.494	0.035	1.661
Total assets	11,879	253,192	39,559	1,376,465	19.13	14.76	56,000,000
Parent profit	11,879	3,164,903	1,158,663	5,225,451	3.467	19.12	51,100,000
Parent profit (real)	11,879	2,823,784	1,076,612	5,628,808	6.941	122.7	79,000,000
Low-tax subsidiary	11,879	0.523	1.000	0.499	-0.094	0.000	1.000
Leverage	11,879	0.612	0.627	0.406	46.84	0.000	33.93
Population	11,879	113,334	59,540	267,029	4.293	323.0	1,357,380
GDP per capita	11,879	31.12	35.77	14.05	-0.437	1.282	65.62
Intangible fixed assets	11,543	21,140	80.64	339,069	56.11	-2.091	23,800,000
Corporate tax difference	11,879	0.045	0.012	0.075	0.677	-0.225	0.395
Fraction of low-tax subsidiaries	11,879	0.559	0.500	0.347	-0.034	0.000	1.000
Parent total assets	11,879	44,300,000	17,000,000	67,800,000	2.695	145.1	377,000,000
Parent population	11,877	136,023	80,622	118,731	1.967	4,577	1,350,695
Parent GDP per capita	11,877	39.24	39.27	7.119	-1.550	3.122	65.62
Parent cash flows to assets	11,879	0.0004	0.000	0.003	0.371	-0.028	0.031

Table A4: Correlation matrix

Period: 2010-2013	EBT	P. Lev-erage	Total assets	P. Pro-fit	P. Pro-fit(r)	Low-tax	Leve-rage	Popu-lation	GDP p. c.	Int. F. assets	Tax diff.	F. of low-tax	P. Tot. assets	P.Popu-lation	P. GDP p.c.	Δt	Δt2	EPU	Up. Δt	Down. Δt
EBT	1.000																			
Par. leverage	0.012*	1.000																		
Total assets	0.693*	0.028*	1.000																	
Par. profit	0.136*	0.020*	0.138*	1.000																
Par. profit (r)	0.152*	-0.040*	0.155*	0.848*	1.000															
Low-tax subs.	-0.040*	-0.244*	-0.052*	0.010*	0.010*	1.000														
Leverage	-0.015*	-0.012*	-0.001	-0.003	-0.002	0.005	1.000													
Population	-0.010	-0.014*	-0.018*	0.026*	0.014*	0.089*	-0.001	1.000												
GDP per capita	0.020*	-0.011*	0.020*	-0.089*	-0.053*	-0.258*	0.004	-0.424*	1.000											
Intang. f. assets	0.254*	0.025*	0.506*	0.032*	0.033*	-0.024*	0.008	-0.008	-0.004	1.000										
Corp. tax diff.	-0.031*	-0.221*	-0.044*	0.109*	0.105*	0.761*	0.004	0.061*	-0.277*	-0.026*	1.000									
F.of low-tax sub	-0.018*	-0.324*	-0.030*	0.131*	0.132*	0.753*	0.007	0.080*	-0.124*	-0.023*	0.656*	1.000								
Par. total assets	0.108*	0.120*	0.121*	0.841*	0.677*	0.024*	-0.003	0.044*	-0.093*	0.019*	0.051*	0.030*	1.000							
Par. population	-0.020*	-0.310*	-0.022*	0.077*	0.118*	0.527*	0.009	0.116*	-0.024*	-0.017*	0.566*	0.699*	-0.003	1.000						
Par. GDP p.c	-0.035*	-0.205*	-0.053*	-0.062*	0.013*	0.242*	0.005	-0.040*	0.257*	-0.034*	0.200*	0.321*	-0.160*	0.328*	1.000					
Tax change (Δt)	0.019*	-0.010	0.014*	-0.056*	-0.032*	0.034*	-0.005	-0.057*	0.082*	0.003	0.049*	-0.021*	-0.094*	0.015*	0.023*	1.000				
Tax change2(Δt)	0.022*	-0.023*	0.015*	-0.066*	-0.039*	0.061*	-0.005	-0.012	0.059*	0.006	0.086*	-0.010	-0.116*	0.023*	0.020*	0.802*	1.000			
EPU	-0.005	-0.003	-0.007	-0.141*	-0.093*	0.001	-0.023*	0.027*	0.132*	-0.011	-0.001	-0.031*	-0.190*	0.026*	0.093*	0.414*	0.308*	1.000		
Upward Δt	-0.002	0.020*	-0.007	0.008	0.001	-0.042*	-0.001	-0.022*	-0.007	0.002	-0.126*	0.023*	0.014*	0.018*	-0.005	0.230*	0.134*	-0.067*	1.000	
Downward Δt	0.012*	-0.010	0.013*	-0.049*	-0.028*	0.041*	-0.003	-0.049*	0.093*	0.001	0.080*	-0.019*	-0.076*	0.020*	0.038*	0.681*	0.576*	0.471*	-0.108*	1.000

Table A5: Profit shifting and tax-rate uncertainty (replication of table 3 for a four-year stable corporate tax rate)

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $log\pi_{it} = \varphi_i + \beta_1 log a_{it} + \beta_2 log\tilde{\pi}_{pt} + \beta_3(d_{it} \cdot log\tilde{\pi}_{pt}) + \beta_4 d_{it} + \beta_5 X_{it} + \rho_t + e_{it}$, with robust standard errors clustered by subsidiary. The observational units are multinational subsidiaries whose parent firms are in other countries. The dependent variable is the log of *EBT*, and $log\tilde{\pi}_{pt}$ reflects parent profit; all variables are defined in table 1. Tax-rate uncertainty is defined by a four-year period of corporate tax rate stability. In columns 1 to 4 we include countries with high tax-rate uncertainty, and in columns 5 to 8 we include countries with low tax-rate uncertainty. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary's country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary's country and the parent's country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent: EBT	**High tax-rate uncertainty**				**Low tax-rate uncertainty**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Low-tax subsidiary ×	0.060*	0.042	0.047	0.023	0.093**	0.086*	0.088*	0.105**
Parent profit	[1.875]	[1.150]	[1.263]	[0.668]	[2.147]	[1.886]	[1.878]	[2.142]
Total assets	0.646***	0.647***	0.644***	0.652***	0.740***	0.799***	0.798***	0.773***
	[7.846]	[7.483]	[7.341]	[7.508]	[10.249]	[11.869]	[11.480]	[10.899]
Leverage	-0.399*	-0.343*	-0.334	-0.323	-0.779***	-0.981***	-0.972***	-0.921***
	[-1.730]	[-1.651]	[-1.606]	[-1.628]	[-3.688]	[-4.569]	[-4.453]	[-4.236]
Low-tax subsidiary	-0.738*	-0.508	-0.559	-12,650.755	-1.199**	-1.128*	-1.159*	4,886.182
	[-1.743]	[-1.054]	[-1.125]	[-0.000]	[-1.998]	[-1.781]	[-1.796]	[0.000]
Parent profit	0.017	0.050	0.047	0.049	-0.060	-0.084*	-0.082*	-0.087*
	[0.388]	[0.995]	[0.918]	[0.958]	[-1.421]	[-1.813]	[-1.746]	[-1.706]
Population	-0.093	-0.091			0.755	1.781		
	[-0.023]	[-0.022]			[0.563]	[1.202]		
GDP per capita	3.266**	2.553*			1.625***	2.069***		
	[2.370]	[1.661]			[3.082]	[3.752]		
Observations	4,318	4,230	4,230	4,176	8,710	8,582	8,598	8,441
Number of subsidiaries	1,896	1,858	1,858	1,835	3,875	3,821	3,828	3,763
Adjusted *R*-squared	0.860	0.862	0.862	0.864	0.881	0.882	0.883	0.885
Subsidiary effects	√	√	√	√	√	√	√	√
Year effects	√	√	√	√	√	√	√	√
Industry-year effects	-	√	√	√	-	√	√	√
Country-year effects	-	-	√	-	-	-	√	-
Country-pair-year effects	-	-	-	√	-	-	-	√

Table A6: Profit shifting and economic policy uncertainty measured by the EPU Index

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $log\pi_{it} = \varphi_i + \beta_1 loga_{it} + \beta_2 log\tilde{\pi}_{pt} + \beta_3(d_{it} \cdot log\tilde{\pi}_{pt}) + \beta_4 d_{it} + \beta_5 X_{it} + \rho_t + e_{it}$, with robust standard errors clustered by subsidiary. The observational units are multinational subsidiaries whose parents are in other countries. The dependent variable is the log of *EBT*, and $log\tilde{\pi}_{pt}$ reflects parent profit; all variables are defined in table 1. High economic policy uncertainty exists when the Economic Policy Uncertainty Index value is above the median. In columns 1 to 3 we include subsidiaries in countries with high corporate tax rate volatility, and in columns 4 to 6 we include subsidiaries in countries with low corporate tax rate volatility. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary's country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary country and the parent country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	High economic policy uncertainty			**Low economic policy uncertainty**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Low-tax subsidiary ×	0.080	0.065	0.062	0.098**	0.097**	0.104***
Parent profit	[1.569]	[1.265]	[1.134]	[2.533]	[2.505]	[2.783]
Total assets	0.612***	0.614***	0.594***	0.845***	0.839***	0.803***
	[8.082]	[8.107]	[8.175]	[8.138]	[7.854]	[7.455]
Leverage	-0.788***	-0.796***	-0.793***	-1.183***	-1.198***	-1.193***
	[-3.706]	[-3.721]	[-3.690]	[-4.335]	[-4.321]	[-3.990]
Low-tax subsidiary	-0.992	-0.803		-1.306**	-1.301**	
	[-1.488]	[-1.193]		[-2.531]	[-2.528]	
Parent profit	0.026	0.032	0.035	-0.099	-0.109*	-0.168**
	[0.523]	[0.659]	[0.704]	[-1.535]	[-1.689]	[-2.381]
Population	3.950			-2.220		
	[1.045]			[-0.558]		
GDP per capita	0.673			1.286*		
	[0.426]			[1.734]		
Observations	4,581	4,577	4,535	3,150	3,150	3,091
Number of subsidiaries	1,963	1,961	1,941	1,307	1,307	1,285
Adjusted R-squared	0.869	0.869	0.870	0.904	0.904	0.904
Subsidiary effects	√	√	√	√	√	√
Year effects	√	√	√	√	√	√
Industry-year effects	√	√	√	√	√	√
Country-year effects	-	√	-	-	√	-
Country-pair-year effects	-	-	√	-	-	√

The tax-differential approach of profit shifting

The tax-differential approach, initially developed by Hines and Rice (1994) and refined by Huizinga and Laeven (2008), is widely used in the empirical profit-shifting literature. The basic assumption is that a subsidiary's pretax income is the sum of both "true" and "shifted" incomes. The subsidiary generates true income using capital and labor, whereas it generates shifted income from taxation-related incentives its parent company uses to move profits into or out of the subsidiary. According to the indirect method, controlling for all the factors of the subsidiary's production, unexplained earnings must come from profit-shifting activity. Consequently, this practice reduces pretax profits for high-tax subsidiaries and increases pretax profits for low-tax subsidiaries.

The empirical model stemming from the indirect approach takes the following form:

$$log\pi_{it} = \alpha_i + \gamma_1 logL_{it} + \gamma_2 logK_{it} + \gamma_3 utd_{it} + \gamma_4 lever_{it} + \rho_t + \varepsilon_{it}. \quad \text{(A1)}$$

We formally define all variables in the empirical analysis in table 1, and we provide the data sources. Following Huizinga and Laeven (2008), in equation (A1) we control for labor (*L*) and capital (*K*), as measured by the log of labor cost and the log of total assets, respectively. We also use financial leverage to control for each firm's economic conditions. Further, we include subsidiary fixed effects, year fixed effects, industry-year fixed effects, and country-year fixed effects to control for time-invariant characteristics in the subsidiary countries during our panel years (e.g., effects common to all affiliates in Australia in 2009).

The explanatory variable of central interest is the unweighted tax difference, utd_{it} (see, e.g., Karkinsky and Riedel, 2012), which captures the relative attractiveness of profit shifting for a subsidiary among a multinational group's subsidiaries (including its headquarters). Formally, we define utd_{it} as follows:

$$utd_{it} = \sum_j \frac{(\tau_{it} - \tau_{jt})}{N}, i \neq j, \ \forall t \in \{1, \ldots, T\}, \quad \text{(A2)}$$

where *N* represents the total number of affiliates in the corporate group at time t, and τ denotes the subsidiary country's statutory corporate tax rate. It captures the potential profit shifting among all of a corporate group's affiliates. Prior studies use simpler tax-incentive measures such as the statutory tax difference between the subsidiary and the parent country — that is, $(\tau_{it}^{s} - \tau_{jt}^{p})$. A systematic negative sign of the tax-incentive measure associated with higher reported pretax earnings for the subsidiary implies the existence of tax-motivating profit shifting from the parent firm toward its subsidiary.

We use the unweighted tax difference as the tax-incentive variable of profit shifting. In this way, the results encompass not only profit shifting arising from corporate tax differences between the subsidiary's country and the parent's country, but also the corporate tax differences among the countries where the multinational subsidiaries operate. A negative value for utd_{it} implies that the multinational group optimally shifts profits in country i at time *t* and vice versa. A disadvantage of the indirect approach is the potential endogeneity issue arising from both reverse causality and omitted variables.

The results are reported in table A8. In column 1, the tax-incentive variable, *utd*, shows in general extended profit shifting at the 1% level. The coefficient of *Unweighted tax difference* × *High tax-rate uncertainty* is positive and significant at the 5% level, however, highlighting that profit shifting is lower among subsidiaries in countries with high tax-rate uncertainty (i.e., where *High tax-rate uncertainty* equals 1). Importantly, the two previously stated coefficients having opposite signs and almost equal absolute values suggest that high tax-rate uncertainty countries do not just reduce profit shifting — they eliminate it.

Next, we split the sample to countries with high tax-rate uncertainty (column 2) and countries with low tax-rate uncertainty (column 3). The tax-incentive variable *utd* is negative and significant at the 5% level only for the latter group. We obtain very similar results using tax-rate volatility instead of frequency of tax rate changes (see columns 4-6). Finally, in columns 7-8 we test for potential asymmetric effects on profit shifting resulting from positive or negative changes in tax rates. Our results, similar to those in the DID approach (see table 6), provide no evidence of asymmetric effects for upward or downward tax changes in countries with high tax-rate uncertainty. Clearly, these results complement those in table 3 and are consistent with H1. Accordingly, profit shifting to low-tax subsidiaries is higher in countries with relatively stable corporate tax rates.

Table A7: The effect of tax-rate uncertainty on profit shifting using the tax-differential approach

The table reports coefficient estimates and *t*-statistics (in parentheses) from the estimation of $log\pi_{it} = \alpha_i + \gamma_1 logL_{it} + \gamma_2 logK_{it} + \gamma_3 utd_{it} + \gamma_4 lever_{it} + \rho_t + \varepsilon_{it}$. The observational units are multinational subsidiaries whose parent firms are in other countries. The measures of tax-rate uncertainty are in the first line of the table. All variables are defined in table 1. In columns 2-3 and 5-6, we split our sample into countries with high and low tax-rate uncertainty, respectively. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary's country. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Measure:	**Frequency of tax-rate changes**			**Tax-rate volatility**			**Downward tax-rate changes**	
2011–2013	**Double interaction**	**High tax-rate uncertainty**	**Low tax-rate uncertainty**	**Double interaction**	**High tax-rate uncertainty**	**Low tax-rate uncertainty**	**High tax-rate uncertainty (3y)**	**High tax-rate uncertainty (4y)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Unweighted tax difference	-2.332***	0.491	-2.454**	-2.842***	0.177	-2.653***	-2.012	-2.777
	[-2.671]	[0.418]	[-2.449]	[-2.851]	[0.187]	[-2.644]	[-0.667]	[-1.201]
Unweighted tax difference × High tax-rate uncertainty	2.310** [2.228]							
Unweighted tax difference × High tax-rate volatility				3.444** [2.541]				
Unweighted tax difference × Downward tax change							2.790 [0.927]	2.760 [1.205]
Total assets	0.664***	0.476***	0.778***	0.663***	0.520***	0.747***	0.476***	0.517***
	[12.444]	[5.679]	[10.391]	[12.418]	[7.268]	[10.345]	[5.668]	[6.583]
Leverage	-0.480***	-0.280**	-0.934***	-0.483***	-0.558***	-0.467**	-0.279**	-0.294**
	[-2.986]	[-1.979]	[-4.604]	[-3.035]	[-2.921]	[-2.357]	[-1.968]	[-2.021]
Cost of employees	0.206***	0.027	0.257***	0.206***	0.058	0.276***	0.028	0.091
	[4.022]	[0.280]	[4.328]	[4.023]	[0.712]	[4.481]	[0.288]	[0.960]
Observations	14,247	3,881	9,060	14,247	5,007	9,204	3,881	4,564
Number of subsidiaries	5,964	1,668	3,971	5,964	2,052	3,900	1,668	1,999
Adjusted *R*-squared	0.883	0.881	0.887	0.883	0.890	0.880	0.881	0.879
Subsidiary effects	√	√	√	√	√	√	√	√
Year effects	√	√	√	√	√	√	√	√
Industry-year effects	√	√	√	√	√	√	√	√
Country-year effects	√	√	√	√	√	√	√	√

Table A8: Debt shifting and tax-rate uncertainty: Sensitivity analysis using alternative tax-rate uncertainty measures

The table reports coefficient estimates and *t*-statistics (in parentheses) from the DID model $Parent\ leverage_{pt} = \varphi_p + \gamma_1 log\alpha_{pt} + \gamma_2 log\tilde{\pi}_{pt} + \gamma_3(f_{pt} \cdot log\tilde{\pi}_{pt}) + \gamma_4 f_{pt} + \gamma_5 X_{pt} + \rho_t + e_{pt}$, estimated using standard errors clustered by subsidiary. The observational units are multinational parent firms. The dependent variable is parent leverage, $log\tilde{\pi}_{pt}$ reflects parent profit, and all variables are defined in table 1. In columns 1 to 4 we include countries with high tax-rate uncertainty, and in columns 5 to 8 we include countries with low tax-rate uncertainty. The lower part of the table indicates the type of fixed effects used in each regression. Year effects (industry-year effects) indicate a full set of year fixed effects (industry-year fixed effects at the two-digit NACE level). Country-year effects represent a full set of country-year fixed effects for the subsidiary's country. Country-pair-year effects represent country-pair-year fixed effects for the subsidiary's country and the parent's country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	High tax-rate uncertainty countries			**Low tax-rate uncertainty countries**		
Measure for tax uncertainty:	**Tax volatility**	**Four-year tax-rate stability**	**EPU**	**Tax volatility**	**Four-year tax-rate stability**	**EPU**
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Fraction of low-tax subsidiaries × Parent profit	0.017**	0.026***	0.033***	0.020***	0.024***	0.016**
	[2.363]	[3.254]	[3.893]	[2.642]	[3.088]	[2.082]
Parent total assets	0.031***	0.040***	0.042***	0.038***	0.034***	0.028***
	[3.780]	[4.613]	[5.181]	[3.768]	[3.605]	[2.704]
Parent profit	-0.015**	-0.022***	-0.027***	-0.010	-0.013*	-0.007
	[-2.317]	[-3.359]	[-3.905]	[-1.557]	[-1.824]	[-0.975]
Fraction of low-tax subsidiaries	-0.233***	-0.315***	-0.401***	-0.220***	-0.281***	-0.195**
	[-2.623]	[-3.280]	[-3.983]	[-2.603]	[-3.175]	[-2.200]
Observations	6,831	5,897	7,088	9,873	10,902	5,686
Number of parent firms	758	702	730	586	644	470
Adjusted R-squared	0.973	0.972	0.978	0.977	0.979	0.970
Parent effects	√	√	√	√	√	√
Year effects	√	√	√	√	√	√
Parent industry-year effects	√	√	√	√	√	√
Parent country-year effects	-	-	-	-	-	-
Country-pair-year effects	√	√	√	√	√	√