Tax Regimes and Profit Shifting*

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Abstract

We examine whether and how the imputation and non-imputation tax regimes of foreign affiliates influence the profit shifting behavior of multinational enterprises (MNEs). We find that MNEs exhibit a strong and consistent preference for sending more taxable income to low-tax affiliates under an imputation tax regime than to low-tax affiliates under a non-imputation tax regime. In this way, an MNE benefits twice: (i) from tax rate differences, and (ii) from receiving dividend tax credits. Next, we provide evidence that MNEs receive these dividend tax credits by owning a network of affiliates in the tax credit country that has a domestic ultimate owner. This profit shifting increase occurs via debt shifting. Furthermore, we demonstrate that the above effect of dividend tax credits on profit shifting is heterogeneous; it increases profit shifting for MNEs with high aggregate-group ETR and reduces profit shifting for MNEs with very low aggregate-group ETR. This result is consistent with over and under-investment tax planning strategies. Finally, we find that the combination of a non-imputation parent and a low-tax subsidiary under an imputation tax regime yields the highest level of profit shifting.

Keywords: Tax Regimes; Dividend taxation; Profit shifting; Multinational firms.
JEL codes: F23, G35, H21, H26, M16

1 Introduction

Multinational enterprises (MNEs) operate in many different countries, and as a result, they face different tax regimes and rates. Relevant literature shows that MNEs' international business operations facilitate strategic exploitations of international corporate tax rate differences to lower their global-overall corporate tax liability (e.g., Huizinga and Laeven, 2008; Dharmapala and Riedel, 2013; Markle, 2016).

According to OECD's Base Erosion and Profit Shifting (BEPS), MNEs exploit gaps and rule mismatches in the countries they operate to avoid paying taxes. Profit shifting is one technique they employ, whereby MNEs transfer profits to affiliates with a lower corporate tax rate. Prior studies highlight that besides the corporate tax rate differences, an affiliate's country-specific characteristics (such as institutions, tax enforcement, or tax rate uncertainty) also matter for profit shifting (see Dharmapala and Hines, 2009; Beuselinck et al., 2015; Delis et al., 2020). In this study, we focus on the corporate tax regime differences among foreign affiliates that potentially lead to different levels of after-tax earnings and ask whether and how these differences generate tax opportunities for profit shifting. To this end, we comprehensively examine the effect of the imputation tax regime on MNEs' profit shifting by considering, at the same time, the tax regimes (imputation or non-imputation) of all the countries where an MNE operates.

Under an imputation tax regime, firms pay income taxes at the corporate level. A part or the full amount of these tax payments (partial or full imputation) returns as credits that reduce shareholders' dividend taxes (double taxation is reduced or eliminated). Recent studies investigate the relationship between the imputation tax regime and general tax avoidance using the tax regime of the country where a firm is located (Ikin and Tran, 2013; McClure et al., 2018; Amiram et al., 2019). This line of research finds that a firm located in a country under an imputation tax regime

systematically exhibits higher effective tax rates (ETR) than those under non-imputation tax regimes, — and thus less tax avoidance. This is because the imputation tax regime can provide lower taxes to shareholders without their firm being exposed to the associated tax avoidance costs. However, even though these studies examine the tax regime of the country where a firm is located, they do not consider whether their sample firms are affiliated and thus they cannot address the questions of whether and how affiliates' tax regimes affect the **total level** of an MNE's tax avoidance. In line with the OECD's BEPS initiative, we examine the tax regimes of foreign affiliates jointly to discover whether and how MNEs exploit gaps and tax regime mismatches in all of the countries in which they operate to avoid paying taxes.

We extend the profit shifting line of research by investigating the effect dividend tax credits have on a less studied aspect of imputation tax regimes, foreign affiliates (i.e., connected firms operating in different countries), where an affiliate's reported before-tax earnings can be higher or lower than its actual before-tax earnings. This is the case of an MNE's income shifting toward lower-tax affiliates. We argue that in the case of foreign affiliates, MNEs respond not only to corporate tax rate differential incentives in allocating income across them, but also to profit shifting opportunities shaped by the affiliates' imputation tax regimes. We expect that after accounting for the affiliates' statutory corporate tax rates, overseas affiliates subject to imputation tax regimes should have additional profits transferred to them. As a result, reporting more pre-tax income in imputation countries generates more imputation credits, which contribute to higher after-tax earnings.

Furthermore, our research aims to add to the body of knowledge on dividend taxation. A large body of literature investigates the impact of dividend taxes on corporate investment decisions, cost of equity, and optimal capital structure (see e.g., Dhaliwal et al., 2007a; Chetty and

Saez, 2005; Lin and Flannery, 2013). Although several studies find that dividend tax cuts affect corporate investment allocation but not the aggregate investment amount (e.g., Becker et al., 2013; Alstadsaeter et al., 2017; Chay et al., 2022), little is known about the effect of dividend taxes on corporate tax planning investment allocation. By providing dividend tax credits, the imputation tax regime reduces the total tax burden for shareholders. According to Chay et al. (2022), who examine the effect of dividend taxes on firms' investment behavior, a dividend tax cut significantly improved the investment efficiency of both over- and under-investing US-listed firms. Investment efficiency is critical because it aligns with firms' efforts to invest in tax planning projects with a positive net present value (NPV) (see Armstrong et al., 2015; Kim et al., 2022; Chay et al., 2022). Profit shifting by MNEs is one of a company's many risky investment opportunities (Armstrong et al., 2015; Kim et al., 2022).[1] Thus, understanding whether MNEs use dividend tax credits to improve the efficiency of their income shifting strategies is important for corporate executives, policymakers, and academics.

We distinguish between imputation and non-imputation tax regimes, and we examine whether and how dividend tax credits affect profit shifting incrementally (i.e., beyond corporate tax differentials). To that end, we investigate: a) whether imputation tax regimes influence an MNE's decision to engage in cross-border tax-motivated profit shifting by taking into account the tax regime of each affiliate; b) if dividend tax credits in a country affect profit shifting, what type of ownership structure facilitates it; c) how profit shifting is achieved, i.e., what internal profit shifting channels are used (i.e., transfer pricing and/or debt relocation); d) whether a dividend tax credit for shareholders affects the efficiency of MNE tax planning investment, and e) whether the parent dividend tax regime is relevant in profit shifting.

[1] MNEs through their profit shifting engagement seek for an expected future benefit. The latter though, comes with a non-negligible cost for MNEs (see e.g., Dyreng and Markle, 2016; Delis et al., 2020).

In an international setting, all other things equal, we expect an MNE to prefer shifting taxable income to low-tax affiliates located under an imputation tax regime. In this way, the MNE increases its global after-tax earnings because not only enjoys lower tax rates due to profit shifting but also tax credits offered by the imputation tax regime. MNEs have tools at their disposal to use the credits received from imputation tax regimes to increase, at least partially, the wealth of their shareholders. First, an MNE that owns a pyramidal network of affiliates in a tax credit country can use these dividend tax credits through the Domestic Ultimate Owner (DUO). DUO is considered a tax resident shareholder for the rest of affiliates in the same country and thus, it can collect the entire tax credit. In turn, when the parent firm is in a territorial tax system, DUO can return the tax credit (and the benefit from profit shifting) to the parent firm as foreign earnings. When the parent firm is located in a worldwide tax system, DUO can reinvest its earnings (e.g., in developing new intangibles) and postpone the repatriation of earnings until a tax holiday occurs.

Second, Cannavan and Gray (2017) explain how tax credits can be transferred from resident to non-resident investors via dividend stripping strategies. Because these credits reduce residents' tax liability but provide no direct benefit to non-residents, MNEs can use dividend-stripping strategies to transfer dividend tax credits to resident investors who value such benefits (Michaely and Murgia, 1995; Rantapuska, 2008; Cannavan and Gray, 2017; Le et al., 2020).[2] Dividend stripping has a clear direction. Foreign (i.e., tax-exempt) investors abnormally sell their shares to a resident investor immediately before the ex-date and immediately repurchase them afterward (the reverse direction holds for the domestic investor). The dividend-stripping resident taxpayer then compensates the foreign investor for the dividend and an agreed portion of the credit.

[2] Dividend-stripping strategies can be executed via the use of derivative contracts. Even though in a different context, Donohoe (2015) highlights the effects of financial derivatives on corporate tax avoidance strategies.

MNEs use internal mechanisms (channels) to shift taxable income among their affiliates. Prior studies have suggested mechanisms such as transfer pricing (including the relocation of intangibles like e.g., R&D activities), and debt shifting. Because the costs of establishing each of these mechanisms differ (see Dyreng and Markle, 2016; Delis et al., 2020), we anticipate that MNEs will select the mechanism with the lowest cost to achieve profit shifting under the alternative tax regimes they face (see e.g., Slemrod, 1992). Our affiliate-level data allows us to provide evidence of the profit shifting mechanisms MNEs employ under the imputation and non-imputation cases we examine. Detecting not only whether the imputation tax regime affects profit shifting but also the mechanism used to achieve profit shifting to (or out of) imputation countries should be useful to policymakers in their efforts to detect and mitigate profit shifting.[3]

To test our predictions, we construct a unique dataset with international coverage of MNEs. This dataset comprises MNEs' affiliates located in 32 OECD countries for the period 2009-2017. For these countries, we also have information about their bilateral tax treaties. Two countries in our sample, Australia and the United Kingdom, employ imputation tax regimes, while the remaining countries employ non-imputation tax regimes.[4] Our sample consists of 28,171 affiliate-year observations. Our granular data allows us to include several affiliate-level and non–tax country-level characteristics, as well as a rich set of fixed effects, allowing us to examine in depth how imputation versus non-imputation tax regimes affect MNE profit shifting. We analyze the data

[3] Amiram et al. (2019) provide some scarce evidence about the imputation tax regime and the foreign returns on assets. They show that when a firm is located in a country that eliminates an imputation tax regime, the elimination is positively associated with foreign returns on assets. However, this study does not address three crucial issues for income shifting. First, Amiram et al. (2019) cannot differentiate whether their result is due to foreign direct investment or income shifting. Second, they do not use affiliate data in their analysis and thus they ignore the role that affiliate countries' tax regimes plays in profit shifting. Third, their analysis provides no evidence about the underlying mechanism – channel of profit shifting. Our paper, focusing solely on the relationship between the imputation tax regime and profit shifting fills these gaps.

[4] We note that for the imputation countries of our sample, Australia has a statutory corporate tax rate of 30% for the whole sample period, while the statutory tax rate of the UK has declined from 28% in 2009 to 19% in 2017.

to test our predictions using the tax-differential approach (e.g., Huizinga and Laeven, 2008; Beuselink et al., 2015).

We begin our analysis by estimating profit shifting for the entire sample. The estimation reveals a level of profit shifting comparable to previous studies, but for a different period (Huizinga and Laeven, 2008; Markle, 2016). In turn, we find that MNEs shift more taxable income to a low-tax affiliate when it is subject to an imputation tax regime. Next, we provide evidence that an MNE uses pyramidal networks of affiliates and collects the tax credits through the domestic ultimate owner (DUO) that is considered a domestic investor for the rest of the affiliates in the same imputation tax country. In this case, MNEs use debt shifting as a channel to achieve profit shifting.

In turn, we show that the effect of tax credits on MNEs' profit shifting we document above is not homogeneous across all multinational groups. In particular, we find that dividend tax credits systematically increase profit shifting for those MNEs with very high aggregate-group ETR, which is consistent with under-investment in profit shifting (i.e., not fully exploited profit shifting opportunities). We also find that dividend tax credits decrease profit shifting for those MNEs with very low aggregate-group ETR, which is consistent with over-investment in profit shifting (i.e., already fully exploited profit shifting opportunities). Collectively, these two findings show that MNEs utilize dividend tax credit regimes to improve the efficiency of their tax planning investments. Finally, when simultaneously taking the parent and the rest of the affiliates' tax regimes into consideration, the highest profit shifting occurs in the case where the parent is under a non-imputation tax regime, but the low-tax subsidiary is under an imputation tax regime. In this combination, the parent firm has no incentive to report taxable income in its jurisdiction, while at the same time the MNE enjoys the lower corporate tax rate plus tax credits.

These results survive a battery of robustness tests. Specifically, our results hold when, instead of using the whole sample, we utilize propensity score matching techniques, thus making the control and treatment groups more comparable. Further, the results are robust to the inclusion of several controls, including information about countries' bilateral tax agreements, various types of fixed effects, and the inclusion of various tax incentive proxies (see e.g., Hines and Rice, 1994; Karkinsky and Riedel, 2012).

Our study contributes to the literature in the following ways. First, we extend and generalize the conclusion of McClure et al. (2018) and Amiram et al. (2019) that firms' incentives for tax avoidance are reduced when they operate under an imputation tax regime as these authors do not distinguish whether the firms in their samples belong to a network of foreign affiliates. We show that in the case of connected firms of a multinational group, MNEs systematically target low-tax affiliates in imputation tax regimes. In this way, an MNE receives not only the tax rate difference but also tax credits for tax payments made in the imputation tax country. The combination of a parent under a non-imputation tax regime and a low-tax subsidiary under an imputation tax regime yields the highest level of profit shifting.

Second, we identify for the first time the role that ownership structure plays in the way that an MNE escalates profit shifting to and exploits dividend tax credits in low-tax countries with imputation tax regimes. Our evidence shows that an MNE systematically increases profit shifting toward low-tax affiliates in imputation-tax countries when it owns a domestic ultimate owner in that country. In this case, the domestic ultimate owner is a local tax resident, collects the tax credits, and returns these (along with the benefits from profit shifting) to the foreign parent firm. Third, for the above case, we identify the specific channel of profit shifting as we find that when the low-tax affiliate is located under an imputation tax regime and the MNE increases the level of profit

shifting, it does so through debt shifting. Fourth, the dividend tax literature demonstrates that lowering the dividend tax causes a shift in the allocation of investments across firms (see e.g., Becker et al., 2013; Alstadsaeter et al., 2017; Chay et al., 2022). In line with this finding, we demonstrate for the first time that the provision of dividend tax credits affects MNEs' tax planning investment allocation; MNEs with high aggregate-group ETR (i.e., consistent with under-investment) will increase their income shifting, while MNEs with low aggregate-group ETR (i.e., consistent with over-investment) will decrease their income shifting activities.

Our findings from jointly examining the tax regimes of all the affiliate countries where an MNE operates have implications for tax policy because they reveal the characteristics of tax regime combinations with varying propensities for profit shifting. Policymakers should focus on combinations of tax regimes that motivate significant profit shifting and prioritize them when considering bilateral tax agreements or the selection of corporate tax regimes that aim to reduce MNEs' profit shifting. Our identification of the ownership structure and profit shifting channel MNEs use can also be useful to policymakers because they can focus their monitoring efforts on those channels.

Our paper proceeds as follows. Section 2 streamlines the relevant literature and builds hypotheses linking the imputation tax regime to profit shifting. Section 3 describes the research design, sample selection, and data, while Section 4 discusses the results. Section 5 concludes the paper.

2 Literature review and testable predictions' development

2.1 Profit shifting

Several empirical studies using accounting firm-level data analyze the reporting behavior patterns of multinational companies and document the existence of profit shifting (e.g., Hines and Rice,

1994; Huizinga and Laeven, 2008; Dharmapala and Riedel, 2013; Dowd et al., 2017).[5] Recently, Bilicka (2019) using confidential administrative firm-level data for UK companies, finds significant profit shifting. In the same line, Liu et al. (2020), using data from UK MNEs, document significant profit shifting toward low-tax subsidiaries, including the non-tax havens and low-tax jurisdictions, while they take into consideration the switch from a worldwide to a territorial tax system.

The voluminous literature on profit shifting identifies several internal and external factors that affect MNEs' profit shifting. On the one hand, firm-level characteristics like R&D expenses (Harris, 1993; De Simone et al., 2020), tax haven operations (Desai et al., 2006), high-tech operations (De Simone et al., 2022), financial reporting incentives (Klassen and Laplante, 2012a), internal information quality (McGuire et al., 2018), and corporate governance (Delis et al., 2021) have been found as factors that crucially affect the extent of profit shifting. On the other hand, several factors that shape the business environment and can be considered exogenous to an MNE crucially affect profit shifting as well. Countries' institutions and infrastructure have a direct effect on an MNE's level of profit shifting (Dharmapala and Hines, 2009; Sugathan and George, 2015). Delis et al. (2020) show that when MNEs decide on the location and level of their income shifting, they have a strong preference for low-tax subsidiaries located in jurisdictions with low tax rate uncertainty.

Two papers related to ours examine the impact that the worldwide and territorial tax systems have on tax avoidance and multinationals' profit shifting (Atwood et al., 2012, Markle, 2016). They find that the territorial tax system, which excludes the corporate income generated by foreign subsidiaries, creates incentives for higher tax avoidance. Although both studies work in an

[5] See Dharmapala (2014) and Heckemeyer and Overesch (2017) for a thorough review of the empirical profit shifting literature.

international setup, they examine only the parent firms' tax systems (worldwide vs. territorial) and ignore the rest of the affiliates' tax systems.

According to OECD's Base Erosion and Profit Shifting initiation, MNEs exploit gaps and rule mismatches in the countries they operate to avoid paying taxes. In this study, we focus on the corporate tax regime differences (imputation vs. non-imputation) among foreign affiliates that potentially lead to different levels of double taxation and ask whether and how these differences generate tax incentives for income shifting. As such, we follow Huizinga et al. (2008) who study the financial structure of multinational firms by combining the tax regimes of the subsidiary and parent countries where an MNE operates and not solely on the parent's tax regime.

2.2 Dividend taxation

In general, corporations are considered independent legal entities (see Schanz and Schanz, 2011) and thus subject to corporate income taxes while their shareholders are subject to personal income taxes on the dividends they receive (and capital gains from selling shares). This leads to the double taxation problem.[6]

Countries differ in the way they attempt to integrate corporate and shareholders' taxation to eliminate or just mitigate double taxation. This difference generates heterogeneous costs and benefits to the tax-avoiding firms and thus different tax arbitrage opportunities. Under an imputation tax regime, shareholders receive tax credits for the full (full imputation) or part (partial imputation) of the corporate income taxes paid. In this way, imputation reduces shareholders' tax burden, and thus reduces firm managers' incentives to participate in costly tax avoidance. McClure et al. (2018) and Amiram et al. (2019) show that the imputation tax regime reduces shareholders'

[6] The owners of partnerships, sole proprietorships as well as pass-through and flow-through entities are taxed only for their personal income.

and managers' incentives for tax avoidance. This happens because, under an imputation tax regime, shareholders can have tax benefits that mitigate the cost of corporate tax without incurring any of the potential associated costs of tax avoidance.

Dividend taxation has been at the center of interest for many decades. According to theory, dividend taxation has a significant impact on corporate behavior, optimal capital structure, and the cost of capital (e.g., Dhaliwal et al., 2007a; Chetty and Saez, 2005, 2010; Lin and Flannery, 2013). According to Alstadsaeter and Jacob (2016), a dividend tax cut in Sweden in 2006 caused firms to significantly reclassify earned income as dividend income. Recent research looks at the impact of a dividend tax cut on firms' specific investment behavior. Becker et al. (2013) show that dividend taxes affect allocation but not the aggregate corporate investment in an international sample of listed firms, whereas Alstadsaeter et al. (2017) show similar results but for Swedish unlisted firms. Chay et al. (2022) exploiting the U.S. Jobs and Growth Tax Relief Reconciliation Act of 2003, examine the effect that a dividend tax cut has on investment efficiency. They show that this dividend tax cut significantly improved investment efficiency but in line with prior studies, find no effect on total investment level.

Our study aims to extend the important findings of McClure et al. (2018) and Amiram et al. (2019). Specifically, using affiliate level data, we examine for the first time whether an imputation tax regime affects the cross-border tax avoidance (i.e., total profit shifting) of MNEs.[7] Moreover, our study aims to provide insights regarding the effect that dividend tax credits have on MNEs' tax planning investment allocation.

[7] In the Appendix, we provide an illustrative example to better describe and explain our arguments (see Table A1).

2.3 Testable predictions

McClure et al. (2018) and Amiram et al. (2019) focus on the tax avoidance of single firms—not the affiliates of an MNE. Thus, it is still far from obvious whether and how the imputation tax regime of affiliated firms affects an MNE's overall profit shifting behavior, given the opportunities for international tax arbitrage. According to Huizinga et al. (2008), in an international setting, it is the "combined tax regimes of the subsidiary and parent countries of the multinational firm" that matter. An MNE operates in many countries. Some of the (low/high tax) affiliates might be under an imputation tax regime, while others under a non-imputation tax regime. Thus, in case a specific affiliate has no (or reduced) incentives to participate in activities that reduce its income tax payments under an imputation tax regime, profit shifting could still occur (even with higher intensity) only among the rest of the affiliates. Whether the reduced incentives for profit shifting of a specific affiliate will affect MNEs' total income shifting level is an empirical question examined in this study.

We start examining whether an MNE exhibits a preference for income shifting to low-tax affiliates located in countries under an imputation tax regime. Assuming that an MNE is engaged in tax-motivated income shifting, then sending systematically taxable income to a low-tax affiliate under an imputation tax regime translates into two tax benefits. The first benefit is due to the lower corporate tax rate that is applied to the taxable income of that affiliate. The second benefit stems from the tax credit, which will benefit the MNE (at least in part) and will leave the MNE with higher after-tax earnings. Thus, we anticipate a preference for low-tax affiliates located in countries under an imputation tax regime if MNEs can obtain at least a portion of these dividend tax credits (e.g., through a pyramidal network of affiliates and a domestic ultimate owner or dividend stripping strategies).

Prediction 1: *All else equal, MNEs prefer to shift income to low-tax affiliates located in countries with imputation tax regimes than to low-tax affiliates in countries with non-imputation tax regimes.*

MNEs have tools at their disposal to use the credits received from imputation tax regimes to increase, at least partially, the wealth of their shareholders. One method that allows MNEs to fully exploit these dividend tax credits makes use of a pyramidal network of affiliates in a tax credit country through the domestic ultimate owner. Suppose an MNE owns a lower-tax foreign affiliate, *Domestic Ultimate Owner (DUO)*, in a country with an imputation tax regime, and this affiliate owns one or more affiliates in the same country, let us say *AFFILIATES B-F* (see Figure 1). In this case, *DUO* is considered a tax resident shareholder of *AFFILIATES B-F*. Thus, if the MNE strategically shifts income to the low-tax *AFFILIATES B-F*, *DUO* will be able to collect the entire tax credit. Then *DUO* can either return tax credit (and of course the benefit that comes from profit shifting) to the parent firm (Global Ultimate Owner) as foreign earnings in case that parent firm is located in a territorial tax system or reinvest it (e.g., in developing new intangibles that will benefit the MNE in the future) and postpone the repatriation of earnings until a tax holiday occurs in the case that parent is under a worldwide tax system.[8]

(Insert Figure 1 about here)

We expect profit shifting to low-tax affiliates under an imputation tax regime to be higher when an MNE owns and uses a pyramidal network of affiliates through a domestic ultimate owner to extract dividend tax credits.

[8] If instead of *AFFILIATES B-F*, the MNE chooses *Domestic Ultimate Owner* (*DUO)* for direct profit shifting, then the MNE will not be able to receive 100% of the dividend tax credit, because the parent of *DUO* is not a tax resident. In such a case, or if an MNE does not own a *DUO* in an imputation country (e.g., see Figure A1 in the Online appendix), it can still use dividend stripping strategies to receive part of the total tax credit by sharing it with one or more tax resident investors.

Prediction 2: *All else equal, income shifting to low-tax affiliate countries with imputation tax regimes is exacerbated when MNEs own a domestic ultimate owner plus at least one more affiliate in this country (pyramidal network).*

The extended profit shifting literature provides ample evidence that MNEs choose strategically the channel of profit shifting that is relatively cheaper (see e.g., Hopland et al., 2018; Nicolay et al., 2017; Saunders-Scott, 2015). Dyreng and Markle (2016) and Delis et al. (2020) argue that transfer pricing is associated with non-negligible costs. Such costs include investments in foreign manufacturing facilities, negotiations with governments in foreign jurisdictions, buy-in payments for cost-sharing agreements, compliance costs, administrative costs, etc. The costs mentioned above apply to transfer pricing, and they are significantly different from the costs associated with debt shifting from one affiliate to another, which can be summed up by a higher risk of bankruptcy (see e.g., Huizinga et al., 2008). Both Dyreng and Markle (2016) and Delis et al. (2020) imply that debt shifting is relatively cheaper than transfer pricing.[9] This difference in the cost of profit shifting implementation potentially leads to heterogeneous outcomes regarding the effect that the imputation tax regime has on the level of income shifting and the channel that is used.

We predict that if MNEs send additional taxable income to these low-tax affiliates in imputation tax regime countries, there will be a strong preference to use the relatively low-cost profit shifting channel. Even though the cost of profit shifting varies depending on the main operations and industries of the connected affiliates, we argue that debt shifting is less expensive

[9] Transfer pricing depends on a series of intra-group transactions, in a way that, artificially through product and services mispricing, they shift part of the total group's earnings to be reported in low-tax subsidiaries. Debt shifting depends on intragroup loans. According to this channel, a low tax affiliate of an MNE issues a loan toward a high tax affiliate. At the end of the year the low tax affiliate, besides its operational revenues, will report nonoperational financial revenues for the interests of the issued loan. In this way, part of the MNE's profits is shifted toward the low tax jurisdictions.

than transfer pricing following Dyreng and Markle (2016) and Delis et al. (2020). This is because it excludes the costs of investments in foreign manufacturing facilities, negotiations with governments in foreign jurisdictions, buy-in payments for cost-sharing agreements, compliance costs, administrative costs, and so on that the transfer pricing channel requires.

Prediction 3: *All else equal, MNEs prefer to shift additional income toward the low-tax affiliates located in countries with imputation tax regimes via debt shifting.*

A vast body of literature examines the effect of dividend taxes on corporate decisions about investments, cost of equity, and optimal capital structure (see e.g., Dhaliwal et al., 2007a; Chetty and Saez, 2005; Lin and Flannery, 2013). Although several studies find that dividend tax cuts affect the allocation of corporate investments but not the aggregated investment amount (see e.g., Becker et al., 2013; Alstadsæter et al., 2017; Chay et al., 2022), little is known about the effect of dividend taxes on the allocation of corporate tax planning investments.

MNEs' profit shifting is one of a firm's many risky investment opportunities (Armstrong et al., 2015; Kim et al., 2022). Chay et al. (2022) find that a dividend tax cut significantly improved the investment efficiency of over- and underinvesting US listed firms. Based on this insight, our next prediction is that dividend tax credit regimes could help MNEs to improve their tax planning investment efficiency. On the one hand, we predict that MNEs with high consolidated ETRs that imply under-investment in profit shifting will use extensively the imputation tax regime to increase profit shifting. On the other hand, we predict that MNEs with low consolidated ETRs that imply over-investment in profit shifting will reduce or at least will not use the tax credits to further increase their profit shifting.

Prediction 4a: *All else equal, imputation tax regimes lead to an increase in profit shifting for those MNEs with high aggregate-group ETR (consistent with under-investment in profit shifting).*

Prediction 4b: *All else equal, imputation tax regimes lead to a reduction in profit shifting for those MNEs with low aggregate-group ETR (consistent with over-investment in profit shifting).*

Predictions 1-4 are not conditional on the tax regimes of parents. However, several studies examine the way that parent firms of MNEs potentially bias the groups' income shifting (see e.g., Dischinger et al., 2014). Our sample includes all foreign affiliates of an MNE for which we have unconsolidated data but not the majority of the parent firms for which Orbis provides only consolidated data. Nevertheless, we have information for all the affiliates' tax regimes, either parent or subsidiary. Thus, to gain additional insights into the effect of the imputation tax regime on profit shifting, we examine whether the parent firm's tax regime affects the relation between affiliates' imputation regime and profit shifting. To this end, we compare the profit shifting behavior for the cases of (1) parent under the non-imputation regime – (some) subsidiaries under the imputation regime, (2) parent and subsidiaries under non-imputation regimes, and (3) parent and (some) subsidiaries under imputation regimes, against the case of the parent under the imputation regime – subsidiaries under non-imputation regimes, which serves as our benchmark case.

We anticipate that the first case (parent under non-imputation - some subsidiaries under imputation) will exhibit greater profit shifting than the benchmark case (parent with imputation - subsidiaries without imputation) because a parent under non-imputation has the incentive to engage in costly cross-border tax avoidance. Sending taxable income to low-tax subsidiaries under imputation regimes reduces the MNE's total tax liability, and the MNE also receives tax credits. In the second case, where both the parent and subsidiaries are under non-imputation tax regimes, the only parameter determining profit shifting (all other things being equal) is the corporate tax rate difference among the affiliates of the MNE. Profit shifting, in this case, is expected to be lower

compared to case (1), where some low-tax subsidiaries are also located in countries with imputation tax regimes, and thus, besides the tax rate difference, they also receive tax credits. Finally, we cannot make any prediction for the cases where the parent and (some) subsidiaries are subject to imputation regimes because there are opposite effects.[10]

Prediction 5: *All else equal, MNEs with low-tax subsidiaries in countries with imputation tax regimes and parent firms in countries with non-imputation tax regimes will exhibit the highest profit shifting level among all potential combinations.*

3 Research design and data

3.1 Research design

To examine our first two predictions, we estimate various modifications of a widely used model:

$$log\,\pi_{it} = \beta_0 + \beta_1 C_{it} + \beta_2\, Tax\ Credit_{it} + \beta_3 C_{it} \times\ Tax\ Credit_{it} + \beta_4 Firm_{it} + \beta_5 \text{Country}_{it} + \rho_{it} + \epsilon_{it}. \quad (1)$$

In Eq. (1), the dependent variable, π_{it}, denotes reported pre-tax earnings of affiliate *i* at time *t*. For most of our estimations we use the earnings before tax, *EBT*. For those cases where we examine specific profit shifting channels, we use the relevant proxies. Specifically, for the transfer pricing channel, we use the affiliates' earnings before interest and taxes, *EBIT*, which excludes financial income. For the debt shifting channel, we use the affiliates' financial income, *Financial profit*. *C* is the tax incentive variable. The relevant literature has used different versions of this income-shifting incentive measure — starting from the difference between the subsidiary and

[10] A parent (that literature finds that potentially bias income shifting) under an imputation tax regime has reduced incentive to participate in tax avoidance while low-tax affiliates under an imputation tax regime may be the target of other affiliates as we discussed above.

parent statutory corporate tax rates (see Hines and Rice, 1994), to the unweighted and weighted tax difference (see e.g., Karkinsky and Riedel, 2012; Huizinga and Laeven, 2008 among many others). In this study, we choose the weighted tax difference as our baseline tax incentive variable, but we also check the robustness of our results using two additional tax incentive measures. Following Huizinga and Laeven (2008), we calculate the weighted tax differential, C, of each affiliate to all other affiliates of an MNE for each year:

$$C_i = \frac{\sum_{k \neq i}^{n} B_k(\tau_i - \tau_k)}{\sum_{k=1}^{n} B_k}. \quad (2)$$

In equation (2), k represents all other affiliates in the multinational group, while n is the total number of the affiliates. B denotes the total assets of an affiliate, while τ denotes corporate tax rates. *Tax Credit* is an indicator variable that takes the value 1 if an affiliate is located in a country with an imputation tax regime and 0 otherwise, while τ_i is the statutory corporate tax rate in country *i*. Consistent with previous studies (see e.g., Huizinga and Laeven, 2008; Dharmapala and Riedel, 2013; Markle, 2016), we include several firm-level (*Firm*) and country-level (*Country*) controls, to rule out other possible explanations for our results. For firm-level controls, we use the natural logarithm of fixed assets *(Fixed assets)* and the natural logarithm of the number of employees *(Employees)* to control for capital and labor respectively. We use the ratio of total debt to total assets (*Leverage*) to control for an affiliate's risk exposure. We also utilize *GDP per capita* and *Population* in some specifications, to control for general economic conditions and market size. Finally, ρ_{it} accounts for parent, year, industry-year and country-year fixed effects. We utilize various fixed effects to further reduce concerns for unobserved heterogeneity that might bias our estimations. We define all variables in Table 1.

In Eq. (1), a negative β_1 (i.e., a negative association between pre-tax profits and affiliates' tax incentives), implies that high-tax affiliates will report lower profits (shift out), and low-tax

affiliates will report higher profits (shift in). Consistent with prior studies, a more negative β_1 shows more aggressive income shifting (see e.g., Hines and Rice, 1994; Huizinga and Laeven, 2008; Beuselick et al., 2015; De Simone et al., 2017; De Simone et al. 2022).[11, 12] However, a statistically significant coefficient for the interaction term, $C_{it} \times Tax\ Credit_{it}$ (i.e., β_3), would provide evidence that the imputation tax regime affects profit shifting. In support of *Prediction 1*, we expect β_3 to be negative. The implication would be that MNEs prefer sending taxable income to low-tax subsidiaries located under an imputation tax regime and not to low-tax subsidiaries located in non-imputation tax regimes. In support of *Prediction 2*, we expect β_3 to be more negative than for prediction 1 and strongly significant for the cases where an MNE owns a domestic ultimate owner that owns one or more affiliates in the same country. In support of *Prediction 3*, we expect β_3 to be negative for the case of debt shifting and insignificant for the cases of transfer pricing. In support of *Prediction 4a*, we expect a negative β_3 for those MNEs with high aggregate-group ETR while a positive β_3 will provide support to *Prediction 4b*.

As we argued in section 2.3, our focus in *Prediction 5* is to examine the joint moderating effects of the parent and subsidiary tax regimes on profit shifting. To this end, we modify Eq. (1) to include information about the pairs of parent-subsidiary tax regimes. We formally estimate:

$$log\,\pi_{it} = \beta_0 + \beta_1 C_{it} + \beta_2 (C_{it} \times Tax\ Credit(s)\_Non-tax\ Credit(p)_{it}) + \beta_3 (C_{it} \times Tax\ Credit(s)\_Tax\ Credit(p)_{it}) + \beta_4 (C_{it} \times Non-tax\ Credit(s)\_Non-tax\ Credit(p)_{it}) + \beta_5\ Tax\ Credit(s)\_Non-tax\ Credit(p)_{it} + \beta_6\ Tax\ Credit(s)\_Tax\ Credit(p)_{it} + \beta_7\ Non-tax\ Credit(s)\_Non-tax\ Credit(p)_{it} + \beta_8 Firm_{it} + \beta_9 Country_{it} + \rho_{it} + \epsilon_{it}, \quad (3)$$

[11] A positive β_1 even though is rather unusual can be attributed to implicit taxes (see Markle et al., 2020).
[12] In the online appendix, we provide an analytical explanation about the mechanics of our research design, along with an illustrative numerical example.

where *Tax Credit(s)_Non-Tax Credit(p)* is an indicator variable that takes the value 1 if a subsidiary *i* at time *t* is located in a country with an imputation tax regime while its parent is under a non-imputation regime, and zero otherwise. Similarly, *Tax Credit(s)_Tax Credit(p)*, *Non-tax Credit(s)_Non-tax Credit(p)* takes the value 1 if both a subsidiary *i* at time *t* and its parent company are (not) under an imputation tax regime. The benchmark case is *Non-tax Credit(s)_Tax Credit(p),* i.e., a subsidiary is under non-imputation and the parent is under imputation because in this case there is no strong incentive for profit shifting from the parent to the subsidiary. Coefficient β_1 reflects the profit shifting effect of this benchmark case and thus coefficients β_2, β_3, and β_4, reflect incremental effects. The rest of the controls are the same as in model (1).

The coefficient of interest in model (3) is β_2 as it tests *Prediction 5*. We predict that profit shifting will be higher than the benchmark case for an MNE with a parent located in a non-imputation country and a low-tax subsidiary located in an imputation country. Thus, after controlling for all possible combinations, a negative β_2 should provide evidence that MNEs with subsidiaries under imputation regimes and parents under non-imputation regimes systematically shift more taxable income to low-tax subsidiaries.

3.2 Data

We construct our dataset using unconsolidated affiliate-level data from Orbis, which provides accounting information for national and multinational firms. In our sample, all affiliates of a multinational group have the same Global Ultimate Owner. The Domestic Ultimate Owner owns one or more affiliates in the same country, has a foreign parent and it is directly or indirectly owned by the Global Ultimate Owner of the MNE. Moreover, a firm is said to be a subsidiary if another

single firm (parent) owns more than 50% of its shares.[13] The parent firm of the MNE in our sample is the ultimate owner of the subsidiary and each parent firm has at least one foreign subsidiary.

Since this paper studies the effect of tax regimes on profit shifting, our sample includes affiliate firms from 32 OECD countries for which we can extract reliable information about their tax regimes from OECD statistics. Dropping missing observations on the key variables, our sample is left with 28,171 affiliate-year observations for the period 2009-2017. In the online appendix Table A2, we present the list of OECD countries along with their year of ascension to the organization.

Table 1 defines the variables used in the empirical analysis along with their sources. In line with the relevant literature, our main dependent variable is the logarithm of an affiliate's earnings before tax (Huizinga and Laeven, 2008; Dharmapala and Riedel, 2013; Markle, 2016). Alternatively, we also use affiliate earnings before interest and taxes, and financial profit (interest revenue) to check for the various profit shifting channels. The current sample includes affiliates located in countries with imputation and non-imputation tax regimes. A non-imputation regime includes the classical and modified classical tax regimes, along with the rest of the tax regimes that are without tax credits.[14]

(Insert Table 1 about here)

We present summary statistics in Table 2. Close inspection of the table reveals that about 15% of the affiliates in the sample are from countries under an imputation regime (utilize tax credits). These firms are coming from two countries in our sample, the UK and Australia; the rest

[13] A drawback to the Orbis data is that the ownership structure is available only as a snapshot, i.e., only for the last reported year. In line with previous studies, we argue that 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).

[14] According to the OECD, in the classical tax system, corporate tax and shareholder individual tax are treated separately. The modified classical tax system offers a reduced tax rate on dividend income. The rest of the tax systems category includes all other tax systems, such as partial inclusion, no shareholder tax, or other tax systems.

are from countries under a non-imputation regime (do not use tax credits). The statistics for the rest of the variables are in accordance with prior literature.

(Insert Table 2 about here)

Table 3 shows the bivariate relations of the main variables of this study. Our sample exhibits a positive association between the imputation tax regime of the affiliates and the affiliate earnings before taxes (*EBT*), earnings before interest and taxes (*EBIT*), and financial profit reported. As mentioned, regression analysis determines whether these bivariate relationships carry over to a multivariate framework, and that is where we next turn our attention. Further, in Table 4, we present the distribution of parent firms and their respective subsidiaries. In particular, 28% of the parents are from the U.S.A. while the U.K. and Germany follow with 21% and 13% respectively. Moreover, 31% of all subsidiaries are global subsidiaries of US MNEs, 17% are French subsidiaries, 16% are German and the remaining 15% are UK subsidiaries.[15]

(Insert Tables 3 & 4 about here)

Before moving to the main results of our analysis, we perform an analysis à la Huizinga and Laeven (2008) to validate our sample and check whether it reveals any profit shifting activities. The model introduced by these authors can account for profit shifting that arises from tax differences among affiliates belonging to the same parent company but are hosted in different countries. In their econometric model, Huizinga and Laeven include standard firm-level controls (such as labor and capital), along with a composite tax variable, which in our case is the weighted

[15] Table A3 in the appendix shows the number of tax treaties per parent country of our sample. The country with the most bilateral tax agreements is the UK with more than 105 per year for the sample period 2009-2017. Because we want to study the relationship of the imputation tax regime and profit shifting, in Table A4 we present differences between our variables across the two different tax schemes. Our sample's information indicates that affiliates under an imputation tax regime report higher *EBT, EBIT, Financial profit*, and exhibit smaller tax differences than those under a non-imputation tax regime. This difference is statistically significant at a 1% level. This initial outcome is first-hand univariate evidence of a relationship between profit shifting and imputation tax regime. In the next section of the paper, we present multivariate analysis.

tax difference. Our results for alternative fixed effects in Table 5 are in tandem with those of Huizinga and Laeven. Specifically, we observe that the weighted tax difference enters consistently with a negative and statistically significant coefficient (ranging from -1.395 to -1.700), indicating that, when all other things are equal, an increase in the parent company's corporate tax rate is followed by a systematic increase in the reported pre-tax profits of its subsidiaries located in countries with a smaller tax rate. For the rest of the variables, the estimations in this replication test are in line with Huizinga and Laeven (2008). The factors of production (capital and labor) carry positive and significant coefficients, leverage enters with a negative and significant coefficient, while GDP per capita appears with a positive and statistically significant effect on firm profitability. Overall, profit shifting is present in our sample.

(Insert Table 5 about here)

4 Results

4.1 Affiliate firm under an imputation tax regime and MNEs' profit shifting

Having shown above that profit shifting is present in our sample, our next task is to examine the impact of the imputation and non-imputation tax regimes on profit shifting. We report results from the estimation of model (1) in Table 6a, which consists of three columns. The first contains observations for affiliates located in countries under an imputation tax regime (i.e., Australia and the UK), while the second column reports results for affiliates located in countries under a non-imputation tax regime. The third column shows the effect of the interaction of *Weighted tax difference (C)* and imputation tax regime, i.e., *Tax Credit,* for the whole sample. Per our *Prediction 1*, when affiliates are under imputation regimes, the incentives for profit shifting to those affiliates should be stronger than when affiliates are under non-imputation regimes.

To provide robust inference to our baseline findings of Table 6a, we include a plethora of fixed effects. Specifically, all the above specifications include parent fixed effects and parent and subsidiary industry-year fixed effects—used to control for time-varying characteristics common to all industries in the parent and subsidiary countries, respectively. Finally, the parent country-year fixed effects control for time-varying country-level characteristics (e.g., GDP per capita). The inclusion of these fixed effects, allows us to control for many potential regressors that are omitted factors in our analysis, thus minimizing endogeneity concerns. Such regressors include macroeconomic, institutional, and societal characteristics in the parent country (Delis et al., 2020). The inclusion of these fixed effects increases the explanatory power of our sample significantly, as it easily reaches an adjusted R-squared close to 60%.[16]

The comparison of Table 6A columns (1) and (2) reveals that the incentive for profit shifting is much stronger when affiliates are under an imputation than in a non-imputation regime. The coefficient of *C* in column (1) is negative (-8.160), statistically significant, and more than 15 times larger than the corresponding coefficient in column (2) which is also negative (-0.527) and statistically significant. This result is confirmed in column (3), for the full sample, where the coefficient of *C* is negative (-0.792) and significant at 1%, indicating profit shifting for the mean firm of our sample, and an enhanced profit shifting effect for affiliates under imputation regimes given the negative and significant coefficient of the interaction term (-0.762).[17]

In terms of economic magnitude, the coefficient -0.792 of *Weighted tax difference (C)* indicates that as the tax incentive variable is reduced from 0.2 to 0.1, profit shifting goes up by

[16] Even though we cannot utilize subsidiary fixed effects, as these would be collinear with the tax systems of the subsidiary companies, our baseline specifications with adjusted R-squared reaching almost 60%, provide a much higher explanatory power than that of Amiram et al. (2019) (2.9% – 33.4%) and McClure et al. (2018) (14.6% - 14.9%).
[17] The negative *Tax credit* coefficient (-0.163) is unrelated to profit shifting, indicating that affiliates in imputation countries report lower *EBT* on average.

around 7.9%. The coefficient of $C_{it} \times Tax\ Credit_{it}$ (i.e., -0.762) indicates that as the tax incentive variable of an MNE with a low-tax affiliate under an imputation regime goes from 0.2 to 0.1, profit shifting increases by 15.51% (i.e., 7.9% + 7.62%). To put it in perspective, all other things equal, MNEs shift more income to low-tax affiliates under an imputation regime than to low-tax affiliates under a non-imputation regime. This statistically and economically significant finding is in accordance with *Prediction 1*.

(Insert Table 6A around here)

As we mentioned above, for the period studied, two countries in our sample are under the tax credit scheme, the UK and Australia. Most cases are from the UK. One concern here can be that our sample might not be representative, and our results are affected by selection bias. To deal with this issue, and as a robustness test, we utilize propensity score matching techniques (PSM). Specifically, we use a nearest-neighbor (with common support) matching procedure based on the following affiliate-level variables: fixed assets, number of employees, leverage, and the weighted tax difference.[18]

We present the results of the matched sample in Table 6B.[19] Juxtaposing this table with Table 6A, we find that the results hold qualitatively, and if anything, they are quantitatively stronger. For example, the interaction term $C_{it} \times Tax\ Credit_{it}$ is about twice as large compared to the unmatched sample, with a value of -1.484 (t-statistic -2.024). This indicates that the results we present in Table 6A might be biased downwards and if anything, more conservative. Since we need

[18] The matched sample has a mean (median) bias of 1.8% (1.4%). Rubin's numbers (B and R) are within limits, indicating a balanced sample of control and treatment groups — B is 4.3% and R is 0.9. We would have had a problem (the matching process would not have been successful) if B was above 25% and R was outside the range (0.5, 2). See Rosenbaum and Rubin (1985) and Rubin (2001) for details.

[19] To perform matching, we use *psmatch2* in Stata. This command does not yield the correct standard errors, as they might be very small or very large. To this end, the standard errors presented in the model with the matched sample are a result of a bootstrapping process with 1,000 repetitions.

to test various hypotheses that require the presence of many countries in the sample, we will not be using the matched sample for the remainder of this paper. By using the PSM, we have just provided evidence that our results hold even in the presence of selection bias.

(Insert Table 6B around here)

We further check the sensitivity of our findings in the presence of bilateral tax agreements between parent and subsidiary firms. Given the ever-increasing cooperation of countries for tax purposes, we ask whether our findings survive when parent and subsidiary countries have (i) signed a bilateral tax agreement or (ii) have a signed bilateral tax agreement into force.[20] The results of this exercise are qualitatively similar to our baseline ones. We show them in Panel A, column 1, and Panel B, column 1 of the online appendix Table A5.

So far, we have investigated the effect of tax credits on profit shifting using the weighted tax difference of Huizinga and Laeven (2008) as a proxy for profit shifting incentives. Nonetheless, the literature provides additional proxies for profit-shifting incentives. To be sure that our results are not driven by a sole measure, we utilize two other measures suggested in the literature. The first one is *Tax difference*. This variable is constructed as the difference between a subsidiary's and the parent company's corporate income tax rates (see e.g., Beuselinck et al., 2015). The second one is the *Unweighted tax difference,* and it is constructed according to Karkinsky and Riedel (2012) — see Table 1 for the exact variable definitions. We present the results in online Appendix Table A6. Therein, the first three columns report results when *Tax difference* is used as a control, while the last three report results when *Unweighted tax difference* is used instead. In both cases, the results are in tandem with the baseline findings. If anything, the interaction term with the

[20] It usually takes 1-3 years from the date of signing until the agreement comes into force.

unweighted tax difference is much larger.[21] On the surface, these results provide a clear answer to our testable *Prediction 1*: All other things equal, multinationals shift more income to low-tax affiliates located in countries under an imputation tax regime than low-tax affiliates located in countries without an imputation tax regime.

4.2 Pyramidal ownership structure in imputation tax regime countries and MNEs' profit shifting

Under an imputation tax regime, firms pay income taxes at the corporate level, and a part or the full amount of these tax payments (partial or full imputation) returns as credits that reduce domestic investors' dividend taxes (double taxation is reduced or eliminated). We next examine the way MNEs get access to these dividend tax credits while at the same time engaging in profit shifting. To this end, we test whether the effect of the imputation tax regime on profit shifting is stronger when an MNE owns a domestic ultimate owner (DUO) in such a country and this domestic ultimate owner owns one or more subsidiaries in the same country. We expect that under such a structure, the MNE shifts taxable income to all of this country's low-tax affiliates except the domestic ultimate owner. Then these low-tax affiliates pay their corporate taxes and return their after-tax earnings as dividends to DUO. Finally, when DUO receives the dividends from these affiliates, it claims the tax credit before paying the dividend tax (see Figure 1).

Therefore, we estimate Eq. (1) for two sub-samples. The first sub-sample concerns the cases where we identify multinational groups owning a DUO, and then this DUO owns one or more

[21] In Table A7, we also saturate our model with several combinations of additional fixed effects and see whether our main results hold. Given that in the baseline model we utilize fixed effects that allow for time variation in the second dimension, we now see whether one-dimension fixed effects (such as the year or parent industry) alter our findings. We find that our results hold even with the inclusion of these combinations of fixed effects, further supporting our hypotheses. In all cases, the adjusted R-squared is around 50%.

firms in the same country, and all of them have the same global ultimate owner. We call this "Pyramidal ownership via DUO." The second sub-sample concerns the cases where an MNE does not have a pyramidal ownership structure in a country, and we call this an "Ownership without DUO." A higher and stronger profit shifting evidence for the cases of the pyramidal ownership structure through a DUO will support our *Prediction 2*.

Table 7 shows the results of this test. Columns 1-6 consistently support our prediction. Our findings show that when an MNE owns a pyramidal ownership structure like the one described above, the effect of tax credits on profit shifting is always higher and stronger. That is, through a DUO, MNEs utilize both the tax rate differences and the tax credit benefit, leaving the MNE with higher after-tax earnings. More precisely, the coefficient of the interaction ($Tax\ incentive\ variable\ x\ Tax\ credit$) is always more negative when an MNE owns a DUO than when it owns one or more subsidiaries in the imputation country, i.e., -2.009 vis-à-vis -1.223 for the case of *Weighted tax difference*; -2.289 vis-à-vis -0.896 for the case of *Tax difference*; and -2.964 vis-à-vis -1.320 for the case of *Unweighted tax difference*. Moreover, the marginal effects are also aligned providing extra support to this finding.[22]

These findings support *Prediction 2*. MNEs systematically shift more taxable income to lower tax affiliates located in countries with imputation tax regimes, when the multinational group holds a pyramidal ownership structure through a DUO. Its subsidiaries utilize the lower corporate tax rates, reduce the group's total tax liability, and return the after-tax earnings to their DUO. The latter, that is a tax resident, receives the tax credits for taxes paid by its subsidiaries.

[22] In a robustness test, we show that the coefficient of the interaction ($Tax\ incentive\ variable\ x\ Tax\ credit$) is less negative for the cases in that MNE has only one affiliate. In this case, MNEs do not have a DUO to receive the tax credits for the taxes paid by their local subsidiaries. As a result, MNEs need to engage in dividend-stripping strategies and share a part of the total tax credits with local investors. We show this test in Table A8 of the online appendix.

(Insert Table 7 around here)

4.3 Imputation tax regime countries and underlining channels of profit shifting

Our next test is to look at how the imputation tax regime affects the different channels of profit shifting. In general, the literature broadly recognizes the following profit shifting channels: (i) transfer pricing,[23] and (ii) the strategic use of inter-affiliate debt. We present results for these manifestations of profit shifting in columns 1 and 2 of Table 8. The coefficient of the interaction term, $C_{it} \times Tax\ Credit_{it}$, is negative (-3.750) and statistically significant at the 1% level (t-statistic -3.291) for only the channel of debt shifting (column 2). These results are consistent with *Prediction 3*: MNEs with low-tax affiliates under an imputation tax regime not only shift more income than do MNEs with low-tax affiliates under a non-imputation tax regime, but they also choose to increase profit shifting through debt shifting. This channel of profit shifting is considered to be relatively less costly than the transfer pricing channel (see Dyreng and Markle, 2016; Delis et al., 2020). This finding is also robust when we control for the bilateral tax agreements for parent-subsidiary country pairs (see in the online appendix Panel A, columns 2-3, and Panel B, columns 2-3 of Table A5).

(Insert Table 8 around here)

4.4 Imputation tax regime, MNE's tax aggressiveness, and profit shifting

We now test whether our baseline result, which shows that the imputation tax regime has a positive effect on MNEs' total profit shifting, is consistent across the entire tax planning distribution in our

[23] Aligned with previous literature (see e.g., Huizinga and Laeven, 2008), we examine transfer pricing by using as a dependent variable for the specification of column 1 the earnings before interest and taxes (*EBIT*). Because EBIT does not include interest income, it cannot detect the debt-shifting channel.

sample. This question naturally follows from our hypothesis that the relationship between profit shifting and dividend tax credits will differ at low and high levels of tax aggressiveness, as expressed by the aggregate-group ETR. According to the relevant literature, a dividend tax reduction affects the allocation of corporate investment rather than the total amount of investment (see e.g., Becker et al., 2013; Alstadsaeter et al., 2017; Chay et al., 2022). Profit shifting is one of many risky investment opportunities available to a firm, and firms seek investments with a positive net present value (Armstrong et al., 2015; Kim et al., 2022). We then investigate whether dividend tax credits influence MNEs' tax planning investment allocation from over-investment (i.e., MNEs with low aggregate-group ETR) to under-investment (i.e., MNEs with high aggregate-group ETR).

(Insert Table 9 around here)

Table 9 displays the results. We use the group's consolidated GAAP ETR to test for differences in tax aggressiveness among MNEs. We separate multinational groups into "no tax aggressive" and "tax aggressive" using the median of the aggregate-group ETR (see columns 1-2), the top and bottom 25% (see columns 3-4), the top and bottom 20% (see columns 5-6) and top and bottom 15% (see columns 7-8). In terms of tax aggressiveness, the results of the sample splits appear to be reasonable: the lower the group ETR, the more negative and stronger the observed coefficient for *C*, which ranges from -0.760 for the bottom 50% to -1.770 for the bottom 15%. This observation is supported by the documented marginal effects at the bottom of the table: MNEs with lower aggregate-group ETR exhibit higher and stronger evidence of profit shifting.

The coefficient of the interaction term is the key coefficient in this test ($C_{it} \times Tax\ Credit_{it}$). Throughout all the cases where a multinational group comes with a high ETR (see columns 1, 3, 5, and 7), our results show a negative and statistically significant coefficient. This finding is in support of *Prediction 4a*. It demonstrates that multinational groups with a high

consolidated ETR (consistent with underinvestment in profit shifting) take advantage of the additional benefit provided by lower-tax countries with imputation tax regimes to increase the level of profit shifting. At the same time, we find that for multinational groups with a very low ETR (see column 10) the coefficient of $C_{it} \times Tax\ Credit_{it}$ is positive and marginally significant. Thus, dividend tax credits appear to have a negative effect on the (already high) level of profit shifting in this case. This finding is in support of *Prediction 4b*.

4.5 Parent imputation tax regime and MNE's profit shifting

Heretofore, we have studied whether and how the imputation tax regimes under which multinational affiliates operate affect profit shifting. Prior studies show that parent firms of MNEs potentially bias the groups' income shifting (see e.g., Dischinger et al., 2014). To gain additional insights into the effect of the imputation tax regime on profit shifting, we examine whether the parent firm's tax regime affects the relation between affiliates' imputation regime and profit shifting we documented so far. To this end, we investigate the combined parent and subsidiary tax regimes' effects on MNEs' profit shifting.

We present the results from the estimation of model (3) in Table 10. These results employ the same set of fixed effects, but each column has different levels of robust standard errors to correct for potentially correlated errors in the pairs of regimes (countries). The results in column (1) are robust to heteroskedasticity, while columns (2) to (4), account also for the correlation of the errors at different levels; that is, the results for columns (2) to (4) are clustered. Throughout all the specifications of Table 10, the coefficient of $C \times Non-tax\ credit\ (p)\_Tax\ Credit\ (s)$ exhibits the most negative and significant coefficient (first line of coefficients) among all the rest of the cases. MNEs with parents under non-imputation tax regimes but with subsidiaries under imputation tax regimes shift more profits to their subsidiaries in tandem with *Prediction 5*. For the

case where parent and subsidiaries are not under an imputation regime, only the tax rate differences matter for profit shifting. The negative and significant coefficient of $C \times Non - tax\ credit\ (p)\_Non - tax\ Credit\ (s)$ indicates that profit shifting exists (second line of coefficients) but is at a lower level compared with the previous case. When both countries have tax credits, the coefficient of *C × Tax credit (p)_Tax credit (s)* is not statistically different from zero (third line of coefficients) throughout all four specifications indicating no evidence of profit shifting in this case.

These findings hold up when various fixed effects (see Online Appendix Table A9), proxies for profit shifting incentives (see Online Appendix Table A10), and controls for bilateral tax agreements for parent-subsidiary country pairs are included (see Panel A, column 5 and Panel B, column 5 of Online Appendix Table A5). They are informative from a policymaker's perspective because they highlight the pair of countries that have a higher propensity for profit shifting (i.e., a parent country without imputation and a subsidiary country with an imputation tax regime). This specific information should be beneficial in policymakers' attempts to contain excessive profit shifting and/or design the appropriate bilateral tax agreements.

(Insert Table 10 around here)

5 Conclusion

We study whether and how the imputation and non-imputation tax regimes affect MNEs' profit shifting. In doing so, we utilize affiliate-level information for firms located in OECD countries for which we have the necessary information to conduct the analysis. We first find that income shifting is present in our dataset, and then investigate for any moderating effect imputation tax regimes have on profit shifting.

Our results show that an MNE, *ceteris paribus*, shifts more income to low-tax affiliates under an imputation tax regime and thus not only receives the tax rate differences but also a tax credit for its tax payments in the imputation regime country. We then show that this finding mainly comes from MNEs that use a pyramidal ownership structure. In this case, one of the affiliates acts as the Domestic Ultimate Owner that owns other subsidiaries in the same imputation country and collects their after-tax earnings as dividends and tax credits. Moreover, our findings show that the incremental profit shifting due to the tax credit regime comes through the relatively less costly debt shifting channel.

In turn, we show that the effect of tax credits on MNEs' profit shifting we document above is not homogeneous across all the multinational groups. In particular, we find that dividend tax credits systematically increase profit shifting for those MNEs with very high aggregate-group ETR, which is consistent with under-investment in profit shifting. We also find that dividend tax credits decrease profit shifting for those MNEs with very low aggregate-group ETR, which is consistent with over-investment in profit shifting (i.e., already fully exploited profit shifting opportunities). Collectively, these two findings show that MNEs utilize dividend tax credit regimes to improve the efficiency of their tax planning investments. Finally, the combination where a parent is in a non-imputation country and the low-tax subsidiary is in an imputation country maximizes the potency of profit shifting (the profit shifting is at its highest extent). Reassuringly, the baseline results hold to a battery of robustness tests and the inclusion of various tax incentive proxies as well as controlling for bilateral tax treaties.

These findings have clear policy implications and should be informative to policymakers. Recently, the G7 countries, in a historic moment, agreed on a universally minimum corporate tax rate that focuses directly on the mitigation of multinationals' tax aggressiveness and profit shifting.

However, the road ahead is long, and effective policies require difficult international collaboration and coordination to reduce international corporate tax avoidance. It is therefore crucial that policymakers around the world come together and devise ways to deal with tax erosion due to profit shifting that absorbs many resources and affects the welfare of many countries. The findings of this study illustrate the important role tax regimes, play in creating or impeding the tendency of multinational enterprises to shift income. Given the multiple countries' bilateral tax treaties and the efforts of OECD to close loopholes like the one of treaty-shopping, our findings not only show how tax regimes affect profit shifting but also the economic mechanisms employed to achieve the shifting. As a result, our findings should be useful in designing more efficient bilateral tax regimes. We first emphasize the ownership structure (i.e., pyramidal ownership through a domestic ultimate owner with access to domestic investors' tax credits). Then, the multinational groups with a higher propensity to utilize dividend tax credits to increase their profit shifting (i.e., MNEs with very high aggregate-group ETR). Finally, our findings highlight the pair of countries with a higher proclivity for profit shifting (i.e., a parent country without imputation and a subsidiary country with an imputation tax regime).

Future work should look at the systematic variations between different countries. Due to data limitations, we do not have information for all the affiliates in each MNE and we could only look at a specific number of countries to test our hypotheses. We thus believe that an avenue for future research would be to gather data for more affiliates (even those in tax havens), countries, and periods. We reckon that future researchers will find nuanced results on the role of tax regimes on profit-shifting, as the latter can affect foreign direct investments, and, more generally, can have both positive and negative outcomes for different parties involved. That is, profit-shifting is expected to affect welfare, but its exact direction, positive or negative, is hard to pin down without

having better data. The role of tax regimes and anti-tax avoidance measures play a crucial role, but to inform policymakers on the exact effect, more work with granular data is needed. We trust that future researchers will investigate these issues in more detail.

References

Alstadsæter, A., & Jacob, M. (2016). Dividend Taxes and Income Shifting. *Scandinavian Journal of Economics* 118(4), 693-716.

Alstadsæter, A., Jacob, M., & Michaely, R. (2017). Do dividend taxes affect corporate investment? *Journal of Public Economics* 151, 74-83.

Amiram, D., Bauer, A., Frank, M. (2019). Tax Avoidance at Public Corporations Driven by Shareholder Taxes: Evidence from Changes in Dividend Tax Policy. *The Accounting Review* 94(5), 27-55.

Armstrong, C.S., Blouin, J.L., Jagolinzer, A.D., & Larcker, D.F. (2015). Corporate governance, incentives, and tax avoidance. *Journal of Accounting and Economics* 60 (1): 1–17.

Atwood, A.J., Drake, M., Myers, J., & Myers, L. (2012). Home Country Tax System Characteristics and Corporate Tax Avoidance: International Evidence. *The Accounting Review* 87(6), 1831-1860.

Becker, B., Jacob, M., & Jacob, M. (2013). Payout taxes and the allocation of investment. *Journal of Financial Economics* 107 (1), 1-24.

Beuselinck, C., Deloof, M., & Vanstraelen, A. (2015). Cross-jurisdictional income shifting and tax enforcement: evidence from public versus private multinationals. *Review of Accounting Studies* 20, 710 – 746.

Bilicka, K. (2019). Comparing UK Tax Returns of Foreign Multinationals to Matched Domestic Firms. *American Economic Review* 109(8), 2921–2953.

Budd, J.W., Konings, J., & Slaughter, J. (2005).Wages and international rent sharing in multinational firms. *The Review of Economics and Statistics*, 87, 73–84.

Cannavan, D., & Gray, S. (2017). Dividend drop-off estimates of the value of dividend imputation tax credits. *Pacific-Basin Finance Journal* 46, 213-226.

Chay, J. B., Chong, B., & Im, H. J. (2022). Dividend taxes and investment efficiency: Evidence from the 2003 U.S. personal taxation reform. *Journal of Accounting and Economics* (Forthcoming).

Chetty, R., & Saez, E. (2005). Dividend taxes and corporate behavior: Evidence from the 2003 dividend tax cut. *Quarterly Journal of Economics* 120 (3), 791–833.

Chetty, R., & Saez, E. (2010). Dividend and corporate taxation in an agency model of the firm. *American Economic Journal: Economic Policy* (2), 1–31.

De Simone, L., Huang, J., & Krull L. (2020). R&D and the Rising Foreign Profitability of US Multinational Corporations. *The Accounting Review* 95, 177–204.

De Simone, L., Klassen, K. J., & Seidman, J. K. (2017). Unprofitable Affiliates and Income Shifting Behavior. *The Accounting Review 92*, 113 – 136.

De Simone, L., Klassen, K. J., & Seidman, J. K. (2022). The effect of income-shifting aggressiveness on corporate investment. *Journal of Accounting and Economics*, 101491.

Delis, F., Delis, M.D., Karavitis, P. & Klassen, K.J. (2021). Corporate Governance and Profit Shifting: The Role of the Audit Committee. *European Accounting Review (forthcoming)*.

Delis, D. M., Hasan, I., & Karavitis, P. (2020). Profit Shifting and Tax-Rate Uncertainty. *Journal of Business Finance and Accounting* 47(5-6), 645-676.

Desai, M. A., Foley, C. F. & Hines, J. R. (2006). The Demand for Tax Haven Operations. *Journal of Public Economics* 90, 513–31.

Dhaliwal, D., Krull, L., & Li, O.Z. (2007a). Did the 2003 tax act reduce the cost of equity capital? *Journal of Accounting and Economics* 43 (1), 121-150.

Dharmapala, D., & Hines, J. R. (2009). Which countries become tax havens? *Journal of Public Economics* 93, 1058–1068.

Dharmapala, D., & Riedel, N. (2013). Earnings Shocks and Tax-motivated Income-shifting: Evidence from European Multinationals. *Journal of Public Economics 97*, 95-107.

Dharmapala, D. (2014). What do we know about base erosion and profit shifting? A review of the empirical literature. *Fiscal Studies 35*(4), 421-448.

Dischinger, M., Knoll, B., & Riedel, N. (2014). The role of headquarters in multinational profit shifting strategies. *International Tax and Public Finance* 21, 248-271.

Dyreng, S., & Markle, K. (2016). The effect of financial constraints on income shifting by U.S. multinationals. *The Accounting Review* 91, 1601–1627.
Donohoe, M. (2015). The economic effects of financial derivatives on corporate tax avoidance. *Journal of Accounting and Economics* 59, 1-24.
Dowd, T., P. Landefeld, and A. Moore, 2017. Profit shifting of U.S. multinationals. *Journal of Public Economics* 148, 1-13.
Harris, D. G. (1993). The Impact of U.S. Tax Law Revision on Multinational Corporations' Capital Location and Income-Shifting Decisions. *Journal of Accounting Research* 31, 111–140.
Heckemeyer, J.H. and Overesch, M. (2017). Multinationals' profit response to tax differentials: effect size and shifting channels. *Canadian Journal of Economics* 50(4), 965–994.
Hines, J., & Rice, E. (1994). Fiscal Paradise: Foreign Tax Havens and American Business. *Quarterly Journal of Economics* 109(1), 149-182.
Hopland, A., Lisowsky, P., Mardan, M., & Schindler, D. (2018). Flexibility in income shifting under losses. *The Accounting Review* 93, 163–183.
Huizinga, H., & Laeven, L. (2008). International profit shifting within multinationals: A multi-country perspective. *Journal of Public Economics* 92(5-6), 1164-1182.
Huizinga, H., Laeven, L., & Nicodeme, G. (2008). Capital structure and international debt shifting. *Journal of Financial Economics* 88, 80-118.
Ikin, A., & Tran, C. (2013). Corporate tax strategy in the Australian dividend imputation system. *Australian Tax Forum* 28(3), 523-553.
Karkinsky, T., & Riedel, N. (2012). Corporate taxation and the choice of patent location within multinational firms. *Journal of international Economics 88*(1), 176-185.
Klassen, K., & Laplante, S. (2012a). The Effect of Foreign Reinvestment and Financial Reporting Incentives on Cross-Jurisdictional Income Shifting. *Contemporary Accounting Research* 29, 928–955.
Kim, J., McGuire, S., Savoy, S., & Wilson, R. (2022). Expected economic growth and investment in corporate tax planning. *Review of Accounting Studies* 27, 745-778.
Le, A., Yin, X. & Zhao, J. (2020). Effects of investor tax heterogeneity on stock prices and trading behaviour around the ex-dividend day: the case of Australia. *Accounting and Finance* 60, 3775–3812.
Lin, L., & Flannery, M.J. (2013). Do personal taxes affect capital structure? Evidence from the 2003 tax cut. *Journal of Financial Economics* 109 (2), 549-565.
Liu, L., Schmidt-Eisenlohr, T., & Guo, D. (2020). International transfer pricing and tax avoidance: Evidence from linked trade-tax statistics in the United Kingdom. *Review of Economic and Statistics* 102(4), 766-778.
Markle, K. (2016). A comparison of the tax-motivated income shifting of multinationals in territorial and worldwide countries. *Contemporary Accounting Research* 33(1), 7-43.
Markle, K., Mills, L., & Williams, B. (2020). Implicit Corporate Taxes and Income Shifting. *The Accounting Review* 95, 315 – 342.
McClure, R., Lanis, R., Wells, P., & Govendir, B. (2018). The impact of dividend imputation on corporate tax avoidance: The case of shareholder value. *Journal of Corporate Finance* 48, 492-514.
McGuire, S., & Rane, S., & Weaver, C. (2018). Internal Information Quality and Tax-Motivated Income Shifting. *Journal of the American Taxation Association* 40, 25–44.
Michaely, R., Murgia, M., 1995. The effect of tax heterogeneity on prices and volume around the ex-dividend day: evidence from the Milan Stock Exchange. *Review of Financial Studies* 8(2), 369–399.
Nicolay, K., Nusser, H., & Pfeiffer, O. (2017). On the interdependency of profit-shifting channels and the effectiveness of anti-avoidance legislation. mimeo, ZEW – Centre for European Economic Research Discussion Paper No. 17-066.
Rantapuska, E., 2008. Ex-dividend day trading: who, how, and why? Evidence from the Finnish market. *Journal of Financial Economics* 88, 355–374.
Rosenbaum, P. R., & Rubin, D. B. (1985). Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *The American Statistician 39*(1), 33-38.

Rubin, D. B. (2001). Using propensity scores to help design observational studies: application to the tobacco litigation. *Health Services and Outcomes Research Methodology 2*(3), 169-188.
Saunders-Scott, M. (2015). Substitution across methods of profit shifting. *National Tax Journal* 68, 1099–1120.
Schanz, D., & Schanz, S. (2011). Business taxation and financial decisions. Springer.
Slemrod, J. (1992). Do Taxes Matter? Lessons from the 1980's. American Economic Review Papers and Proceedings 82, 250–256.
Sugathan, A., & George, R. (2015). The influence of governance infrastructure and corporate governance on profit shifting. *Journal of International Business Studies* 46, 886–916.

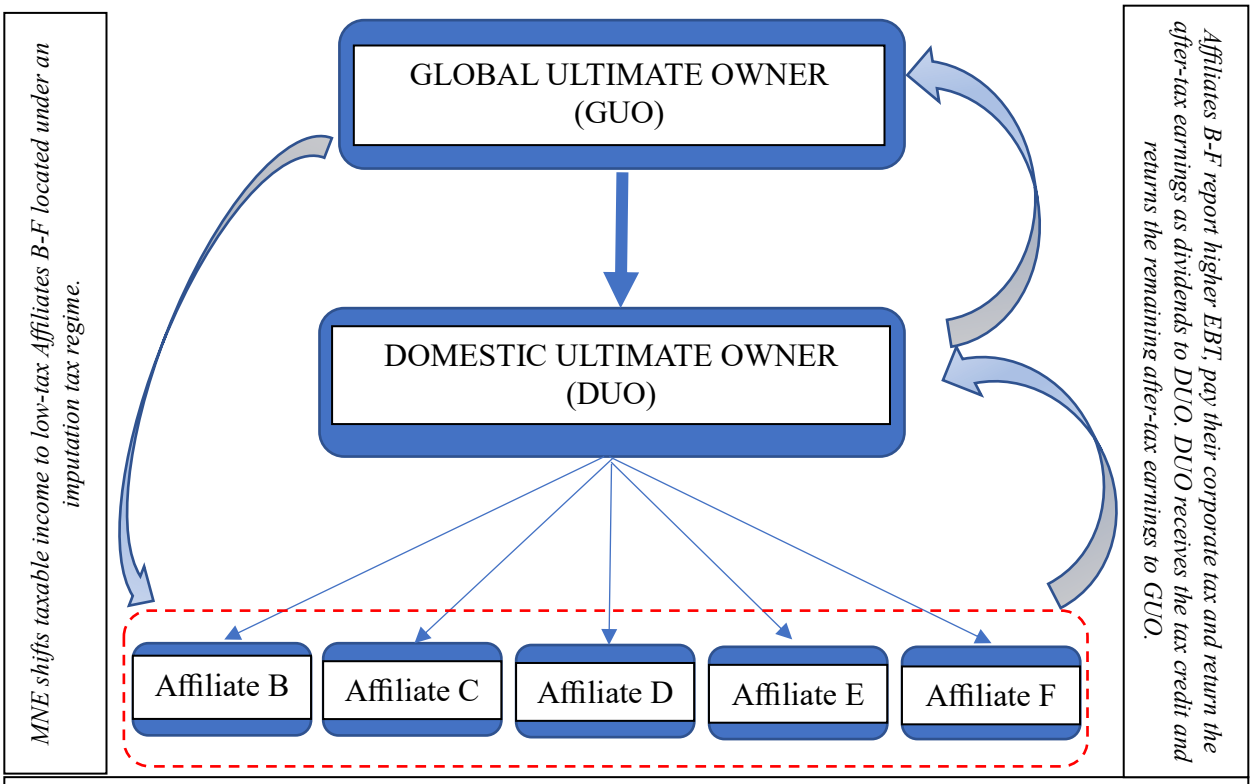

Figure 1. Pyramidal ownership via a Domestic Ultimate Owner (DUO) in imputation tax regime countries and MNEs' profit shifting. The figure illustrates the way that an MNE via a DUO can extract tax rate differences and tax credits from an imputation tax country. The Global Ultimate Owner (GUO) owns in a low-tax country DUO and DUO owns Affiliates B – F. The MNE sends taxable income to Affiliates B – F. These affiliates report higher Earnings Before Tax (EBT), pay corporate taxes for these earnings, and return the after-tax earnings as dividends to DUO. DUO must pay taxes for these dividends, but because its country provides tax credits to mitigate (or eliminate) double taxation, DUO being a tax resident of the country receives the tax credits, and finally repatriates the total earnings back to GUO (directly if GUO is in a territorial tax system country or defer repatriation in case GUO is in a worldwide tax system country).

Table 1: Definition of variables

Variable	Definition	Source
EBT	Affiliate's pre-tax profits (in logs).	Orbis
EBIT	Affiliate's earnings before interest and taxes (in logs).	Orbis
Financial profit	Affiliate financial profit captured by the difference of EBT-EBIT (in logs).	Own calculation
Fixed assets	Affiliate fixed asset (in logs).	Orbis
Number of employees	Affiliate number of employees (in logs).	Orbis
Leverage	The ratio of affiliate total debt to total assets.	Orbis
Population	Natural logarithm of the total population of the affiliate's country.	World Bank
GDP per capita	Natural logarithm of GDP per capita of the affiliate's country.	World Bank
Tax credit	Dummy that equals 1 if an affiliate is located in a country with a tax credit regime and 0 otherwise. The tax credit category contains full imputation and partial imputation tax regimes. Non-tax credit regimes include classical, modified classical, partial inclusion, and regimes without a shareholder's tax.	OECD Statistics
Classical	Dummy that equals 1 if an affiliate is in a country with a classical tax regime and 0 otherwise.	OECD Statistics
Tax credit(p)_Tax credit (s)	Dummy that equals 1 if the parent and subsidiary corporations are located in countries (different countries) with a tax credit tax regime; 0 otherwise.	Own calculation
Tax credit (p)_Non-tax credit (s)	Dummy that equals 1 if the parent is located in a country with a tax credit regime, and the subsidiary is located in a country with a non-tax credit regime.	Own calculation
Non-tax credit (p)_Tax credit (s)	Dummy that equals 1 if the parent corporation is located in a country with a non-tax credit regime, and the subsidiary is located in a country with a tax credit regime.	Own calculation
Non-tax credit (p)_Non-tax credit (s)	Dummy that equals 1 if both the parent and subsidiary corporations are located in (different) countries with non-tax credit regimes.	Own calculation
Tax difference	The difference between the subsidiary's corporate income tax rate, τ_s and the parent's corporate income tax rate, τ_p. That is, $(\tau_s - \tau_p)$.	Orbis
Weighted tax difference	Weighted tax difference derived from Huizinga and Laeven (2008). It is calculated as: $\frac{\sum_{k\neq i}^{n} B_k(\tau_i - \tau_k)}{\sum_{k=1}^{n} B_k}$. B_i denotes an affiliate *i's* total assets , while τ denotes corporate tax rates, while k shows the rest of the affiliates but *i.*	Own calculation
Unweighted tax difference	Calculated as in Karkinsky and Riedel (2012). Specifically, $\sum_j \frac{1}{N}(\tau_{it} - \tau_{jt}),\ i \neq j$. N denotes the total number of foreign affiliates, while j denotes all foreign affiliates in the same multinational group as affiliate i.	Own calculation
Parent subsidiary bilateral tax agreement signed	Dummy that equals 1 for the year onwards on which parent and subsidiary signed the bilateral tax agreement and 0 otherwise.	OECD Statistics
Parent subsidiary bilateral tax agreement into force	Dummy that equals 1 for the year onwards on which parent and subsidiary bilateral tax agreement came into force and 0 otherwise.	OECD Statistics
Aggregate-group ETR	The consolidated ETR.	Own calculations

Table 2: Summary statistics

Variables	Obs.	Mean	S.D	Min	P25	p50	p75	Max
EBT (log)	28,171	7.85	1.74	2.51	6.76	7.83	8.92	16.47
EBIT (log)	27,558	7.88	1.65	0.38	6.82	7.85	8.90	16.09
Financial profit (log)	11,472	5.09	2.81	-6.65	3.31	5.03	6.82	16.50
Tax difference	28,171	-0.05	0.08	-0.27	-0.09	-0.05	0.01	0.21
Unweighted tax difference	28,171	0.00	0.05	-0.18	-0.03	0.01	0.04	0.14
Weighted tax difference	28,171	-0.03	0.07	-0.27	-0.09	-0.03	0.01	0.21
Tax credit	28,171	0.15	0.36	0.00	0.00	0.00	0.00	1.00
Non-tax credit	28,171	0.85	0.36	0.00	1.00	1.00	1.00	1.00
Classical	28,171	0.40	0.49	0.00	0.00	0.00	1.00	1.00
Fixed assets (log)	28,171	8.40	2.29	-2.91	6.88	8.41	9.87	17.78
Number of employees (log)	28,171	4.96	1.18	0.00	4.12	4.80	5.66	12.75
Leverage	28,171	0.94	0.45	0.08	0.60	0.90	1.23	3.53
GDP per capita (log)	28,171	10.47	0.40	9.04	10.29	10.62	10.99	11.69
Population (log)	28,171	17.16	1.07	12.69	16.17	17.66	17.99	18.67
Tax credit(P)_Tax credit(s)	28,171	0.00	0.07	0.00	0.00	0.00	0.00	1.00
Tax credit(P)_Non-tax credit(s)	28,171	0.15	0.35	0.00	0.00	0.00	0.00	1.00
Non-tax credit(P)_Tax credit(s)	28,171	0.14	0.35	0.00	0.00	0.00	0.00	1.00
Non-tax credit(P)_Non-tax credit(s)	28,171	0.70	0.46	0.00	0.00	1.00	1.00	1.00
Parent subsidiary bilateral tax agreement signed	28,167	0.88	0.33	0.00	1.00	1.00	1.00	1.00
Parent subsidiary bilateral tax agreement into force	28,167	0.82	0.39	0.00	1.00	1.00	1.00	1.00
Aggregate-group ETR	25,534	0.27	0.13	0.00	0.20	0.26	0.32	1.00

Table 3: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) EBT (log)	1.00												
(2) EBIT (log)	0.95*	1.00											
(3) Financial profit (log)	0.64*	0.51*	1.00										
(4) Tax credit	0.11*	0.11*	0.05*	1.00									
(5) Non-tax credit	-0.11*	-0.11*	-0.05*	-1.00	1.00								
(6) Tax difference	-0.04*	-0.04*	-0.05*	-0.21*	0.21*	1.00							
(7) Unweighted tax difference	0.08*	0.07*	0.04*	-0.19*	0.19*	0.72*	1.00						
(8) Weighted tax difference	-0.03*	-0.03*	-0.03*	-0.22*	0.22*	0.98*	0.79*	1.00					
(9) Fixed assets (log)	0.59*	0.60*	0.63*	0.09*	-0.09*	-0.01	0.04*	0.00	1.00				
(10) Number of employees (log)	0.51*	0.55*	0.40*	0.09*	-0.09*	-0.06*	-0.04*	-0.06*	0.53*	1.00			
(11) Leverage	-0.10*	-0.05*	-0.06*	-0.12*	0.12*	0.09*	0.11*	0.10*	-0.13*	0.05*	1.00		
(12) GDP per capita (log)	0.16*	0.14*	0.09*	0.19*	-0.19*	0.28*	0.45*	0.32*	0.07*	-0.04*	0.14*	1.00	
(13) Population (log)	0.12*	0.12*	0.05*	0.25*	-0.25*	0.19*	0.35*	0.23*	0.10*	0.05*	0.07*	0.04*	1.00

** $p<0.01$*

Table 4: Distribution of parent firms and their respective subsidiaries.

This table reports the number of unique parent firms by country and the number of subsidiaries these parent firms own in these countries. Parents% is calculated as the number of unique parent firms in a country divided by the total number of unique parent firms in our sample. Subsidiaries% is calculated as the number of unique subsidiaries each of these parents owns divided by the total number of unique subsidiaries in our sample. Finally, the ratio of subsidiaries/parent shows the average number of subsidiaries that each parent firm owns in a country.

Country	Parents	Parents%	Subsidiaries	Subsidiaries%	Subsidiaries/parent
Australia	3	0.00	7	0.00	2.33
Austria	9	0.01	44	0.01	4.89
Belgium	22	0.02	137	0.02	6.23
Czech Republic	2	0.00	2	0.00	1.00
Denmark	11	0.01	72	0.01	6.55
Finland	16	0.01	94	0.01	5.88
France	86	0.08	1,171	0.17	13.62
Germany	139	0.13	1,100	0.16	7.91
Greece	2	0.00	4	0.00	2.00
Hungary	6	0.01	9	0.00	1.50
Ireland	16	0.01	53	0.01	3.31
Israel	1	0.00	3	0.00	3.00
Italy	19	0.02	47	0.01	2.47
Japan	18	0.02	21	0.00	1.17
Luxembourg	1	0.00	2	0.00	2.00
Netherlands	63	0.06	289	0.04	4.59
Norway	20	0.02	46	0.01	2.30
Poland	16	0.01	33	0.00	2.06
Portugal	5	0.00	5	0.00	1.00
Spain	31	0.03	172	0.03	5.55
Sweden	74	0.07	379	0.06	5.12
Switzerland	3	0.00	11	0.00	3.67
Turkey	1	0.00	1	0.00	1.00
United Kingdom	226	0.21	1,021	0.15	4.52
United States	304	0.28	2,098	0.31	6.90
Total	**1,094**	**1.00**	**6,821**	**1.00**	

Table 5: Replication of Huizinga and Laeven (2008)

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the types of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)
Weighted tax difference	-1.395***	-1.226***	-1.249***	-1.700***
	(-4.491)	(-3.827)	(-3.822)	(-4.914)
Fixed assets (in logs)	0.054***	0.052***	0.048***	0.051***
	(5.419)	(5.196)	(4.774)	(5.121)
Number of employees (in logs)	0.377***	0.382***	0.377***	0.373***
	(15.678)	(15.713)	(15.080)	(14.952)
Leverage	-0.335***	-0.339***	-0.325***	-0.326***
	(-10.954)	(-11.077)	(-10.523)	(-10.592)
GDP per capita (in logs)	0.389***	0.477***	0.375***	0.376***
	(5.177)	(4.001)	(3.056)	(3.047)
Population (in logs)	-0.129	0.485	0.580	0.328
	(-0.267)	(0.815)	(0.949)	(0.526)
Observations	27,247	27,247	27,097	27,054
Adjusted R^2	0.807	0.807	0.809	0.810
Subsidiary FE	✓	✓	✓	✓
Year FE	-	✓	-	-
Sub. industry-year FE	-	-	✓	✓
Parent industry-year FE	-	-	-	✓

Table 6a: Affiliates located in countries under an imputation tax regime and profit shifting

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the types of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	Tax credit	Non-tax credit	Whole sample
	(1)	(2)	(3)
Weighted tax difference	-8.160***	-0.527**	-0.792***
	(-2.704)	(-2.228)	(-3.648)
Tax credit			-0.163***
			(-4.147)
Weighted tax difference × Tax credit			-0.762**
			(-2.060)
Fixed assets (in logs)	0.166***	0.250***	0.247***
	(9.978)	(39.175)	(42.844)
Number of employees (in logs)	0.600***	0.509***	0.508***
	(20.527)	(42.803)	(48.144)
Leverage	-0.718***	-0.375***	-0.400***
	(-10.013)	(-16.760)	(-19.462)
GDP per capita (in logs)	-0.846	0.664***	0.676***
	(-1.473)	(23.335)	(24.924)
Population (in logs)	-0.728*	0.082***	0.103***
	(-1.818)	(7.354)	(9.930)
Observations	3,970	23,932	28,171
Adjusted R^2	0.636	0.569	0.572
Parent FE	✓	✓	✓
Sub. industry-year FE	✓	✓	✓
Parent industry-year FE	✓	✓	✓
Parent country-year FE	✓	✓	✓

Table 6B: Affiliates located in countries under an imputation tax regime and profit shifting (propensity score matching samples)

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the type of fixed effects used in each regression. The table reports coefficient estimates, and t-statistics (in parentheses) based on robust standard errors produced with a bootstrap procedure of 1,000 repetitions. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	Tax credit	**Non-tax credit**	**Whole sample**
	(1)	**(2)**	**(3)**
Weighted tax difference	-7.505**	-1.151	-1.269**
	(-2.189)	(-1.132)	(-2.119)
Tax credit			-0.417***
			(-5.516)
Weighted tax difference × Tax credit			-1.484**
			(-2.024)
Fixed assets (in logs)	0.158***	0.216***	0.200***
	(8.878)	(8.449)	(16.549)
Number of employees (in logs)	0.620***	0.576***	0.572***
	(20.182)	(11.843)	(25.578)
Leverage	-0.709***	-0.362***	-0.520***
	(-9.695)	(-3.516)	(-10.637)
GDP per capita (in logs)	-0.780	0.761***	0.785***
	(-1.231)	(7.485)	(10.614)
Population (in logs)	-0.653	0.161***	0.179***
	(-1.444)	(3.295)	(6.345)
Observations	3,936	2,325	6,621
Adjusted R^2	0.640	0.575	0.595
Parent FE	✓	✓	✓
Sub. industry-year FE	✓	✓	✓
Parent industry-year FE	✓	✓	✓
Parent country-year FE	✓	✓	✓

Table 7: Pyramidal ownership through a domestic ultimate owner (DUO) in countries under an imputation tax regime and profit shifting

The dependent variable is *EBT (in logs)*. The Tax incentive variable is either (a) *Weighted tax difference* constructed using the method of Huizinga and Laeven (2008), or (b) *Tax difference* defined as the difference of the corporate income tax rates between a subsidiary and a parent corporation, or (c) *Unweighted tax difference* defined using the method of Karkinsky and Riedel (2012). The observational units are multinational affiliates with a foreign parent firm. The lower part of the table indicates the type of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

Tax incentive variable:	**Weighted tax difference**		**Tax difference**		**Unweighted tax difference**	
	Pyramidal ownership via DUO	**Ownership without DUO**	**Pyramidal ownership via DUO**	**Ownership without DUO**	**Pyramidal ownership via DUO**	**Ownership without DUO**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Tax incentive variable	-2.251***	-0.515*	-2.235***	-0.508*	-2.314***	-0.452
	(-3.254)	(-1.871)	(-3.270)	(-1.835)	(-3.181)	(-1.592)
Tax incentive variable x Tax credit	-2.009*	-1.223**	-2.289**	-0.896*	-2.964*	-1.320
	(-1.711)	(-2.037)	(-2.347)	(-1.693)	(-1.715)	(-1.233)
Tax credit	-0.403***	-0.151**	-0.464***	-0.134*	-0.345***	-0.078
	(-3.422)	(-2.137)	(-3.872)	(-1.883)	(-3.864)	(-1.423)
Fixed assets (in logs)	0.258***	0.224***	0.257***	0.224***	0.258***	0.224***
	(21.061)	(28.141)	(21.094)	(28.122)	(21.206)	(28.221)
Number of employees (in logs)	0.462***	0.530***	0.461***	0.530***	0.461***	0.531***
	(20.806)	(36.158)	(20.830)	(36.161)	(20.797)	(36.173)
Leverage	-0.322***	-0.497***	-0.320***	-0.497***	-0.325***	-0.498***
	(-7.054)	(-17.922)	(-7.007)	(-17.923)	(-7.111)	(-17.938)
GDP per capita (in logs)	0.853***	0.663***	0.853***	0.662***	0.851***	0.659***
	(9.169)	(20.816)	(9.236)	(20.773)	(8.808)	(20.498)
Population (in logs)	0.091***	0.083***	0.091***	0.083***	0.091***	0.081***
	(3.234)	(5.789)	(3.235)	(5.739)	(3.248)	(5.585)
Marginal effect at mean of the tax incentive variable (dy/dx)	**-2.622*** (-3.985)**	**-0.663** (-2.407)**	**-2.657*** (-4.021)**	**-0.616** (-2.225)**	**-2.861*** (-4.301)**	**-0.612** (-2.170)**
Observations	6,461	16,472	6,461	16,472	6,461	16,472
Adjusted R-squared	0.589	0.595	0.589	0.595	0.589	0.595
Parent effects	✓	✓	✓	✓	✓	✓
Sub. industry-year FE	✓	✓	✓	✓	✓	✓
Parent industry-year FE	✓	✓	✓	✓	✓	✓
Parent country-year FE	✓	✓	✓	✓	✓	✓

Table 8: Affiliates located in countries under an imputation tax regime and profit shifting channels.

The dependent variable in column (1) is *EBIT (in logs)*, and in column (2) *Financial profit (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the types of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

Dependent variable:	**EBIT (log)**	**Financial profit (log)**
	(1)	**(2)**
Weighted tax difference	-0.740***	-0.546
	(-3.684)	(-0.807)
Tax credit	-0.057	-0.377***
	(-1.567)	(-3.172)
Weighted tax difference × Tax credit	0.002	-3.750***
	(0.006)	(-3.291)
Fixed assets (in logs)	0.221***	0.612***
	(39.810)	(41.751)
Number of employees (in logs)	0.537***	0.301***
	(52.471)	(11.498)
Leverage	-0.198***	-0.099*
	(-10.362)	(-1.669)
GDP per capita (in logs)	0.570***	0.444***
	(22.764)	(5.374)
Population (in logs)	0.094***	0.008
	(9.794)	(0.252)
Observations	27,558	11,472
Adjusted R^2	0.595	0.513
Parent FE	✓	✓
Sub. industry-year FE	✓	✓
Parent industry-year FE	✓	✓
Parent country-year FE	✓	✓

Table 9: Imputation tax regime, multinational group's tax aggressiveness and profit shifting

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the types of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	High group ETR (Top 50%)	**Low group ETR (Bottom 50%)**	**High group ETR (Top 25%)**	**Low group ETR (Bottom 25%)**	**High group ETR (Top 20%)**	**Low group ETR (Bottom 20%)**	**High group ETR (Top 15%)**	**Low group ETR (Bottom 15%)**	**High group ETR (Top 10%)**	**Low group ETR (Bottom 10%)**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Weighted tax difference	-0.404	-0.760**	0.165	-0.999**	-0.132	-1.136**	-0.378	-1.770***	-1.366	-2.323***
	(-1.208)	(-2.397)	(0.318)	(-2.143)	(-0.232)	(-2.090)	(-0.520)	(-2.720)	(-1.371)	(-2.941)
Weighted tax difference x Tax credit	-1.202**	-0.585	-1.512*	0.243	-2.180**	0.487	-3.200**	1.292	-0.069	2.362*
	(-1.978)	(-1.106)	(-1.684)	(0.325)	(-2.106)	(0.587)	(-2.460)	(1.353)	(-0.038)	(1.890)
Tax credit	-0.182***	-0.161***	-0.092	-0.081	-0.188*	-0.073	-0.292**	-0.095	-0.068	-0.047
	(-2.906)	(-2.787)	(-0.930)	(-0.945)	(-1.730)	(-0.752)	(-2.169)	(-0.864)	(-0.409)	(-0.336)
Fixed assets (in logs)	0.241***	0.250***	0.234***	0.242***	0.246***	0.233***	0.253***	0.232***	0.262***	0.204***
	(26.511)	(30.169)	(17.229)	(19.928)	(15.430)	(16.970)	(12.329)	(14.535)	(9.175)	(10.041)
Number of employees (in logs)	0.512***	0.524***	0.487***	0.539***	0.478***	0.544***	0.503***	0.536***	0.478***	0.536***
	(31.658)	(33.858)	(20.866)	(23.404)	(17.644)	(20.311)	(14.586)	(17.197)	(10.125)	(12.581)
Leverage	-0.485***	-0.356***	-0.473***	-0.317***	-0.497***	-0.325***	-0.448***	-0.302***	-0.491***	-0.372***
	(-14.697)	(-11.841)	(-9.441)	(-7.522)	(-8.599)	(-6.816)	(-6.178)	(-5.420)	(-5.135)	(-5.515)
GDP per capita (in logs)	0.677***	0.630***	0.673***	0.603***	0.693***	0.616***	0.662***	0.666***	0.682***	0.875***
	(15.818)	(16.225)	(10.136)	(10.199)	(9.137)	(9.143)	(6.914)	(8.258)	(5.412)	(8.820)
Population (in logs)	0.107***	0.111***	0.131***	0.120***	0.128***	0.137***	0.148***	0.146***	0.197***	0.208***
	(6.650)	(7.350)	(5.285)	(5.290)	(4.415)	(5.337)	(4.088)	(4.711)	(4.164)	(5.488)
Marginal effect at mean of the tax incentive variable (dy/dx)	-0.585*	-0.844***	-0.063	-0.963**	-0.460	-1.067**	-0.848	-1.577**	-1.375	-1.974**
	(-1.806)	(-2.735)	(-0.126)	(-2.119)	(-0.836)	(-2.002)	(-1.206)	(-2.458)	(-1.421)	(-2.526)
Observations	12,319	12,786	6,006	6,222	4,689	4,909	3,366	3,600	2,128	2,296
Adjusted R-squared	0.554	0.576	0.554	0.591	0.560	0.582	0.569	0.571	0.554	0.598
Parent effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sub. industry-year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Parent industry-year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Parent country-year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 10: Combined parent-subsidiary tax regimes and profit shifting

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the types of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)
Weighted tax difference × Non-tax credit(p)_Tax credit(s)	-2.723***	-2.723**	-2.723***	-2.723***
	(-4.870)	(-2.595)	(-4.411)	(-3.686)
Weighted tax difference × Non-tax credit(p)_Non-tax credit(s)	-1.612***	-1.612*	-1.612***	-1.612***
	(-3.969)	(-2.056)	(-3.696)	(-3.555)
Weighted tax difference × Tax credit(p)_Tax credit(s)	-2.583	-2.583	-2.583	-2.583
	(-0.881)	(-1.157)	(-1.333)	(-0.889)
Weighted tax difference	0.572	0.572	0.572	0.572
	(1.425)	(0.576)	(1.290)	(1.309)
Tax credit(p)_Non-tax credit(s)	-0.221	-0.221	-0.221	-0.221
	(-0.848)	(-0.990)	(-1.259)	(-1.108)
Non-tax credit(p)_Non-tax credit(s)	0.213***	0.213**	0.213***	0.213**
	(4.855)	(2.891)	(3.775)	(2.563)
Fixed assets (in logs)	0.246***	0.246***	0.246***	0.246***
	(42.697)	(17.379)	(21.489)	(13.214)
Number of employees (in logs)	0.509***	0.509***	0.509***	0.509***
	(48.217)	(26.936)	(18.215)	(17.057)
Leverage	-0.402***	-0.402***	-0.402***	-0.402***
	(-19.556)	(-4.991)	(-11.280)	(-5.683)
GDP per capita (in logs)	0.680***	0.680***	0.680***	0.680***
	(25.075)	(10.795)	(12.003)	(10.812)
Population (in logs)	0.103***	0.103***	0.103***	0.103***
	(9.898)	(3.950)	(3.495)	(3.512)
Observations	28,171	28,171	28,171	28,171
Adjusted R^2	0.572	0.571	0.571	0.571
Standard error	robust	Cluster: Subsidiary Year	Cluster: Parent Year	Cluster: Parent Subsidiary Year
Parent FE	✓	✓	✓	✓
Sub. industry-year FE	✓	✓	✓	✓
Parent industry-year FE	✓	✓	✓	✓
Parent country-year FE	✓	✓	✓	✓

Online Appendix

Tax Regimes and Profit Shifting

This appendix is intended for online use only. It provides additional information along with various robustness tests.

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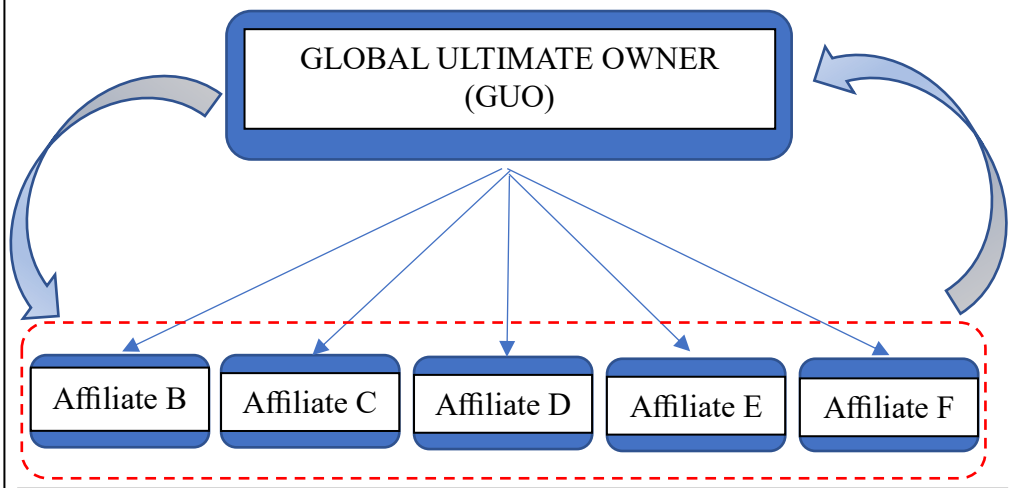
MNE shifts taxable income to low-tax Affiliates B-F located under an imputation tax regime.



Affiliates B-F report higher EBT, pay their corporate tax, and return the after-tax earnings as dividends to GUO. GUO receives the after-tax earnings but cannot receive tax credits because is not a tax resident of this country.

Figure A1. This figure shows an example of non-pyramidal ownership via Domestic Ultimate Owner (DUO). It illustrates an ownership structure where the Global Ultimate Owner (GUO) owns Affiliates B – F in the same low-tax country with an imputation tax regime. When Affiliates B – F do not own any of the rest of the affiliates, then their parent company is considered a foreign investor and thus it cannot receive dividend tax credits, because it is not a tax resident of this country. In this case, an MNE can use dividend stripping strategies to share the tax credit with one or more tax residents.

An illustrative example about the effect of imputation tax regime on the incentives for cross-countries tax avoidance (i.e., profit shifting).

Two scenarios are used in the illustrative example. First, in *Panel A* of Table A1, following McClure et al. (2018) and Amiram et al. (2019), we examine two identical firms located in two identical countries except for their shareholder dividend tax regime. The illustration includes the following assumptions:

1. The statutory corporate tax rate is 30%.
2. The level of deductions used for tax avoidance is 50% of the Net Profit before Tax.
3. The cost of the deduction for tax avoidance is 5% of the value attained.
4. All profits are distributed as dividends.
5. We assume a full imputation tax regime.
7. The dividends tax rate is 35% for the country with the imputation tax regime and 15% for the classical tax regime country.

The bottom line of *Panel A,* Table A1, shows the "After-tax dividend income". The first two columns indicate the case of no tax avoidance for these two identical firms under an imputation (column 1) and under a classical tax regime (column 2). The difference in the "After tax dividend income" indicates that, even with a dividend tax rate of 35% for the imputation, compared to a dividend tax rate of 15% for the classical system, the shareholder receives almost 10% more after-tax income. Columns (3) and (4) introduce a level of firm tax avoidance. The costly tax avoidance reverses the difference between the two shareholders, leaving the shareholder under imputation over 10% worse off them under the classical system.

In *Panel B,* of Table A1 we extend the example to motivate our research questions. We assume a multinational group, where the parent firm is located under an imputation tax regime and the rest of the affiliates of this multinational group are located in low-tax countries (15%) with classical tax regimes. The bottom line of *Panel B* of Table A1 shows that the low-tax subsidiaries have the incentive to participate in tax-motivated profit shifting, without the parent firm's engagement since the after-tax dividend income is higher with tax avoidance.

Table A1: Illustrative example of the imputation tax regime on multinational groups' profit shifting

Panel A: Single firm scenario				
	No tax avoidance		With tax avoidance	
	Imputation	Classical	Imputation	Classical
Firm level				
Operating profit	1,000,000	1,000,000	1,000,000	1,000,000
Less tax avoidance cost (5%)	0	0	50,000	50,000
Earnings before tax	1,000,000	1,000,000	950,000	950,000
Tax avoidance (50% of Op. Profit)	0	0	500,000	500,000
Taxable income	1,000,000	1,000,000	450,000	450,000
Statutory corporate tax rate	30%	30%	30%	30%
Corporate tax obligation	300,000	300,000	135,000	135,000
After tax earnings	700,000	700,000	815,000	815,000
Dividends				
Dividend pay-out ratio	100%	100%	100%	100%
Cash dividends	700,000	700,000	815,000	815,000
Tax credits	300,000	0	135,000	0
Imputation percentage	100.00%	0.00%	45.00%	0.00%
Shareholders' level				
% of shares	100%	100%	100%	100%
Cash dividends	700,000	700,000	815,000	815,000
Tax credits	300,000	0	135,000	0
Dividend income	1,000,000	700,000	950,000	815,000
Marginal tax rate	35%	15%	35%	15%
Tax liability	350,000	105,000	332,500	122,250
Less tax credits	300,000	0	135,000	0
Tax payable	50,000	105,000	197,500	122,250
After tax dividend income	*650,000*	*595,000*	*617,500*	*692,750*

Panel B: Multinational group scenario				
	Parent firm		Rest of affiliates	
	No tax avoidance Imputation	With tax avoidance Imputation	No tax avoidance Classical	With tax avoidance Classical
Firm level				
Operating profit	1,000,000	1,000,000	10,000,000	10,000,000
Less tax avoidance cost (5%)	0	50,000	0	500,000
Earnings before tax	1,000,000	950,000	10,000,000	9,500,000
Tax avoidance (50% of Op. Profit)	0	500,000	0	5,000,000
Taxable income	1,000,000	450,000	10,000,000	4,500,000
Statutory corporate tax rate	30%	30%	15%	15%
Corporate tax obligation	300,000	135,000	1,500,000	675,000
After tax earnings	700,000	815,000	8,500,000	8,825,000
Dividends				
Dividend pay-out ratio	100%	100%	100%	100%
Cash dividends	700,000	815,000	8,500,000	8,825,000
Tax credits	300,000	135,000	0	0
Imputation percentage	100.00%	45.00%	0.00%	0.00%
Shareholders' level				
% of shares	100%	100%	100%	100%
Cash dividends	700,000	815,000	8,500,000	8,825,000
Tax credits	300,000	135,000	0	0
Dividend income	1,000,000	950,000	8,500,000	8,825,000
Marginal tax rate	35%	35%	35%	35%
Tax liability	350,000	332,500	2,975,000	3,088,750
Less tax credits	300,000	135,000	0	0
Tax payable	50,000	197,500	2,975,000	3,088,750
After tax dividend income	*650,000*	*617,500*	*5,525,000*	*5,736,250*

Explanation and illustrative example for the tax differential approach

Consider the next set of equations:

$$log\,\pi_{it} = \beta_0 + \beta_1 C_{it} + \beta_2 Firm_{it} + \beta_3 \text{Country}_{it} + \rho_{it} + \epsilon_{it} \quad \text{(A.1)}$$

$$C_i = \frac{\sum_{k\neq i}^{n} B_k(\tau_i - \tau_k)}{\sum_{k=1}^{n} B_k}, \quad \text{(A.2)}$$

where:

π_{it}: denotes reported pre-tax earnings of subsidiary *i* at time *t.*

C_{it}: denotes the tax incentive variable.

$Firm_{it}$: a vector of firm level characteristics

Country_{it}: a vector of country level characteristics

ρ_{it}: a set of fixed effects

ϵ_{it}: the idiosyncratic error

B_k: a proxy for affiliate's k total size

According to eq. (A.2), if an affiliate's i corporate tax rate, τ_i, is lower than the corporate tax rate of the affiliate k, τ_k, then there will be a tax incentive for incoming profit shifting from affiliate k to affiliate i. The smaller the $(\tau_i - \tau_k)$ the higher the tax incentive for profit shifting toward affiliate i. Moreover, the higher the size of affiliate's k size, B_k, the higher the incentive for profit shifting, given that $(\tau_i - \tau_k) < 0$. Every time the tax difference $(\tau_i - \tau_k)$ is reduced then the affiliate i will systematically report higher profits before tax, π_{it}, due to income shifting. This negative relationship between $(\tau_i - \tau_k)$ and profits before tax, π_{it}, indicates the existence of profit shifting. In other words, a negative and statistically significant β_1 in eq. (A.1) would indicate the existence of profit shifting (see e.g., Huizinga and Laeven, 2008).

For this illustrative example, we consider a multinational group with 3 affiliates. The parent firm in Country 1, and two subsidiaries in Country 2 and Country 3. Regarding their total sales: $B_1 = 100, B_2 = 200$ and $B_3 = 300$. Regarding their corporate tax rates: $\tau_1 = 0.2, \tau_2 = 0.25, \tau_3 = 0.3$. Calculating the tax incentive variable, C_i, for each of the three affiliates:

- $C_1 = \frac{\sum_{k\neq 1}^{n} B_k(\tau_1 - \tau_k)}{\sum_{k=1}^{n} B_k} = \frac{200(0.2-0.25)+300(0.2-0.3)}{100+200+300} = \frac{-10-30}{600} = \frac{-40}{600} \Rightarrow C_1 \approx -0.07$
- $C_2 = \frac{\sum_{k\neq 2}^{n} B_k(\tau_2 - \tau_k)}{\sum_{k=1}^{n} B_k} = \frac{100(0.25-0.2)+300(0.25-0.3)}{100+200+300} = \frac{5-15}{600} = \frac{-10}{600} \Rightarrow C_2 \approx -0.02$
- $C_3 = \frac{\sum_{k\neq 3}^{n} B_k(\tau_3 - \tau_k)}{\sum_{k=1}^{n} B_k} = \frac{100(0.3-0.2)+200(0.3-0.25)}{100+200+300} = \frac{10+10}{600} = \frac{20}{600} \Rightarrow C_3 \approx 0.03$

The results show a relative high tax incentive to shift income to country 1, a moderate tax incentive to shift income to country 2, and a tax incentive to shift income out of country 3.

Table A2: OECD Countries with their year of accession agreement

Country	Year of Accession
Australia	1971
Austria	1961
Belgium	1961
Czech Republic	1995
Denmark	1961
Estonia	2010
Finland	1969
France	1961
Germany	1961
Greece	1961
Hungary	1996
Iceland	1961
Ireland	1961
Israel	2010
Italy	1962
Japan	1964
Latvia	2016
Lithuania	2018
Luxembourg	1961
Mexico	1994
Netherlands	1961
Norway	1961
Poland	1996
Portugal	1961
Slovakia	2000
Slovenia	2010
Spain	1961
Sweden	1961
Switzerland	1961
Turkey	1961
United Kingdom	1961
United States	1961

Table A3: Bilateral tax treaties by parent country for the period 2009-17.

Parent country	Mean tax treaties	Min.	Max.
Australia	41.73	41	42
Austria	36.50	33	37
Belgium	96.34	93	98
Czech Republic	81.43	73	87
Denmark	64.85	64	65
Finland	65.38	60	70
France	123.47	119	125
Germany	28.71	18	35
Greece	56.29	55	57
Hungary	62.84	54	66
Ireland	63.71	47	71
Israel	46.38	42	49
Italy	82.37	81	84
Japan	34.12	29	35
Luxembourg	72.00	58	84
Netherlands	77.39	73	81
Norway	23.16	17	28
Poland	74.30	69	78
Portugal	71.83	53	77
Slovakia	62.57	60	66
Spain	79.50	65	86
Sweden	59.93	58	64
Switzerland	12.06	10	14
Turkey	86.00	86	86
United Kingdom	106.61	95	119
United States	66.37	64	67
Total	64.46	10	125

Table A4: Sample t-test

Affiliates under imputation and non-imputation tax regime

Variables	Tax credit (s) (1)		Non-tax credit(s) (2)		Difference (2)-(1)	
	N	**Mean**	**N**	**Mean**	**Mean**	**Sign.**
GAAP ETR	4,065	0.141	23,109	0.271	0.13	***
EBT (in logs)	4,191	8.329	23,980	7.769	-0.56	***
EBIT (in logs)	4,095	8.338	23,472	7.807	-0.531	***
Financial profit (in logs)	2,076	5.386	9,652	5.01	-0.376	***
Tax difference	4,191	-0.093	23,980	-0.036	0.057	***
Weighted tax difference	4,191	-0.08	23,980	-0.027	0.053	***
Unweighted tax difference	4,191	-0.027	23,980	0.008	0.035	***
Fixed asset (in logs)	4,191	8.892	23,980	8.314	-0.578	***
Number of employees (in logs)	4,191	5.204	23,980	4.919	-0.285	***
Leverage	4,191	0.805	23,980	0.962	0.157	***
GDP per capita (in logs)	4,191	10.679	23,980	10.435	-0.244	***
Population (in logs)	4,191	17.852	23,980	17.043	-0.809	***

Table A5: Robustness tests controlling for bilateral tax agreements.

The dependent variable in columns (1) and (4) is *EBT*, in column (2) is *EBIT (in logs)*, in column (3) is *Financial profit (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the types of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

Panel A: Controlling for parent-subsidiary bilateral tax agreement signed (but not into force)

Dependent Variable	**EBT (log)**	**EBIT (log)**	**Financial profit (log)**	**EBT (log)**
	(1)	**(2)**	**(3)**	**(4)**
Weighted tax difference	-0.781***	-0.733***	-0.591	0.565
	(-3.597)	(-3.644)	(-0.873)	(1.407)
Weighted tax difference × Tax credit	-0.772**	-0.004	-3.671***	
	(-2.087)	(-0.012)	(-3.224)	
Weighted tax difference × Non-tax credit (p)_Tax credit (s)				-2.714***
				(-4.849)
Weighted tax difference × Non-tax credit (p)_Non-tax credit (s)				-1.593***
				(-3.915)
Weighted tax difference × Tax credit (p)_Tax credit (s)				-2.582
				(-0.880)
Tax credit (p)_Non-tax credit (s)				-0.219
				(-0.841)
Non-tax credit (p)_Non-tax credit (s)				0.214***
				(4.889)
Parent subsidiary tax agreement signed	0.026	0.013	-0.269***	0.019
	(0.898)	(0.501)	(-3.156)	(0.660)
Tax credit	-0.165***	-0.058	-0.366***	
	(-4.192)	(-1.601)	(-3.085)	
Observations	28,167	27,554	11,472	28,167
Adjusted R^2	0.572	0.595	0.513	0.572
Firm level controls	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓
Sub. industry-year FE	✓	✓	✓	✓
Parent industry-year FE	✓	✓	✓	✓
Parent country-year FE	✓	✓	✓	✓

(Table A5 continues on next page)

(Table A5 continued from previous page)

Panel B: Controlling for parent-subsidiary bilateral tax agreement (into force)

Dependent variable	**EBT (log)**	**EBIT (log)**	**Financial profit (log)**	**EBT (log)**
Weighted tax difference	-0.794***	-0.742***	-0.502	0.587
	(-3.655)	(-3.688)	(-0.742)	(1.463)
Weighted tax difference × Tax credit	-0.724*	0.037	-3.941***	
	(-1.947)	(0.109)	(-3.451)	
Weighted tax difference × Non-tax credit (p)_Tax credit (s)				-2.691***
				(-4.807)
Weighted tax difference × Non-tax credit (p)_Non-tax credit (s)				-1.634***
				(-4.016)
Weighted tax difference × Tax credit (p)_Tax credit (s)				-2.585
				(-0.880)
Tax credit (p)_Non-tax credit (s)				-0.218
				(-0.838)
Non-tax credit (p)_Non-tax credit (s)				0.209***
				(4.766)
Parent subsidiary tax agreement signed	0.036	0.033	-0.175***	0.037
	(1.553)	(1.555)	(-2.582)	(1.591)
Tax credit	-0.161***	-0.055	-0.392***	
	(-4.091)	(-1.517)	(-3.295)	
Observations	28,167	27,554	11,472	28,167
Adjusted R^2	0.572	0.595	0.513	0.572
Firm level controls	✓	✓	✓	✓
Parent FE	✓	✓	✓	✓
Sub. industry-year FE	✓	✓	✓	✓
Parent industry-year FE	✓	✓	✓	✓
Parent country-year FE	✓	✓	✓	✓

Table A6: Affiliates located in countries under an imputation tax regime and profit shifting (different tax incentive variables)

The dependent variable is *EBT (in logs)*. *Tax difference* is defined as the difference of the corporate income tax rate between a subsidiary and a parent corporation. *Unweighted tax difference* is defined using the method of Karkinsky and Riedel (2012). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the type of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

Tax incentive variable	**Tax difference**			**Unweighted tax difference**		
	Tax-credit	**Non-tax Credit**	**Full sample**	**Tax-credit**	**Non-tax Credit**	**Full sample**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Tax difference	-10.245**	-0.555**	-0.825***			
	(-2.399)	(-2.333)	(-3.803)			
Tax difference × Tax credit			-0.607*			
			(-1.873)			
Unweighted tax difference				-8.441**	-0.540**	-0.594***
				(-2.573)	(-2.266)	(-2.607)
Unweighted tax difference × Tax credit						-2.440***
						(-4.075)
Tax credit			-0.162***			-0.154***
			(-4.039)			(-4.965)
Fixed assets (in logs)	0.166***	0.250***	0.247***	0.167***	0.250***	0.247***
	(9.994)	(39.176)	(42.842)	(10.023)	(39.175)	(42.914)
Number of employees (in logs)	0.599***	0.509***	0.508***	0.599***	0.509***	0.508***
	(20.496)	(42.800)	(48.133)	(20.502)	(42.809)	(48.229)
Leverage	-0.718***	-0.375***	-0.400***	-0.724***	-0.375***	-0.400***
	(-10.004)	(-16.766)	(-19.467)	(-10.111)	(-16.764)	(-19.468)
GDP per capita (in logs)	-1.078*	0.665***	0.677***	-0.859	0.664***	0.666***
	(-1.646)	(23.372)	(24.982)	(-1.493)	(23.318)	(24.343)
Population (in logs)	-0.969*	0.083***	0.104***	-0.747*	0.083***	0.097***
	(-1.828)	(7.404)	(10.028)	(-1.792)	(7.363)	(9.092)
Observations	3,970	23,932	28,171	3,970	23,932	28,171
Adjusted R^2	0.636	0.569	0.572	0.636	0.569	0.572
Parent FE	✓	✓	✓	✓	✓	✓
Sub. industry-year FE	✓	✓	✓	✓	✓	✓
Parent industry-year FE	✓	✓	✓	✓	✓	✓
Parent country-year FE	✓	✓	✓	✓	✓	✓

Table A7: Affiliates located in countries under an imputation tax regime and profit shifting (various fixed effects).

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the types of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Weighted tax difference	-1.390***	-0.979***	-0.865***	-1.385***	-0.981***	-0.911***
	(-10.424)	(-6.944)	(-4.560)	(-10.275)	(-6.810)	(-4.529)
Tax credit	-0.233***	-0.209***	-0.164***	-0.230***	-0.225***	-0.178***
	(-7.346)	(-6.596)	(-4.649)	(-7.141)	(-6.918)	(-4.808)
Weighted tax difference × Tax credit	-1.243***	-0.923***	-0.676**	-1.185***	-1.016***	-0.715**
	(-3.921)	(-2.943)	(-2.010)	(-3.690)	(-3.166)	(-2.055)
Fixed assets (in logs)	0.270***	0.261***	0.262***	0.270***	0.262***	0.262***
	(51.182)	(49.649)	(49.665)	(50.789)	(49.459)	(49.427)
Number of employees (in logs)	0.514***	0.518***	0.516***	0.515***	0.519***	0.516***
	(54.587)	(54.827)	(54.476)	(54.279)	(54.342)	(53.984)
Leverage	-0.357***	-0.379***	-0.373***	-0.355***	-0.380***	-0.375***
	(-18.797)	(-20.362)	(-19.944)	(-18.550)	(-20.126)	(-19.730)
GDP per capita (in logs)	0.701***	0.696***	0.667***	0.704***	0.704***	0.677***
	(30.910)	(30.507)	(27.052)	(30.729)	(30.297)	(26.524)
Population (in logs)	0.119***	0.115***	0.113***	0.118***	0.113***	0.112***
	(13.772)	(13.302)	(12.171)	(13.516)	(12.867)	(11.737)
Observations	28,395	28,394	28,393	28,314	28,275	28,253
Adjusted R^2	0.487	0.508	0.511	0.484	0.505	0.507
Year FE	✓	✓	✓	-	-	-
Sub. industry-year FE	-	-	-	✓	✓	✓
Parent industry-year FE	-	-	-	-	✓	✓
Parent country-year FE	-	-	-	-	-	✓
Sub. industry FE	✓	✓	✓	-	-	-
Parent industry FE	-	✓	✓	-	-	-
Parent country FE	-	-	✓	-	-	-

Table A8: Multiple subsidiaries in countries under an imputation tax regime and profit shifting

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). *Tax difference* is defined as the difference in the corporate income tax rate between a subsidiary and a parent corporation. *Unweighted tax difference* is defined using the method of Karkinsky and Riedel (2012). The observational units are multinational affiliates with a foreign parent firm. The lower part of the table indicates the type of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	Weighted tax difference		**Tax difference**		**Unweighted tax difference**	
	Multiple ownership through DUO	**Ownership without DUO**	**Multiple ownership through DUO**	**Ownership without DUO**	**Multiple ownership through DUO**	**Ownership without DUO**
Tax incentive variable	-1.473***	-0.403	-1.490***	-0.441*	-1.492***	-0.155
	(-2.744)	(-1.578)	(-2.796)	(-1.720)	(-2.652)	(-0.578)
Tax credit	-0.509***	-0.174***	-0.513***	-0.173***	-0.365***	-0.138***
	(-5.537)	(-3.677)	(-5.425)	(-3.601)	(-5.385)	(-3.599)
Tax incentive variable x Tax	-2.939***	-1.195***	-2.478***	-0.973**	-3.509***	-3.209***
	(-3.284)	(-2.734)	(-3.279)	(-2.490)	(-2.651)	(-4.332)
Subsidiary fixed assets	0.271***	0.214***	0.271***	0.214***	0.272***	0.215***
	(31.091)	(27.575)	(31.128)	(27.569)	(31.228)	(27.652)
Subsidiary number of	0.464***	0.552***	0.464***	0.552***	0.464***	0.553***
	(28.961)	(39.267)	(28.958)	(39.261)	(28.925)	(39.411)
Subsidiary leverage	-0.320***	-0.466***	-0.319***	-0.466***	-0.325***	-0.465***
	(-9.323)	(-17.566)	(-9.296)	(-17.568)	(-9.445)	(-17.554)
Subsidiary GDP per capita	0.776***	0.669***	0.779***	0.670***	0.772***	0.658***
	(10.709)	(22.331)	(10.797)	(22.349)	(10.359)	(21.841)
Subsidiary population	0.106***	0.091***	0.107***	0.092***	0.105***	0.082***
	(4.894)	(6.824)	(4.939)	(6.895)	(4.803)	(6.009)
Constant	-6.423***	-4.788***	-6.485***	-4.825***	-6.307***	-4.527***
	(-7.230)	(-11.492)	(-7.302)	(-11.501)	(-6.993)	(-10.819)
Marginal effect at the mean of the tax incentive variable	**-1.966*** (-3.848)**	**-0.566** (-2.274)**	**-1.905*** (-3.703)**	**-0.574** (-2.287)**	**-2.080*** (-4.022)**	**-0.592** (-2.352)**
Observations	10,706	17,322	10,706	17,322	10,706	17,322
Adjusted R-squared	0.560	0.599	0.560	0.599	0.560	0.600
Parent effects	✓	✓	✓	✓	✓	✓
Sub. industry-year FE	✓	✓	✓	✓	✓	✓
Parent industry-year FE	✓	✓	✓	✓	✓	✓
Parent country-year FE	✓	✓	✓	✓	✓	✓

Table A9: Combined parent-subsidiary tax regime and profit shifting (various fixed effects).

The dependent variable is *EBT (in logs)*. *Weighted tax difference* is constructed using the method of Huizinga and Laeven (2008). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the type of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Weighted tax difference × Non-tax credit (p)_Tax credit (s)	-1.999***	-1.816***	-1.457***	-2.027***	-2.022***	-1.544***
	(-4.319)	(-3.967)	(-2.938)	(-4.328)	(-4.302)	(-2.969)
Weighted tax difference × Non-tax credit (p)_Non-tax credit (s)	-1.160***	-1.076***	-0.840**	-1.200***	-1.169***	-0.878**
	(-3.470)	(-3.275)	(-2.489)	(-3.540)	(-3.426)	(-2.404)
Weighted tax difference × Tax credit (p)_Tax credit (s)	-0.923	-1.699	-1.278	0.256	-0.629	-2.553
	(-0.390)	(-0.657)	(-0.452)	(0.112)	(-0.258)	(-0.980)
Weighted tax difference	-0.809**	-0.342	-0.209	-0.765**	-0.266	-0.187
	(-2.515)	(-1.078)	(-0.652)	(-2.339)	(-0.803)	(-0.523)
Tax credit(p)_Non-tax credit (s)	0.342***	0.294***	0.142	0.343***	0.313***	0.033
	(8.138)	(6.846)	(0.594)	(8.066)	(7.111)	(0.151)
Non-tax credit (p)_Non-tax credit (s)	0.212***	0.207***	0.168***	0.214***	0.225***	0.181***
	(6.007)	(5.840)	(4.116)	(5.982)	(6.242)	(4.280)
Tax credit (p)_Tax credit (s)	0.056	0.173		-0.001	0.100	
	(0.274)	(0.790)		(-0.006)	(0.485)	
Fixed assets (in logs)	0.270***	0.261***	0.261***	0.270***	0.261***	0.262***
	(51.165)	(49.595)	(49.643)	(50.753)	(49.410)	(49.393)
Number of employees (in logs)	0.514***	0.519***	0.516***	0.516***	0.519***	0.517***
	(54.670)	(54.924)	(54.539)	(54.353)	(54.424)	(54.041)
Leverage	-0.355***	-0.379***	-0.374***	-0.353***	-0.380***	-0.376***
	(-18.695)	(-20.355)	(-20.006)	(-18.459)	(-20.118)	(-19.761)
GDP per capita (in logs)	0.718***	0.710***	0.673***	0.720***	0.717***	0.680***
	(31.345)	(30.765)	(27.146)	(31.154)	(30.547)	(26.609)
Population (in logs)	0.126***	0.119***	0.114***	0.125***	0.117***	0.112***
	(14.306)	(13.582)	(12.200)	(14.045)	(13.146)	(11.669)
Observations	28,395	28,394	28,393	28,314	28,275	28,253
Adjusted R^2	0.488	0.509	0.511	0.484	0.505	0.507
Year FE	✓	✓	✓	-	-	-
Sub. industry-year FE	-	-	-	✓	✓	✓
Parent industry-year FE	-	-	-	-	✓	✓
Parent country-year FE	-	-	-	-	-	✓
Subsidiary industry FE	✓	✓	✓	-	-	-
Parent industry FE	-	✓	✓	-	-	-
Parent country FE	-	-	✓	-	-	-

Table A10: Combined parent-subsidiary tax regime and profit shifting (tax incentive variables).

The dependent variable is *EBT (in logs)*. *Tax difference* is defined as the difference in the corporate income tax rate between a subsidiary and a parent corporation. *Unweighted tax difference* is defined using the method of Karkinsky and Riedel (2012). The observational units are multinational subsidiaries with a foreign parent firm. The lower part of the table indicates the type of fixed effects used in each regression. The table reports coefficient estimates and t-statistics (in parentheses) based on robust standard errors. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	(1)	**(2)**
Tax difference × Non-tax credit (p)_Tax credit (s)	-2.451***	
	(-4.796)	
Tax difference × Non-tax credit (p)_Non-tax credit (s)	-1.542***	
	(-3.931)	
Tax difference × Tax credit (p)_Tax credit (s)	-3.572	
	(-1.261)	
Tax difference	0.492	
	(1.271)	
Unweighted tax difference × Non-tax credit (p)_Tax credit (s)		-4.094***
		(-5.900)
Unweighted tax difference × Non-tax credit (p)_Non-tax credit (s)		-1.472***
		(-3.742)
Unweighted tax difference × Tax credit (p)_Tax credit (s)		-0.167
		(-0.053)
Unweighted tax difference		0.636
		(1.641)
Tax credit (p)_Non-tax credit (s)	-0.331	-0.020
	(-1.189)	(-0.095)
Non-tax credit (p)_Non-tax credit (s)	0.214***	0.180***
	(5.001)	(5.882)
Fixed assets (in logs)	0.246***	0.246***
	(43.882)	(43.986)
Number of employees (in logs)	0.512***	0.513***
	(49.956)	(50.033)
Leverage	-0.410***	-0.411***
	(-20.629)	(-20.662)
GDP per capita (in logs)	0.680***	0.668***
	(25.659)	(24.969)
Population (in logs)	0.105***	0.099***
	(10.444)	(9.592)
Observations	29,815	29,815
Adjusted R^2	0.574	0.574
Parent FE	✓	✓
Sub. industry-year FE	✓	✓
Parent industry-year FE	✓	✓
Parent country-year FE	✓	✓