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Abstract

This paper examines the impact of tax enforcement and public listing status on income shifting by multinational corporations (MNCs). For a sample of over 8,000 subsidiaries that are majority-owned by 959 European MNCs over the period 1998–2009, we find strong evidence of income shifting from high to low tax countries and that income is shifted more out of high-tax countries when local tax enforcement is weak. In addition, we show that *private* MNCs exploit weak tax enforcement more to shift income out of the parent country compared to *public* MNCs. Combined, our results suggest that tax enforcement plays a crucial role in MNC income shifting decisions and that shifting is more aggressive when MNCs are less affected by nontax shifting costs as is the case in private MNCs.

JEL-classification: H25, H26, M40

Keywords: tax planning, income shifting, tax enforcement, composite tax score

1. Introduction

Multinational income shifting and tax evasion continue to be a major concern for regulators and receive considerable attention in the financial press. A rationale for this focus is that the international business operations of multinational corporations (MNCs) facilitate strategic exploitations of international tax system differences to lower the overall corporate tax liability (e.g., Denis et al. 2002; Scholes et al. 2002). Indeed, empirical support for the regulatory concerns is extensive, and several studies have provided evidence of tax-motivated income shifting towards countries with lower statutory tax rates and debt shifting to countries with higher statutory tax rates (Collins et al. 1998; Harris 1993; Klassen et al. 1993; Newberry and Dhaliwal 2000; Rego 2003).

An important but relatively unexplored question is how the interplay of incentives and opportunities shapes MNC income shifting. Exceptions come from recent studies that focus on the prominence of tax system characteristics for income shifting. Markle (2012) for instance shows that public MNCs subject to territorial tax regimes shift income more than public MNCs subject to worldwide regimes. An explanation for this finding is that firms may be incentivized more to shift income when foreign income is exempted compared to being subjected to an additional home tax under a worldwide system.[1] Relatedly, Atwood et al. (2012) find that public companies from countries with territorial systems engage in greater tax aggressiveness but also that the perceived strength of tax enforcement affects corporate tax avoidance. We extend this line of research by examining the importance of home country and subsidiary country tax enforcement for income shifting decisions in public versus private MNCs. To the best of our knowledge,

[1] Under a territorial tax regime, countries exempt foreign income from additional home country tax also when the foreign tax rate is below the domestic rate. By contrast, under a worldwide regime, governments additionally tax foreign income but allow for tax credits for the foreign tax already paid. We treat the subtleties of both systems in more detail in the additional analyses in Section 5.3.2.

ours is the first study that empirically examines the importance of tax enforcement for income shifting decisions in public versus private MNCs. This question matters given the recent calls for worldwide authorities to increase regulatory and tax enforcement (O'Carroll 2011; House of Lords 2013) and the sizable number of private MNCs. In addition, our study illuminates the debate on foreign income taxation and suggests that capital market incentives may not only affect the ex post repatriation decisions (Blouin et al. 2012; Guerrera 2010) but can also shape the a priori structuring of income shifting activities.

We conduct our study in a European (EU) setting, which is appealing for a number of reasons. First, European corporate tax rates, tax laws, and tax enforcement regulations still vary considerably despite several EU initiatives to harmonize them (Ernst & Young 2008; Needham 2013). The European Commission (EC) acknowledges this issue and has raised concern about the risk that substantial cross-country variations in statutory tax rates, in combination with a web of bilateral tax treaties, may foster complex MNC transfer pricing strategies designed to evade taxes (EC, COM (2006)).[2] Second, European reporting regulations are based on a corporation's legal form rather than on its public listing status (Fourth European Union Directive, 1977). This has led to a vast amount of financial reports for both public and private firms across all member states (Burgstahler et al. 2006). Furthermore, since the European Union has not adopted fiscal consolidation rules and there is a relatively close link between tax and financial reports, the EU setting enables investigation of the importance of tax incentives for MNC subsidiary-level strategic income allocation decisions.

[2] An example of high disparities in national statutory tax rates is the 28% tax rate charged on profitable UK firms in 2009 when firms located in a neighboring country, Ireland, were taxed at only 12.5%. This large disparity has raised serious concerns, and politicians are taking actions in an attempt to avoid a large "tax exodus" (Houlder 2009).

We conduct our empirical analysis on 60,958 subsidiary firm-years for 19 EU countries, pertaining to 8,183 unique subsidiaries that are majority owned by 964 European MNCs. We consider both publicly listed and privately held MNCs and study a period of 12 years (1998-2009), which can capture the impact of country-level statutory tax rate changes on MNCs' decisions to shift income into (out of) subsidiary countries. In our main analyses, we employ an income location model similar to the one in Grubert (2003) to provide insights into the profit/loss allocation decisions of MNCs in specific subsidiaries for tax reasons, while simultaneously controlling for firm-specific factors that affect pre-tax returns on investment. In particular, we examine the decision to shift income into (out of) affiliate countries in relation to the bilateral tax rate differentials and the tax enforcement rigorousness in the country that sees profits (i.e., tax revenues) flowing out because of the income shifting decision.

We find strong evidence that, on average, EU MNCs shift income from high to low tax countries. When studying the *directional* income shifting in more detail, we find the strongest results for income shifting out of relatively high-tax subsidiary countries and into low-tax parent countries. Consistent with the argument that costs of shifting are an important determinant of the responsiveness to tax incentives, we find that income is especially shifted out of high-tax subsidiary (respectively. parent) countries that are characterized by weak tax enforcement. From a listing status perspective, we show that, while private MNCs shift income both into and out of subsidiary countries, public MNCs shift income less into the direction of lower-tax subsidiary countries. While prior work has shown that nontax costs associated with a public listing status may inhibit firms from repatriating foreign earnings (Blouin et al. 2012), the current findings suggest that such costs can even restrain the a priori decision to shift income to tax-favorable jurisdictions.

Combined, our evidence suggests that MNCs take variations in tax enforcement into account in the way they orchestrate their corporate tax burden and that higher nontax shifting costs of listed firms may restrain their income shifting compared to private firms. Our results are robust to various sensitivity checks, including a propensity-score matched design for listed versus private MNCs, MNC family-level tax score analyses as in Huizinga and Laeven (2008), and instrumenting for a country's tax enforcement. Interestingly, our results appear equally important for territorial as for worldwide tax regimes.

Our study contributes to the literature in a number of ways. First, we contribute to the current debate on the use of tax-avoidance schemes by MNCs in an era that is characterized by a high-level digital economy, combined with outdated tax laws compared to MNCs' business practices (Needham 2013; OECD Global Forum 2013). Second, large-scale international evidence on tax strategy differences in public versus private firms is very scarce. We are among the first researchers to show empirically that *private* firms respond more to tax incentives and opportunities for shifting income into low tax rate countries and out of high tax rate ones compared to public firms. This is an important finding of which the economic importance may be underestimated, since the bulk of financial media articles typically cover tax-avoidance behavior of public –and hence more visible– MNCs. As a consequence, the results of the current study may inform policy discussions on tax avoidance by a larger set of firms.

Finally, we provide novel insights by *jointly* studying the income shifting decision in public and private firms and the level of tax enforcement. Specifically, we show that MNCs respond not only to tax rate incentives in allocating income across their multitude of subsidiaries but also to shifting opportunities that are shaped by (a) the importance of

nontax shifting costs and (b) the tax enforcement regime in the subsidiary (resp. parent) country that misses out on shifted profits.

The remainder of our study is structured as follows. Section 2 describes the European setting and highlights cross-country tax differences. Section 3 discusses the literature relevant to our study and develops our hypotheses. Section 4 discusses the sample and research design. Section 5 reports detailed sample statistics and the results of our multivariate analyses and sensitivity tests. Section 6 concludes.

2. The European taxation setting

2.1 EU intra-community taxation

While an integrated European economic and capital market dates back to the early 1950s, the Maastricht Treaty of 1992 was the real kickoff for the European Union allowing free trade of goods and services within the European Union. Next to harmonization of economic fundamentals (e.g., introduction of the Euro as a single currency), the European Commission (EC) also worked on harmonization of financial reporting (e.g., introduction of IFRS).

The economic integration process is said to have resulted in more international capital mobility and financial integration within the European Union (Adjaouté and Danthinne 2004) and in a substantial increase in the international trade within these countries. Although the economic integration of the European Union has moved forward, corporate taxation continues to be country-based. Attempts to introduce a pan-European corporate tax rate are still in their infancy. The EC, however, has acknowledged the potentially negative impact of tax discrepancies and has tried to standardize EU taxation rules. This resulted in 2006 in a proposal for guidelines to introduce a single EU tax rate: the Common Consolidated Corporate Tax Base (CCCTB).

> Eliminating tax obstacles such as high compliance costs for cross-border operations and transfer pricing and the lack of cross-border loss compensation in the internal market can contribute to these goals [of achieving competitiveness]. The Common Consolidated Corporate Tax Base (CCCTB) would significantly reduce the compliance costs of companies operating across the internal market, *resolve existing transfer pricing problems*, *allow for the consolidation* of profits and losses, […], and avoid many situations of *double taxation* and remove many discriminatory situations and restrictions. The CCCTB *would contribute to greater efficiency, effectiveness simplicity and transparency in company tax systems and remove the hiatuses between national systems*. (COM (2006) 157final, emphasis added).

However, the CCCTB proposal, as initially developed, seems to have stalled (Almendral 2010). More recent test cases on abolishing restrictions of cross-border loss relief across the European Union include EU court cases (e.g., X Holding BV) as well as OECD proposals on the taxation of permanent foreign establishments (Almendral 2010). As a consequence, the current fiscal situation in Europe is still characterized by large discrepancies in corporate statutory tax rates, scattered national tax initiatives, and a myriad of bilateral tax agreements engineered at the country level (Ernst and Young 2008; Houlder 2009). Moreover, national tax authorities across Europe differ substantially in terms of their working style and the resources that are available to perform tax audits, to negotiate advance transfer pricing deals with MNCs, or both (OECD 2004).

Statutory corporate tax rates also differ substantially. To provide insight into national differences in statutory tax rates, we present a time-series overview for the years 1998–2009 of national statutory corporate tax rates in Panel A of Table 1. The median 2009 corporate tax rate level for the EU countries analyzed in this study equals 25.2%. At the country level, Belgium (34.0%), France (33.3%), and Italy (31.4%) had the highest corporate tax burdens in 2009, while Ireland (12.5%), Hungary (16.0%), and Slovakia (19%) were at the bottom of the European tax spectrum. The yearly evolution over the period 1998–2009 shows a downward trend in corporate tax rates in all but two countries.

The median tax rate dropped by almost 20% from 34.9% in 1998 to 28.0% in 2004 and went further down to 25.5% in 2009.

In three Nordic countries (Norway, Sweden, and Finland), corporate tax rate levels remained relatively stable. The tax rate decrease was most dramatic in Ireland, where rates went down by about two-thirds (from 36.0% to 12.5%), followed by Germany (from 57.5% to 29.4%) and the Czech Republic (from 35.0% to 19%). This tendency to lower the corporate tax rates comports with the attempts of national authorities to stimulate corporate investments by providing tax incentives to the corporate sector (Devereux et al. 2008).

2.2 Tax system characteristics

Panel B of Table 1 summarizes country-level information pertaining to six institutional characteristics that are used to conceptualize a country's overall tax enforcement score. In each of these characteristics, we employ the logic that a higher score corresponds to better opportunities to avoid paying high taxes or, more generally, represents weaker tax enforcement. Columns [1] and [2] contain average country scores on tax audit risk and related-party disclosure requirements, respectively. The scores are compiled from the biennial Ernst & Young Global Transfer Pricing Reference Guides (1999–2009) and were verified by national tax experts.[3]

[Insert Table 1 here]

Tax audit risk (AUDIT) in Column [1] is the perceived risk of a tax audit within a country. We use a coding method similar to the one used in Christie et al. (2003) and

[3] Some countries were only included in the Ernst & Young Transfer Pricing Guide after 2000, so we cannot track the full historical record of tax rulings and authority rigorousness. For those countries, we consider the situation that existed in the first year that information became available in the guide and assume the same situation was applicable for the earlier years as well. Because this method of classifying countries is conservative, it would only work against the findings presented in the empirical sections below.

code a low perceived tax audit risk as one (1.0), a medium perceived tax audit risk as one-half (0.5), and a high perceived tax audit risk as zero (0.0). The related party disclosure scores (Column [2]: DISCL) relate to the strictness of rules for reporting related-party transactions to tax authorities. Also here, scores range from 1.0 (low disclosure requirements) to a mid-point of 0.5 (medium disclosure requirements) to 0.0 (high disclosure requirements).

Columns [3] to [6] are tax environment proxies compiled by Keller and Schanz (2013) and cover the period 2005–2009. Tax environment features are relatively sticky over time (Goncharov and Jacob 2012), comforting us that we can use the period 2005–2009 as an extrapolation for the full observation period.[4] Column [3] summarizes information on favorable regimes on MNC holdings structures (HOLD). Certain countries have decided to offer special tax-favorable regimes for holding companies to attract foreign investment. One example is Belgium, where so-called coordination centers allowed internationally diversified business groups to minimize their tax bill. Coordination centers were not imposing the normal corporate statutory tax on business income but only a 4% to 10% tax of total "business expenses," with the percentage being a matter for negotiation with the fiscal authorities (Green, 2003).[5] We consider the availability of tax-favorable holdings as an indication of lax tax enforcement. The

[4] Goncharov and Jacob (2012) study differences in accrual accounting for tax purposes among 33 OECD countries and cover all the countries under analysis in the current study. They report very little to no change in a tax accrual index from 2001 to 2005. We therefore presume that the 2005 tax environment is close to the pre-2005 years. In addition, we find in unreported sub-period tests that our main results hold both for the pre-2005 and post-2005 period, although public versus private MNC differences become stronger for the later years.

[5] The Belgian coordination centers regime dates back to 1983 and was introduced to attract multinational companies' activities. The European Commission ordered Belgium to repeal the special tax schedule for coordination centers, due to noncompliance with EU state aid rules. The special tax regime phased out at the end of 2010.

variable is equal to 1.0 if a favorable holding regime exists and is equal to 0.0 if no holding regime exists.

Column [4] contains information on the thin capitalization rules (THIN) a country imposes on the deductibility of interest expenses from taxable income. Since MNCs are well-equipped to locate interest expenses in high tax subsidiaries through their myriad of subsidiaries and intragroup financing strategies (Mills and Newberry 2004) or even can establish an intermediate subsidiary to benefit from so-called "double dips," governments in high tax countries can react by installing thin capitalization rules. The lack of such rules arguably indicates weaker tax enforcement. We code the variable equal to 1.0 if no thin capitalization rules apply, 0.5 if no clear thin capitalization rules apply, and 0.0 if clear thin capitalization rules apply.

Furthermore, column [5] summarizes the number of double tax treaties (DTT) in force in a specific country, relative to the maximum number of double tax treaties. Bilateral double tax treaties serve to avoid double taxation and at the same time may impose lower requirements for granting participation exemptions compared to national tax law (Keller and Schanz 2013). Higher scores correspond to more double tax treaties, making it easier for MNCs to avoid double taxation or even to treaty shop within MNC subsidiary countries.

Furthermore, Column [6] reports information on the loss offset rules with respect to the carry-forward of losses (CFL). In countries where current losses can be used to offset future profits, there are more opportunities to reduce the average tax burden, and consequently these countries are perceived by MNCs as more tax-attractive. The variable CFL is equal to 1.0 if losses can be carried forward indefinitely, 0.5 if losses can be carried forward for more than five and up to 20 years; and 0.0 if carry-forward of losses

is not allowed or is limited to a period less or equal to five years. Column [7] reports the average score on the different tax environment dimensions of Columns [1] to [6], where higher scores represent weaker tax enforcement.

Finally we report the transformed median-split WEAKTAX binary variable between square brackets (1=above median; 0=below median). Austria, Belgium, Denmark, Finland, Germany, Great Britain, Hungary, Ireland, Luxembourg, the Netherlands, and Norway are classified as weak tax enforcement regimes. The remaining countries are classified as strong tax enforcement regimes. We build on these individual country measures in our empirical analyses below.

3. Prior literature and hypothesis development

3.1 Income shifting and tax enforcement

In a stylized world, tax-incentives would drive MNCs to limit operations (and hence related income) in high-tax subsidiary countries and move these into low-tax countries. In reality, however, a complex myriad of tax rules and interpretations may restrain the ability of firms to do so optimally, potentially explaining why empirical studies so far have yielded mixed results. The international tax literature has widely studied income shifting in MNCs. One set of studies examined income shifting that occurred in response to the U.S. Tax Reform Act of 1986. Klassen et al. (1993) and Harris (1993) provide evidence of MNCs shifting income *into* the U.S. during periods when the U.S. tax rates were relatively low. Collins et al. (1998) confirm these findings for a longer period and also show that investors recognize firms' income-shifting patterns in the way they value the foreign components, as opposed to the domestic components, of reported earnings. Recent work by Klassen and Laplante (2012a) shows that US firms

have also become more active in shifting income *out of* the United States over the last decade. The authors explain their findings from the substantial drop in the regulatory costs for shifting income out of the United States in more recent years.[6]

Other studies have examined family-level incentives and opportunities for income shifting by observing heterogeneity in MNC home country and subsidiary country origin and activity. Huizinga and Laeven (2008), for instance, show for a sample of European manufacturing MNCs that profit shifting depends on a weighted average of international tax rate differences between all countries where the multinational is active. Huizinga and Laeven (2008) also estimate the tax revenue implications of profit shifting into and out of specific countries and find that most EU countries (at the expense of Germany) gain from profit shifting. Using a similar research design, Markle (2012) finds confirmation for these family-level tax results on a global sample and further shows that, on average, MNCs subject to territorial tax regimes shift income more than those subject to worldwide regimes.

An important feature that may be incrementally important in explaining income shifting and, in particular, the *direction* of income shifting is the strength of a country's tax enforcement. Altshuler and Grubert (2006) illustrate that the domestic government as well as the foreign governments play and important role in the tax competition game. De Waegenaere et al. (2006) show in theoretical work that firms shift income in response to the strategic interplay of tax rules and tax enforcement between the two countries involved. In examining tax avoidance in general, Atwood et al. (2012) demonstrate that

[6] Klassen and Laplante (2012b) show empirically that firms with low foreign tax rates relative to US tax rates shift significantly more income out of the United States when foreign reinvestment-related incentives are high.

companies have greater tax aggressiveness when they come from a country with lower tax enforcement.

As discussed in Section 2 and tabulated in panel B of Table 1, substantial variation exists across Europe with respect to the tax environment and tax enforcement, in particular. Tax documentation requirements, as well as the likelihood of tax audits or even the proficiency of national tax administrations in negotiating case-specific agreements with MNCs, differ substantially across EU countries. But also the availability of double tax treaties, (lack of) thin capitalization rules, favorable holding regimes, and flexibility on loss offset rules collectively shape the MNC income shifting possibilities. We therefore conjecture that MNCs will focus particularly on realizing tax-advantages in those jurisdictions where tax enforcement is relatively weak.

Specifically, we conjecture that income shifts to lower-tax subsidiary jurisdictions (= *high incentives*) are more pronounced when the MNC parent-country has relatively weak tax enforcement (= *high opportunities*). Conversely, we expect that MNC income shifts to a lower-tax parent-country (= *high incentives*) are more pronounced when the subsidiary country has a relatively weak tax enforcement (= *high opportunities*) in place and hence leaves the door more open for potential income shifting. The combination of the above arguments leads us to propose our first hypotheses as follows:

H1: When foreign tax rates are below domestic statutory tax rates, EU multinationals shift income out of their home country, especially when the home-country tax enforcement is weak.

H2: When foreign tax rates exceed domestic statutory tax rates, EU multinationals shift income into their home country, especially when the subsidiary-country tax enforcement is weak.

3.2 Income shifting in public versus private MNCs

Research on international income shifting and tax-avoidance strategies in general has mainly been performed on domestic and foreign-controlled subsidiaries of publicly listed MNCs.[7] Exceptions include Beatty and Harris (1999), who show that public U.S. banks avoid security sales that decrease book income more compared to private banks. For a sample of public and private U.S. manufacturing firms, Mills and Newberry (2001) show that public firms report higher book earnings (relative to taxable income) than private firms when they are in positive income positions but report larger book losses relative to tax losses when they are in loss positions. Their evidence is consistent with the big bath hypothesis and also suggests that bonus plan thresholds for book income in particular influence managerial book-tax reporting behavior. This evidence is also largely consistent with Stein (1989), who suggests that firms with greater capital market pressure will place greater importance on nontax financial reporting costs of a proposed action, before sacrificing managerial efforts related to tax savings.[8]

In studying Chinese private versus public firms, Lin et al. (2014) find that private Chinese firms shift income more inter-temporarily in response to a local tax cut compared to public Chinese firms. In line with the findings in Burgstahler et al. (2006), who document that public EU firms weigh the quality of reported earnings more heavily than private ones, one could expect a similar tendency of more aggressive income-

[7] Note that Huizinga and Laeven (2008) who investigate family-level income shifting in subsidiary and parent companies of private and public European MNCs are an exception to this. However, while these authors describe that their sample contains both public and private company observations, they do not build tests on a firm's listing status.

[8] The claim that management compensation incentives shape a firm's tax avoidance is confirmed by both theoretical and empirical work. Desai and Dharmapala (2006) model tax evasion while controlling for agency costs and show that increases in variable pay are positively related to corporate tax sheltering. This result is consistent with survey findings from Cloyd et al. (1996), who suggest that managers avoid reporting lower book performance because this is perceived as lowering the market value of a firm (and hence their variable compensation component). For a large international sample, Atwood et al. (2012) also find that corporate tax avoidance is shaped by management compensation, including stock options.

shifting in our international sample of private versus public EU firms. However, a firm's listing status may explain MNC income shifting decisions especially when these result in higher nontax costs for public versus private MNCs. These costs occur when MNCs decide to shift income out of the home country and into a lower-tax affiliate country. Accounting for income taxes (APB 23 under U.S. GAAP or IAS 12 under IFRS) requires MNCs to recognize a repatriation tax expense for actual or expected repatriation taxes when earnings are generated in foreign affiliates, regardless of whether they are repatriated. An important exception to this rule exists when the foreign earnings are deemed indefinitely reinvested abroad, which allows for a deferred recognition of a repatriation tax expense, i.e., until these are actually repatriated ex post. Consequently, repatriation decisions may yield a tax expense without corresponding pre-tax earnings in the same period and can ultimately weaken a firm's market value, which is an important concern for especially public MNCs (Blouin et al. 2012).

This is a nontrivial tax-decision element, since Graham et al. (2011) find in a U.S. survey that executives rate the importance of deferring an accounting expense for repatriation taxes as high as deferring a cash payment for repatriation taxes. Also, in an international setting, these repatriation decisions can yield important nontax shifting costs for public MNCs, for instance, when a worldwide tax system applies or when no controlled foreign corporation (CFC) rules are put in place.[9] In line with the arguments above, we expect that private MNCs shift income more towards low-tax affiliate countries compared to public MNCs and that the predicted effect is more pronounced

[9] For the EU sample under analysis, we observe about 40% of worldwide (i.e., tax credit) regimes and for 10 on 19 of the sample countries, no clear CFC rules are put in place (in alphabetical order: Austria, Belgium, Greece, Luxembourg, Ireland, the Netherlands, Spain, the Slovak Republic, Switzerland, and Sweden). When CFC rules apply, local tax authorities can include the undistributed income of corporations in foreign countries in the corporate tax base of resident parent companies, which decouples the financial reporting impact from the repatriation decision.

when the MNC parent-country has relatively weak tax enforcement. This leads to the following hypothesis with respect to public versus private MNC income shifting (H3):

H3: Private MNCs shift income more towards lower-tax subsidiary countries in response to weak tax enforcement, compared to public MNCs.

4. Sample and research design

4.1 Sample

The sample composition is summarized in Table 2. Data on subsidiaries and parent MNCs were obtained from the Top 1,500,000 Amadeus database, supplied by Bureau van Dijk (December 1998 to 2009 version: yearly tapes). This dataset provides financial statements and ownership data for the 1.5 million largest European private *and* public companies (i.e., largest in terms of sales and total assets). The dataset is compiled from several well-established national information collections. The selection procedure was as follows. We first consulted the Amadeus ownership database to retrieve all nonfinancial European firms for which consolidated financial statements were available. For a firm to be included, there also had to be information regarding its ownership of at least one domestic and one foreign subsidiary located within the European Union. This yielded a set of 2,786 nonfinancial EU firms with complete information on [1] subsidiary identification code, [2] subsidiary country of domicile, and [3] the exact ownership percentage of the subsidiary held by the company.

We select the firm-years at the intersection of the Amadeus ownership and financial records databases for which we had sufficient financial information to perform our empirical calculations. After applying these selection criteria, we obtain a sample of 8,183 unique subsidiaries (60,958 subsidiary firm-years) owned by 964 unique MNCs

(6,905 MNC firm-years). About 60 percent of the observations (=36,700/60,958) pertain to subsidiary observations of private (i.e., unlisted) MNCs. Clustering these data at the MNC subsidiary-country level yields a sample of 2,765 fiscal entities (13,118 fiscal entity-year observations).[10]

[Insert Table 2 here]

At the country-level, we observe most public MNC observations headquartered in Great Britain (37.6%), followed by France (15.0%), and Germany (11.6%). For private MNCs, Dutch MNCs (20.5%) are most represented, followed by MNCs in Great Britain (16.7%), and Italy (15.2%). Furthermore, most public MNC subsidiary observations are located in France (23.9%), Great Britain (23.1%), and Belgium (17.5%), while private MNC subsidiary observations are mainly located in Great Britain (21.5%), Spain (17.7%), and Italy (15.8%).

4.2 Research design

We analyze subsidiary-specific reported profitability in relation to the applicable local (i.e., subsidiary country) statutory tax rate and the tax rate in the parent country. In particular, we study the relationship between profitability and tax rate differences, and we evaluate the extent to which this relationship varies across tax enforcement regimes (weak versus strong). For this purpose, we run the following model at the subsidiary firm-year level (*N*=60,958):

[10] Note that we only observe income shifting in the affiliates in EU countries. We cannot include information on *offshore* income shifting because financial data on non-EU subsidiary fiscal entities are not captured by the database, hindering us from fully capturing structured tax evasion schemes with tax haven countries (such as for instance Double Irish-Dutch Sandwich constructions—O'Carroll 2011). We acknowledge that this is a potential shortcoming of our study but argue that excluding data from these tax haven countries would work against finding evidence in support of our main hypotheses. To mitigate this bias, we select a subsample of MNCs for which we have at least 50% of all EU subsidiaries in the sample we investigated. Results for this subsample provide evidence that is largely in line with the findings for our full sample. Additional information on these results is reported in Table 5.

$$ROS_S = \alpha_0 + \beta_1 STRDIFF + \beta_2 WEAKTAX + \beta_3 STRDIFF \times WEAKTAX + \Theta_S CTRLS_s + \Theta_P CTRLS_p + \varepsilon$$

(1)

In this equation, ROS refers to return on sales and is measured as pre-tax subsidiary profit/losses over subsidiary sales. STRDIFF is the applicable statutory tax rate in the subsidiary country minus the applicable statutory tax rate in the parent country. *WEAKTAX* is the tax environment median split country classification as defined above. Consistent with Grubert (2003), we choose sales rather than assets as a denominator because assets are based on historical book values and are therefore unreliable measures of current market values. Also, in accordance with Grubert (2003), we include control variables that are expected to have an independent effect on the profitability of subsidiaries at the subsidiary level (i.e., leverage and asset turnover) and at the parent level (i.e., consolidated profitability, consolidated sales, and consolidated intangible assets).[11] *Leverage* is measured as subsidiary long-term debt on total assets. It controls for the financial strategies that companies can use to shift income around their worldwide enterprises. *Asset turnover*, measured as assets-to-sales, is included because it can provide a valid indication of differences in capital intensity per unit of sales (Grubert 2003).

MNC *consolidated profitability* (ROS_{MNC}) and *Consolidated sales* ($Ln(SALES_{MNC})$) are added as additional nontax controls because they are expected to have an independent effect on subsidiary-level profitability and, at the same time, are unaffected by income shifting. We measure consolidated profitability as consolidated profit/loss before taxes on consolidated sales. Consolidated sales are calculated as the

[11] All consolidated variables are denoted with the subscript 'MNC.'

natural logarithm of the MNC consolidated sales. Furthermore, we consider it appropriate to include a control for MNC consolidated intangible assets because the presence of intangibles can reduce the cost of income shifting and thus facilitate it (Harris 1993; Klassen and Laplante 2012a). The fact that there are no readily available arm's length prices for intangible assets means that the usual regulatory guidelines for establishing transfer prices are not easily enforceable when intangible assets are involved (Harris 1993; Grubert 2003; O'Carroll 2011). We measure MNC intangibility as the value of consolidated intangible assets relative to consolidated sales ($Intangibility_{MNC}$). Finally, we include GDP growth as obtained from World Bank yearly statistics to control for subsidiary country-level growth patterns that may be correlated with trends in subsidiary profits. We define all test and control variables in detail in Appendix 1.[12]

Consistent with the findings in prior work, we expect a negative coefficient for STRDIFF because this would correspond to low (high) profits in countries with relatively high (low) statutory tax rates in comparison to the tax rates in the parent country. Evidence consistent with H1 and H2 would show a significant negative coefficient on (*STRDIFF×WEAKTAX)*, where *WEAKTAX* refers to the above median tax enforcement classification of the parent country in case of lower-tax foreign subsidiaries and the subsidiary country in case of a lower-tax parent country. In line with H3, we expect a significantly negative coefficient on domestic income outward shifts for private MNCs in weak enforcement settings and a less pronounced effect for public MNCs.

5. Results

5.1 Descriptive Statistics

[12] Note that all firm-level variables are winsorized at the top/bottom 1% to minimize the impact of outliers.

Table 3 reports descriptive statistics at the *subsidiary* level for all the EU subsidiaries observed in the study, distinguishing between subsidiaries by the listing status of the MNC. The mean subsidiary of a public (private) MNC realized a return on sales of 4.3% (3.7%). For the median subsidiary observations, the STRs are identical in the parent and subsidiary countries both for public and private subsidiaries. However, when selecting the foreign observations only, the interquartile range is between -3.8% and +5.2% for listed MNCs and between -4.8% and +2.0% for private MNCs.[13] The mean assets-to-sales for listed MNC subsidiaries equals 2.788, while it is 1.708 for private MNC subsidiaries. Furthermore, subsidiaries have a relatively low long-term leverage. The median value is 0.0% for both public and private MNC subsidiaries, and the mean value is very comparable at around 5%. The consolidated parent profitability (ROS_{MNC}) is 6.9% for public MNCs and 4.4% for private MNCs. We also observe a large variation in MNC sales levels and the average listed MNC—not surprisingly—is markedly larger than the private MNC. Also, listed MNCs have significantly higher intangibles relative to sales (19.5%) compared to private MNCs (4.4%). Finally, approximately 56% (46%) of all listed (private) MNC subsidiary observations are located in weak tax enforcement subsidiary countries. With respect to location of the MNC parent, 71% of listed MNCs are headquartered in weak tax enforcement countries, while this proportion is substantially lower for private MNCs (about 34%).

[Insert Table 3 here]

5.2 Correlations

[Insert Table 4 here]

[13] Note that a negative (positive) number, by definition, corresponds to lower (higher) foreign statutory tax rates.

Table 4 presents the Pearson/Spearman pairwise correlations between the dependent and independent variables in model (1). First, we find that subsidiary profitability (*ROS*) is negatively correlated with the subsidiary-parent country STR difference (Pearson: -0.008; p=0.06 / Spearman: -0.036; p<0.01). Examining the Pearson correlations between ROS and control variables, we observe that ROS is negatively correlated with leverage (-0.082; p<0.01) and positively correlated with subsidiary asset-to-sales (Pearson: 0.035; p<0.01), MNC consolidated profitability (Pearson: 0.116; p<0.01), consolidated sales (0.026; p<0.01), and GDP growth (0.031; p<0.01). Also, subsidiary profitability is higher in weak enforcement subsidiary countries (0.059; p<0.01) as well as in the case when MNCs are headquartered in weak tax enforcement countries (0.012; p<0.01). In addition, we find that the pairwise correlations between independent variables are generally fairly low, except for MNC intangibility and MNC consolidated sales (0.363; p<0.01), which suggests that mainly larger MNCs have more intangibles recognized on the balance sheet. The Spearman correlations generally confirm the Pearson correlations.

5.3 Regression analyses results

5.3.1 ROS income shifting analyses

Table 5 reports the OLS regression results for income shifting models with two-way cluster-robust standard errors as in Petersen (2009) at the MNC and year level while controlling for subsidiary country, industry (SIC1 digit), and year fixed effects.[14] We do

[14] In our primary tests, we use the cluster2gen Stata command to operationalize the two-way cluster-robust standard errors. We decide to cluster standard errors by MNC/year to control for potential unobserved year-correlations in MNC income shifting decisions across different subsidiaries. We thank Dan Taylor for providing the cluster2gen Stata command to calculate two-way cluster-robust standard errors for OLS with multiple fixed effects.

so to maximally correct for both cross-sectional and time-series dependence in our panel since research shows that insufficient controls may cause inflated test statistics (Gow et al. 2010). In the first set of results, we run income shifting regressions independent of the tax enforcement system that was in place and independent of a firm's listing status. The results are reported for the full sample and for several subsamples.

[Insert Table 5 here]

In all regressions, we find evidence of tax-motivated income shifting. In Regression (1), we include both domestic and foreign subsidiary observations and find a coefficient on STRDIFF that is negative and highly significant (-0.339; $p<0.01$). This result can be interpreted as follows: a one standard deviation increase in STRDIFF (4.77%) corresponds to a decrease in ROS by 1.59% (=0.047 × –0.339).[15] With respect to nontax control variables, we observe that subsidiary profitability is higher for high asset-to-sales firms (0.076; $p<0.01$) and lower for highly leveraged firms (-0.126; $p<0.01$). Furthermore, we find that MNC consolidated profitability is positively related to subsidiary profitability (0.010; p<0.01), MNC consolidated sales (0.006, $p<0.01$), and MNC intangibility (0.082; $p<0.01$). Our full sample model explains roughly 23 percent of the variation in the dependent variable. In Regression (2), we exclude firms for which we do not observe 50% or more of the MNC consolidated sales. Doing so overcomes potential bias in our results due to the selection of many subsidiaries that may not contribute significantly to the MNC operations. Although the sample drops by nearly 25%, the regression coefficient on STRDIFF remains relatively stable (-0.313, $p<0.01$).

[15] Note that 4.77% is the standard deviation in STRDIFF for the full sample of public and private MNC observations. Table 3 reports a standard deviation of 4.33% for private MNC observations and 5.32% for public MNC observations.

All relations with respect to the control variables remain unaltered except for the MNC intangibility variable, which becomes insignificant.[16]

In Regression 3, we run our baseline model on foreign observations only (i.e., where STRDIFF differs from zero), and the coefficient on STRDIFF remains significantly negative. However, the association is driven primarily by the observations with a STRDIFF>0, i.e., where subsidiary country statutory taxes are higher than parent country taxes (Regression 5: -0.444; $p<0.01$), suggesting that income is primarily shifted towards the lower-taxed parent country. This evidence is conceptually consistent with earlier work from Collins et al. (1998), who find similar evidence of income shifting primarily *into* the United States when foreign rates were above US tax rates.

[Insert Table 6 here]

In Table 6, we run the ROS model for the sample of subsidiary observations where local statutory tax rates differ from domestic rates (Regression 6 to 8) and further split our sample by public (Regressions 9 and 10) and private (Regressions 11 and 12) listing status.[17] Regression 6 on parent-country *inward* income shifting (STRDIFF>0) shows an insignificant coefficient on STRDIFF, suggesting no income shifting from the subsidiary country to the (lower-taxed) parent country in the case of strong subsidiary tax enforcement. However, the joint coefficient on STRDIFF×WEAKTAX_SUBS is significantly negative (-0.756; $p<0.05$) and indicates that MNCs do shift income into the lower-taxed parent country but only in combination with weak tax enforcement in the subsidiary country that sees profits flowing out. A similar pattern is observed in

[16] It happens in 630 cases (or 1.1% of all observations) that the statutory tax rates (STRs) in subsidiary and parent countries are identical. When verifying the potential impact on regressions (1) and (2), we observe very similar results as for the ones originally reported in the paper.

[17] Note that in all regressions—except for regression (8), which compares public versus private MNC income shifting—the joint effect marked in gray captures the income shifting coefficient for weak enforcement setting observations.

regression 7, where we measure parent-country *outward* income shifting (STRDIFF<0): MNCs do not shift income to lower taxed subsidiary countries (0.024; p=0.18) when the MNC home country has strong tax enforcement. However, we do observe evidence of income shifting to lower-taxed countries when the MNC home country is characterized by weak tax enforcement (-0.221; p<0.05). The combined evidence is consistent with our hypotheses H1 and H2 and suggests that tax enforcement of the country that misses out on income taxes on the shifted income is an important determinant in income shifting decisions of EU MNCs.

We further investigate the difference in income shifting between public and private MNCs in regression 8. The coefficient for public MNCs is consistent with income shifting (-0.223; p<0.01). The joint coefficient STRDIFF×PRIVATE is significantly negative as well: -0.296; p<0.01). However, the *incremental* income shifting observed in private MNCs is not significantly different from public MNCs and suggests that—on average—public MNCs shift income to a similar extent as private MNCs. Next, we investigate whether income shifting depends on the firm's listing status, the direction of the income shifting (inward or outward), and the level of tax enforcement in the country that misses out on shifted profits. We first focus on the parent-country inward income shifting (Regression 9). Public MNCs shift income into the lower-taxed home country when foreign subsidiaries are located in weak tax enforcement settings. We do not observe a similar pattern for private MNCs (Regression 11).

We then concentrate on the outward income shifting pertaining to hypothesis H3 and compare estimation results in regression 10 to 12. Regression 10 suggests that public MNCs do not shift income out of the home country to a lower-taxed subsidiary country, and this result is independent of the MNC tax enforcement intensity. However, private

MNCs do seem to shift income out of the higher-taxed home country but only when home-country tax enforcement is weak (-0.240, $p<0.01$). Combined, the results in regressions 8 to 12 suggest that, although public MNCs shift income to a similar extent as private MNCs, the way the income shifting is orchestrated across subsidiaries is fundamentally different between the two types of MNCs. We conclude that the evidence is consistent with hypothesis H3.

With respect to the nontax variables that are included as controls in the regressions, we observe similar associations for the full sample and the subsamples, although significance levels on consolidated profitability, consolidated sales, and MNC intangibility vary depending on the selection of the subsidiary-country observations.

5.3.2. Additional analyses

A. Propensity-score matched sample analyses

When comparing public to private firms, a primary concern is that public firms could differ intrinsically from private firms, which may be driving the income shifting. To alleviate this concern, we use propensity-score matching models, as developed by Rosenbaum and Rubin (1983), to match private and public firms on various characteristics. Ideally, one would match firms on as many dimensions as possible, but the number of matched firms is tempered by statistical power considerations (Michaely and Roberts 2012). To maximally equilibrate the matching need and the statistical balancing property, we can match private and public MNCs on the following characteristics: *Size* (natural logarithm of total assets), *Sales growth* (year-on-year growth in sales), and *Intangibility* (intangible assets/ total assets) to estimate the selection model of MNC listing status.

To further balance an optimal variance and bias reduction in this matching procedure, we select the five nearest observations with replacement (Smith 1997). Because this replacement option allows private MNC controls to be matched to more than one treated public MNC, this 5:1 nearest neighbor matching procedure retains 2,289 public MNC-year observations and 2,216 private MNC-year observations. Because each MNC has multiple subsidiaries, this matching procedure yields 40,786 subsidiary-year observations (11,926 for public firms and 28,860 for private firms) of which 24,224 pertain to foreign subsidiary-year observations.[18] Table 7 report descriptive statistics as well as multivariate results based upon the full sample and propensity-score matched sample in the result section below.

[Insert Table 7 here]

Panel A of Table 7 shows that, while all selected variables are significantly different between public and private MNCs at the 1 percent level, the propensity-score matched variables become more comparable and are no longer significantly different for the size and intangibility variables. The sales growth values have also moved closer to each other, although the differences are not fully eliminated.[19] In Panel B, we observe results that are very similar to those reported in the main analyses regarding the impact of tax enforcement on directional income shifting.

For the full sample, we observe evidence of income shifting into and out of subsidiary countries, and the effect is most pronounced in combination with weak tax

[18] Note that, while this matching procedure retains most of the private MNC subsidiary observations (78.6% or 28,860/36,700), less than fifty 50 percent (49.2% or 11,926/24,258) of the public MNC observations remain in the sample.

[19] A solution that may reduce the difference in all treatment and control variables may go via the requirement of a stricter match of nearest neighbors, e.g., a one-to-one match. However, when requiring a unique match, the number of public MNC observations that are withheld drops further to 27.2%, and the balancing property of the matching algorithm is no longer satisfied. We therefore withhold the 5:1 match in this sensitivity check. Even though the matching procedure cannot fully eliminate the growth difference in both samples, the sample means are much closer compared to before the matching procedure.

enforcement in the country that loses tax revenue on profits that are shifted out (13 and 14). Furthermore, while public MNC subsidiaries exploit weak subsidiary-country tax enforcement to shift profit to the lower-taxed parent country (15), private MNCs mainly benefit from weak home-country tax enforcement to shift income towards lower-taxed subsidiary countries (18).

B. Family-level composite tax score analyses

So far, our tests have focused on income shifting analyses between MNC home-country and foreign subsidiaries. This design is warranted given that the home country plays a unique role in MNC income shifting. However, Huizinga and Laeven (2008) suggest that this approach may not capture the complete income shifting since potential shifts between subsidiaries in affiliate countries are omitted from the analyses. Huizinga and Laeven (2008) start from a Cobb-Douglas production function to derive an estimation model where reported income is a function of capital and labor inputs, a country-level productivity component, a family-level composite tax incentive and opportunity variable. In applying this research design on a global sample, Markle (2012) finds that MNCs subject to territorial tax regimes shift income more than MNCs subject to worldwide regimes. To capture cross-subsidiary income shifting in our analyses and to compare our results with prior research, we follow this approach and run the following estimation model:

$$Ln(\text{EBIT})_{i,t} = \alpha_0 + \beta_1.C_{i,t} + \beta_2.Ln(\text{Capital})_{i,t} + \beta_3.Ln(\text{Labor})_{i,t} + \beta_4.Ln(\text{GDP})_{j,t} + \varepsilon_{i,t} \qquad (2)$$

Where

Ln(EBIT)	=	Natural logarithm of earnings before interest and taxes;
Ln(Capital)	=	Natural logarithm of total fixed assets;
Ln(Labor)	=	Natural logarithm of number of employees;
Ln(GDP)	=	Natural logarithm of country GDP;
$_{i,t}$	=	MNC subsidiary-country firm-year subscripts.

C stands for the composite tax variable and is calculated as follows:

$$C_{i=} \quad \left(\frac{1}{(1-t_i)} \times \frac{\sum_{k \neq i}^{n} \frac{B_k}{(1-t_k)} \times (t_i - t_k)}{\sum_{k=1}^{n} \frac{B_k}{(1-t_k)}}\right) \qquad (3)$$

where B stands for the scale of the MNC activities (proxied by SALES) in country *i*, respectively *k*, and t refers to the corporate statutory tax rate (STR) in country *i*, respectively *k*.[20] While the sign of the composite tax variable captures the incentive to shift income into or out an affiliate country, the magnitude relates to the incentives to do so. By construction, a positive (negative) value for C_i reflects the incentive to shift income out of (into) country *i*. To compare our main analyses to the composite tax results, we further focus on the tax incentive and opportunity for each subsidiary country vis-à-vis its parent country and label this variable *C_parent* as in Huizinga and Laeven (2008).

[Insert Table 8 here]

The MNC family-level tax model is executed at different aggregation levels (subsidiary-country/fiscal entity) and requires availability of data items on capital and labor intensity, which eventually results in a different sample composition compared to

[20] In summary, this measure summarizes all information about income shifting *incentives* (differences in statutory tax rates [*t*] across all EU-based MNC subsidiary countries) and income shifting *opportunities* (the scale of the firm's operations *B* across all countries). Another interpretation for this measure is that MNC subsidiary-country affiliates' tax reporting incentives can be more easily achieved if larger activity levels are realized in affiliate countries with lower STRs (i.e., more sales are located in low-tax countries). In the presence of tax incentives, this composite tax measure is expected to relate negatively to the reported income level in country *i*. For more information on the composite tax measure, see Huizinga and Laeven (2008), p. 1166 onward.

the main analyses. Panel A of Table 8 shows descriptive statistics on the pretax income, C, and all control variables. Our income shifting sample consists of 6,987 subsidiary-country observations for private MNCs and 6,131 subsidiary-country observations for public ones. The mean composite tax score is slightly negative for private MNCs (-0.01) and slightly positive (0.02) for public MNCs. These mean values, as well as standard deviations of 0.06 (0.08) for private (public) MNCs, are very comparable to the ones reported in Markle (2012). Furthermore, the statistical properties of *C_parent* are very similar to the overall C measure.

Panel B of Table 8 reports the results of the composite tax model, run on the full sample (regression 19), as well as for public and private MNC observations separately (regressions 20 and 21). Regressions 22 to 25 split the results in observations with high incentives and opportunities to shift income out of (C>0) and into (C<0) a specific subsidiary country. Here, we also investigate the effect for public and private MNCs separately. Finally, regressions 26 to 29 identify foreign income shifting relative to the parent country and additionally consider the importance of weak tax enforcement in a foreign subsidiary country (i.e., the country that misses out on shifted profits) by multiplying the *C_parent* variable with the subsidiary tax enforcement indicator.[21]

In regressions 19 to 21, C is significant and negatively related to pretax income, confirming the results in Huizinga and Laeven (2008) and Markle (2012). However, the coefficient and significance level for private MNCs is considerably larger than for public MNCs. When we partition our sample into public versus private firms and split the data further by high incentives to shift income out (C>0) and into (C<0) a subsidiary country

[21] Note that, for interpretational reasons and for consistency with our main analyses on income shifting incentives, we recoded the C and the C_parent score into a dummy variable equal to one if satisfying the condition in the column head and zero elsewhere and multiplying by minus one in the case of a negative C in regression models 22 to 29.

(regressions 22 to 25), we find very similar and significant income shifting results for public versus private firms.

Furthermore, when we focus on the *C_parent* variable to capture the income shifting vis-à-vis the parent country and interact the shifting behavior with the relevant tax enforcement indicator, we find a significantly negative association for public MNCs (regression 26: -0.923; $p<0.01$) and no result for private MNCs. This result is in line with our main finding that primarily public MNCs shift income towards the home country when confronted with high tax rate incentives to do so. When we further disentangle the importance of subsidiary tax enforcement in this relationship, we find that, although income shifts towards the parent country are only marginally significant in strong tax enforcement subsidiary countries (-0.542; 10% one-sided significance), the result is far more pronounced for weak tax enforcement subsidiary observations (-1.136; $p<0.01$). We conclude that is comforting to observe that the overall conclusions yield similar inferences in both sets of tests, although the subsidiary ROS and the composite tax level analyses start from a different conceptual model.

C. The impact of bilateral tax regimes

Outward income shifting decisions from high-tax parent countries into lower-tax subsidiary countries received much attention in recent years, not in the least because of notorious US examples like Starbucks, Google, and Apple have been alleged to do this on a large scale, using inventive and complex tax strategies (e.g., House of Lords 2013). One aspect that may call for a further test regarding the home-country *outward* shifting relates to the applicable tax regime.

Markle (2012) studies income shifting decisions in *territorial* regimes (i.e., countries that exempt foreign income from additional home country tax) compared to *worldwide* regimes (i.e., countries that tax foreign income but allow for tax credits for the foreign tax already paid). Because outward shifted profits are exempted from any further taxation independent from the reinvestment decision, MNCs headquartered in a country with a territorial regime are expected to have a higher incentive to shift profits to lower-tax subsidiary countries compared to MNCs from a country with a worldwide regime (Markle 2012).

If territorial regimes indeed provide more incentives to MNCs for shifting income out of the home country, one would expect our outward income shifting tests to generate stronger results for MNCs located in territorial regime country. Also, it may be interesting to observe any potential difference between public and private MNC home-country outward income shifting for firms that are subject to territorial regimes. The results are summarized in Table 9 and show the results for the ROS model, conditional on STRDIFF<0 (i.e., with the tax-rate incentive to shift profits out of the home country and into a lower-taxed subsidiary country) and for the sample of observations that are subject to a territorial regime treatment (i.e., are exempted from additional home-country taxation). We use the parent-subsidiary bilateral tax agreements from the International Bureau of Fiscal Documentation to identify whether a territorial (TT) or worldwide (WW) approach exists.

[Insert Table 9]

In total, 10,384 (29.4%) of all foreign observations are subject to territorial regimes. Similar to general findings—and consistent with hypothesis H3 that higher nontax costs for public MNCs restrain them more to shift income to lower-tax foreign

subsidiaries—we find stronger results for private MNCs compared to public MNCs. We also observe that this result is driven by observations pertaining to weak tax enforcement home-country settings. However, the economic magnitude of the coefficient and the significance level is not sizably larger compared to the full sample results. In addition, the full sample results now become insignificantly different from zero, suggesting that, on average, the applicable tax regime is not a primary driver of EU MNC outward income shifting.

There are a number of elements that could explain why the territorial outward income shifts may not be dominating. First, MNCs may still value the temporarily lower tax bill under worldwide regimes because, in the majority of cases, controlled foreign corporation (CFC) rules do not apply, making taxation only conditional upon repatriation. This may generate incentives for outward shifts even if a worldwide regime applies. Second, although EU countries apply de jure worldwide tax systems, de facto these countries may still decide to allow temporary, or even indefinite, deferral of this taxation (Huizinga and Laeven 2008, p. 1166).

D. Instrumenting for tax enforcement

A latent problem with our proxy for tax enforcement is that it may endogenously relate to a country's statutory tax rate. Specifically, nations may respond to income shifting by changing their tax regimes or enforcement (e.g., Houlder 2008 and 2009). In an attempt to overcome this concern, we instrument a nation's tax enforcement regime with country-level socioeconomic indicators that may serve as indicators of a country's tax enforcement.

The OECD (2004) states: "[Tax] examination practices vary widely across OECD Member Countries. Differences may be prompted by such factors as … the geographic size and population of the country, the level of domestic and international trade, and cultural and historical influences" (p. IV-3, paragraph 4.6). This suggests that demographic factors may impact tax enforcement. For example, densely populated countries, countries with greater economic activity, or both may be more difficult to screen tax-efficiently by local governments. More particularly, since tax authorities' resources and time are limited, the likelihood of a tax audit diminishes when the proportion of economic agents or activity in a country increases.[22]

Consequently, a country's population density and per capita GDP may be negatively correlated with the level of tax enforcement and uncorrelated with the error term in the original equation, and thus we can use both variables as instruments in separate regressions.[23] We obtain World Bank country-data on the population density and per capita GDP in the EU countries covered in our study and use them as instrumental variables for the weak tax enforcement variable. We run IV regressions using population density in isolation and population density multiplied by GDP per capita to capture the effects of instrumented tax enforcement. Unreported results (available upon request) are consistent with the tests described in the main analyses and reconfirm the hypotheses.

6. Conclusion and discussion

[22] The link between audit rates and tax compliance has been studied by for instance Dubin et al. (1990). The authors find that a continual decline in the audit rate from 1977–1986 caused a significant decline in IRS collections, indicating that tax audit likelihoods are positively related to tax compliance.

[23] Univariate statistics show a Pearson correlation between our tax enforcement variable and the natural logarithm of population density of 0.54 ($p<0.01$) and GDP per capita of 0.09 ($p<0.01$).

We have utilized the unique features of the EU financial reporting environment to examine both the incentives and opportunities that shape multinationals' decisions to shift income for tax purposes. We choose the European setting to examine this research question for three principal reasons. First, European corporate tax rates, tax laws, and tax enforcement regulations still vary considerably despite several EU initiatives to harmonize them (Needham 2013). Second, since the EU has not adopted fiscal consolidation rules and there is a relatively close link between tax and financial reports, the EU setting makes it possible to investigate the importance of tax incentives for MNC subsidiary-level strategic income allocation decisions. Finally, since European reporting regulations are based on a corporation's legal form rather than on its public listing status (Fourth European Union Directive, 1977), this setting allows for large-scale analyses on income shifting differences among public and private MNCs.

Our findings are as follows. First, we find clear evidence that EU MNCs shift income for tax reasons, and the results are the strongest for income shifting out of relatively high-tax subsidiary countries and into low-tax parent countries. We also find that income is especially shifted out of high-tax subsidiary (resp. parent) countries that are characterized by weak tax enforcement, which is consistent with the argument that costs of shifting are an important determinant of the responsiveness to tax incentives. Finally, we find that, while private MNCs shift income both into and out of subsidiary countries, public MNCs shift less income for tax purposes, especially in the direction of low-tax subsidiary countries. The combined evidence suggests that MNCs take variations in tax enforcement into account in the way they strategically orchestrate their corporate tax burden and that higher nontax costs of listed firms may restrain their income shifting compared to private firms.

To the best of our knowledge, our study is among the first to show that MNCs not only respond to tax system incentives in deciding upon income allocation across subsidiaries in various countries but also to the opportunities for shifting income that arise in connection to the tax enforcement regime in the subsidiary country. This finding because suggests that policymakers and tax administrators should pay close attention to MNC international tax planning decisions that involve income shifting in countries with weaker tax enforcement systems. By studying public and private MNCs, we also provide new insights into the extent of international income shifting of public versus private MNCs. Our results may suggest novel dimensions for policy discussions on income shifting by MNCs that differ in listing status.

We acknowledge that our results may be subject to certain limitations. First, despite our ability to obtain and analyze the EU subsidiary-level financial reporting data of MNCs, we cannot examine income shifts toward subsidiaries located outside the EU, including subsidiaries located in (non-EU) tax havens. However, not including information about the possible flow of income to these tax havens is likely to work against finding support for our hypotheses. Therefore the fact that we find evidence in support of our hypotheses arguably makes our conclusions stronger. Second, as is often the case with tax studies, we did not have access to data from national tax authorities, and we had to rely on financial accounting information as a proxy for tax-relevant information. This might be problematic in cases where book income deviates substantially from tax income. It might be desirable for future researchers to examine similar research questions using proprietary tax filing data.

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Appendix 1: Variable definitions

Variable name	**Definition** (Source: BvD Amadeus, unless otherwise mentioned)
ROS	Subsidiary-level return on sales, measured as profit/loss before taxes (*Amadeus item*: PLBT) scaled by sales (SALES)
STRDIFF	Statutory tax rate (STR) applicable in the subsidiary country for a given year minus the statutory tax rate in the parent company's home country. Positive (negative) values indicate incentives to shift income out of (into) the subsidiary country. Source: International Bureau for Fiscal Documentation; various years.
WEAKTAX_SUBS/MNC	Tax enforcement dummy measured at the country-level and based on six (6) dimensions of tax environment compiled from E&Y Transfer Pricing Guides and Keller and Schanz (2013). For each country, an average tax environment score is calculated based upon the availability of double tax treaties, the absence of thin capitalization rules, the presence of preferential holding treatments, the possibility to carry forward losses indefinitely over time, the absence of audit risk, and the nondisclosure requirements of related party transactions. Higher (lower) average scores correspond to lower (higher) tax enforcement. Countries with average scores below the median score on the tax enforcement are classified as *WEAKTAX* countries. The subscript SUBS, resp. MNC, refers to the country classification in the subsidiary country, resp. parent country.
PRIVATE	Dummy variable indicating the public listing status of the MNC and is equal to one if non-listed (=private) or zero if listed on a stock exchange (=public)
Asset T/O	Subsidiary-level assets-to-sales ratio. High values correspond to low sales turnover firms.
Leverage	Subsidiary-level long-term debt relative to total assets.
ROS_{MNC}	Parent consolidated return on sales, measured as consolidated profit/loss before taxes scaled by consolidated sales
$Ln(SALES_{MNC})$	Natural logarithm of consolidated MNC sales (in constant USD)
$Intangibility_{MNC}$	MNC (consolidated) proportion of intangible assets to sales.

GDPG	GDP per capita growth (%). Source: World Bank, various years.
C	Composite (family-level) tax variable, measured as per Huizinga and Laeven (2008) as follows: $C_{i,t} = \left(\frac{1}{(1-t_i)} \times \frac{\sum_{k \neq i}^{n} \frac{B_k}{(1-t_k)} \times (t_i - t_k)}{\sum_{k=1}^{n} \frac{B_k}{(1-t_k)}}\right.$ where B is the proxy for operational activity (Sales), and the subscripts *i* and *k* refer to subsidiary country *i* and *k* respectively, and t is a year indicator.
Ln(EBIT)	Natural logarithm of earnings before interest and taxes.
Ln(Capital)	Natural logarithm of total fixed assets.
Ln(Labor)	Natural logarithm of labor costs.
Ln(GDP)	Natural logarithm of country GDP.
TERRITORIAL	Tax system classification based on a bilateral tax agreement between the parent country and the subsidiary country where subsidiary profits are taxed in the country where the subsidiary is located and the parent company is not liable for an additional tax when the subsidiary profits are repatriated to the home (parent) country.
WORLDWIDE	Tax system classification based on a bilateral tax agreement between the parent country and the subsidiary country where subsidiary profits are taxed in the country where the subsidiary is located at the local tax rate and where the parent company is charged an additional tax (minus tax credits for tax already paid in the subsidiary country) at the parent-country rate when the subsidiary profits are repatriated to the home (parent) country.

TABLES AND FIGURES

Table 1: Tax and Tax Enforcement Indicators (by Country)

Panel A: Statutory Tax Rates (%), 1998–2009 Evolution

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TREND
Austria	34.0	34.0	34.0	34.0	34.0	34.0	25.0	25.0	25.0	25.0	25.0	25.0	-26.5%
Belgium	40.2	40.2	40.2	40.2	40.2	34.0	34.0	34.0	34.0	34.0	34.0	34.0	-15.4%
Czech Republic	35.0	35.0	31.0	31.0	31.0	31.0	26.0	24.0	24.0	21.0	20.0	19.0	-45.7%
Denmark	34.0	34.0	32.0	30.0	30.0	30.0	28.0	28.0	28.0	25.0	25.0	25.0	-26.5%
Finland	28.0	28.0	29.0	29.0	29.0	29.0	26.0	26.0	26.0	26.0	26.0	26.0	-7.1%
France	36.6	41.6	37.8	36.4	35.4	35.4	33.8	33.3	33.3	33.3	33.3	33.3	-9.0%
Germany	57.5	56.5	52.0	38.9	38.9	40.2	38.3	38.3	38.3	29.5	29.4	29.4	-48.9%
Greece	40.0	40.0	40.0	37.5	35.0	35.0	32.0	29.0	25.0	25.0	25.0	24.0	-40.0%
Hungary	18.0	18.0	18.0	18.0	18.0	18.0	16.0	16.0	16.0	16.0	16.0	19.0	5.6%
Ireland	36.0	32.0	24.0	20.0	16.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	-65.3%
Italy	53.2	41.2	37.0	36.0	36.0	34.0	37.3	37.3	37.3	31.4	31.4	31.4	-41.0%
Luxembourg	37.5	37.5	37.5	37.5	30.4	30.4	30.8	29.6	29.6	29.6	28.6	28.6	-23.7%
Netherlands	35.0	35.0	35.0	35.0	34.5	34.5	31.5	29.6	25.5	25.5	25.5	25.5	-27.1%
Norway	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	0.0%
Slovakia	29.0	29.0	29.0	29.0	25.0	25.0	19.0	19.0	19.0	19.0	19.0	19.0	-34.5%
Spain	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	32.5	30.0	30.0	30.0	-14.3%
Sweden	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	26.3	26.3	-6.1%
Switzerland	27.5	25.1	24.9	24.7	24.4	24.1	21.3	21.3	21.3	21.2	21.2	21.2	-22.9%
United Kingdom	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	28.0	28.0	28.0	-9.7%
Average	34.9	34.2	32.8	31.5	30.5	29.9	28.0	27.6	27.0	25.7	25.5	25.5	-24.1%

Panel B: Tax Enforcement Proxies

Country	AUDIT [1]	DISCL [2]	HOLD [3]	THIN [4]	DTT [5]	CFL [6]	WEAKTAX [7]	
Austria	0.50	1.00	0.00	0.50	0.61	1.00	**0.60**	**[1]**
Belgium	0.50	0.50	1.00	1.00	0.73	1.00	**0.79**	**[1]**
Czech Republic	0.50	0.50	0.00	0.00	0.62	0.00	**0.27**	**[0]**
Denmark	0.50	1.00	0.00	0.00	0.64	1.00	**0.52**	**[1]**
Finland	0.50	0.50	0.00	1.00	0.57	0.50	**0.51**	**[1]**
France	0.50	0.50	0.00	0.00	1.00	1.00	**0.50**	**[0]**
Germany	0.50	1.00	0.00	0.00	0.75	1.00	**0.54**	**[1]**
Great Britain	0.00	0.50	1.00	0.50	0.96	1.00	**0.66**	**[1]**
Greece	0.50	1.00	0.00	1.00	0.36	0.00	**0.48**	**[0]**
Hungary	0.50	1.00	0.00	0.00	0.54	1.00	**0.51**	**[1]**
Ireland	0.00	0.50	1.00	1.00	0.38	1.00	**0.65**	**[1]**
Italy	0.50	0.50	0.00	0.00	0.67	0.00	**0.28**	**[0]**
Luxembourg	0.50	0.00	1.00	1.00	0.42	1.00	**0.65**	**[1]**
Netherlands	0.50	0.50	1.00	0.00	0.72	0.70	**0.57**	**[1]**
Norway	0.50	0.50	0.00	1.00	0.69	0.90	**0.60**	**[1]**
Slovak Republic	0.00	0.50	0.00	1.00	0.00	0.54	**0.34**	**[0]**
Spain	0.00	1.00	0.00	0.52	1.00	0.21	**0.45**	**[0]**
Sweden	0.50	0.50	0.00	0.14	1.00	0.32	**0.41**	**[0]**
Switzerland	0.50	0.50	0.00	0.00	1.00	0.48	**0.41**	**[0]**

Panel A of this table displays yearly statutory tax rates (1998–2009) of the countries included in this research. Data are obtained from OECD statistics and from the International Bureau of Fiscal Documentation (IBFD; www.ibfd.org). Data in Panel B relate to international tax environment measures (measurement period 2005–2009) from Global Transfer Pricing Reference Guides and from Keller and Schanz (2013). Figures in column [1] and [2] are compiled from biennial Ernst & Young Global Transfer Pricing Reference Guides (1999–2009) and conversations with national tax experts. They contain average country scores on tax audit risk (AUDIT) and related party disclosure requirements (DISCL). A score of 1.0/0.5/0.0 relates to low/median/high risk, respectively, disclosure obligations. Column [3] summarizes information on special (favorable) regimes on MNC holdings (HOLD). 1.0 = holding regime exists; 0.0 = no holding regime exists. Column [4] summarizes the thin capitalization rules (THIN) a country imposes on the deductibility of interest expenses from taxable income. 1.0 = no thin capitalization rules apply; 0.5 = no clear thin capitalization rules apply; 0.0 thin capitalization rules apply. Column [5] contains the number of double tax treaties (DTT) in force, relative to the maximum number of double tax treaties; higher scores correspond to more double tax treaties and hence a lower likelihood of double taxation. Column [6] reports information on the loss offset rules with respect to carryforward of losses (CFL). 1.0 = losses can be forward indefinitely; 0.5 = losses can be forward for more than five and up to twenty years; 0.0 = carryforward of losses is non-existing or limited to a period smaller than five years. Column [7] is the average tax environment score based upon the six tax system characteristics as described above. Higher (lower) average scores correspond to weaker (stronger) tax enforcement (WEAKTAX). We report the above [1] or below [0] median country score on the tax enforcement measure between square brackets in the final column.

Table 2: Sample Composition

	PUBLIC						PRIVATE					
Country	**Number MNCs**	**%**	**Number Subs**	**%**	**Number Fiscal Entities**	**%**	**Number MNCs**	**%**	**Number Subs**	**%**	**Number Fiscal Entities**	**%**
Austria	0	0.0	37	0.2	19	0,3	0	0.0	162	0.4	58	0,8
Belgium	242	6.0	4,256	17.5	1,052	17,2	237	8.2	1,962	5.3	411	5,9
Czech Rep.	0	0.0	28	0.1	9	0,1	0	0.0	920	2.5	344	4,9
Denmark	164	4.1	1,223	5.0	335	5,5	62	2.2	301	0.8	126	1,8
Finland	307	7.6	2,369	9.8	427	7,0	330	11.5	2,728	7.4	403	5,8
France	606	15.0	5,790	23.9	1,327	21,6	53	1.8	4,717	12.9	878	12,6
Germany	468	11.6	505	2.1	172	2,8	319	11.1	2,071	5.6	437	6,3
Great Britain	1,516	37.6	5,608	23.1	1,099	0,0	481	16.7	7,901	21.5	871	12,5
Greece	0	0.0	408	1.7	212	3,5	3	0.1	243	0.7	92	1,3
Hungary	0	0.0	50	0.2	4	0,1	0	0.0	600	1.6	225	3,2
Ireland	19	0.5	127	0.5	41	0,7	27	0.9	336	0.9	94	1,3
Italy	83	2.1	1,485	6.1	593	9,7	438	15.2	5,784	15.8	821	11,8
Luxembourg	0	0.0	0	0.0	0	0,0		0.0	0	0.0	18	0,3
Netherlands	221	5.5	337	1.4	203	3,3	589	20.5	956	2.6	352	5,0
Norway	0	0.0	0	0.0	180	2,9		0.0	0	0.0	358	5,1
Slovak Rep.	0	0.0	39	0.2	5	0,1	0	0.0	204	0.6	105	1,5
Spain	65	1.6	299	1.2	101	1,6	336	11.7	6,484	17.7	958	13,7
Sweden	294	7.3	1,651	6.8	336	5,5	0	0.0	1,331	3.6	436	6,2
Switzerland	45	1.1	46	0.2	16	0,3	0	0.0	0	0.0	0	0,0
TOTAL	**4,030**	**100.0**	**24,258**	**100.0**	**6,131**	**100.0**	**2,875**	**100.0**	**36,700**	**100.0**	**6,987**	**100.0**

This table reports sample breakdowns by MNC, subsidiary, and subsidiary-country (i.e., fiscal-entity) observations and split by listing status: public versus private. The number of fiscal entity observations may be lower than subsidiary-specific observations in the case an MNC has more than one subsidiary in the same affiliate country.

Table 3: Descriptive Statistics: Public versus Private MNC Observations

VARIABLE	PUBLIC=1 PRIVATE=0	N	Mean	Q1	Median	Q3	STD
ROS	1	24,258	0.043	0.001	0.045	0.120	0.351
	0	36,700	0.037	0.001	0.037	0.101	0.208
STRDIFF (in %)	1	24,258	0.06	0.00	0.00	1.00	5.32
	0	36,700	-0.87	-2.00	0.00	0.40	4.33
$STRDIFF_{FOREIGN}$ (in %)	1	12,572	0.11	-3.80	0.90	5.20	7.39
	0	23,802	-1.33	-4.80	-1.40	2.00	5.32
ASSET T/O	1	24,258	2.788	0.459	0.699	1.309	6.295
	0	36,700	1.708	0.877	1.486	2.275	1.134
LEVERAGE	1	24,258	0.052	0.000	0.000	0.003	0.135
	0	36,700	0.059	0.000	0.000	0.019	0.144
ROS_{MNC}	1	24,258	0.069	-0.028	0.052	0.137	0.211
	0	36,700	0.040	0.017	0.043	0.050	0.042
$Ln(SALES_{MNC})$	1	24,258	17.566	16.156	18.046	19.594	2.947
	0	36,700	13.439	11.195	13.056	16.090	2.318
$Intangibility_{MNC}$	1	24,258	0.195	0.035	0.104	0.250	0.252
	0	36,700	0.044	0.003	0.027	0.046	0.064
GDPG	1	24,258	2.097	1.087	2.374	3.314	1.942
	0	36,700	1.073	0.217	2.036	2.918	2.937
WEAKTAX_SUBS	1	24,258	0.563				
	0	36,700	0.458				
WEAKTAX_MNC	1	24,258	0.715				
	0	36,700	0.344				

Descriptive statistics for public versus private MNC subsidiary observations (MNC consolidated observations if subscript equal to MNC). All variables are defined in Appendix 1.

Table 4: Correlations

VARIABLE	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
[1] ROS	1.000	-0.008	0.059	0.012	0.035	-0.082	0.116	0.026	0.005	0.031
		(0.06)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.21)	(<0.01)
[2] STRDIFF	-0.036	1.000	-0.134	0.113	0.021	0.010	0.018	0.107	0.060	-0.115
	(<0.01)		(<0.01)	(<0.01)	(<0.01)	(0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
[3] WEAKTAX_SUBS	0.098	-0.200	1.000	0.296	0.051	0.085	0.075	0.036	0.043	0.047
	(<0.01)	(<0.01)		(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
[4] WEAKTAX_MNC	0.003	0.179	0.296	1.000	0.080	0.005	0.054	0.211	0.134	0.092
	(0.41)	(<0.01)	(<0.01)		(<0.01)	(0.24)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
[5] ASSET T/O	0.022	-0.027	0.051	-0.001	1.000	-0.004	0.113	0.148	0.073	0.031
	(<0.01)	(<0.01)	(<0.01)	(0.78)		(0.31)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
[6] LEVERAGE	-0.087	0.006	0.071	-0.004	-0.032	1.000	-0.019	-0.038	-0.011	-0.002
	(<0.01)	(0.14)	(<0.01)	(0.37)	(<0.01)		(<0.01)	(<0.01)	(0.01)	0.60
[7] ROS_{MNC}	0.224	-0.037	0.125	0.015	0.032	-0.037	1.000	0.085	0.149	0.070
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)		(<0.01)	(<0.01)	(<0.01)
[8] Ln($SALES_{MNC}$)	0.053	0.113	0.047	0.216	-0.194	-0.078	0.038	1.000	0.363	0.127
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)		(<0.01)	(<0.01)
[9] $INTANGIBILITY_{MNC}$	0.051	0.080	0.008	0.147	-0.136	-0.033	0.041	0.498	1.000	0.038
	(<0.01)	(<0.01)	(0.05)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)		(<0.01)
[10] GDPG	0.065	-0.151	0.090	0.094	-0.010	0.025	0.141	0.082	0.030	1.000
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.02)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	

Pearson (Spearman) correlations above (below) the diagonal. All variables are defined in Appendix 1.

Table 5: Income Shifting Regressions: Pooled Sample Results

	(1)	(2)	(3)	(4)	(5)
VARIABLES	All	>50% Sales	STRDIFF<>0	STRdiff<0	STRdiff>0
STRDIFF	-0.339***	-0.313***	-0.245***	-0.160	-0.444***
	(-5.22)	(-4.31)	(-3.74)	(-1.50)	(-2.69)
ASSET T/O	0.076***	0.055***	0.068***	0.061***	0.072***
	(18.83)	(11.75)	(10.89)	(5.65)	(10.10)
LEVERAGE	-0.126***	-0.139***	-0.141***	-0.093***	-0.206***
	(-5.98)	(-6.47)	(-5.97)	(-3.25)	(-5.17)
ROS_{MNC}	0.010***	0.006***	0.003**	0.001	0.005*
	(5.13)	(2.87)	(2.16)	(1.00)	(1.92)
$Ln(SALES_{MNC})$	0.006***	0.005***	0.005***	0.003**	0.008***
	(7.06)	(5.50)	(4.95)	(2.27)	(5.42)
$INTANGIBILITY_{MNC}$	0.082***	0.023	0.091**	0.061	0.104**
	(2.58)	(0.73)	(2.24)	(1.06)	(2.16)
GDPG	0.002	-0.001	0.004	0.000	0.016**
	(0.80)	(-0.42)	(1.61)	(0.13)	(2.28)
Constant	-0.118***	-0.048	-0.105**	-0.041	-0.164**
	(-2.72)	(-1.03)	(-2.20)	(-0.76)	(-2.02)
Country Effects	YES	YES	YES	YES	YES
Industry Effects	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES
Observations	60,958	45,987	35,744	19,542	16,202
R-squared	0.229	0.160	0.202	0.181	0.218

Results for a robust OLS regression on income shifting in response to tax rate differences and with two-way clustered standard errors as in Petersen (2009) at the MNC and year level while controlling for subsidiary country, industry (SIC1), and year fixed effects. Robust *t*-statistics in parentheses; standard errors two-way clustered by MNC/year (*** p<0.01, ** p<0.05, * p<0.10)

Table 6: Income Shifting in Private and Public Firms: the Impact of Tax Enforcement

	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		ALL		**PUBLIC**		**PRIVATE**	
VARIABLES	STRDIFF>0	STRDIFF <0	STRDIFF<>0	STRDIFF >0	STRDIFF <0	STRDIFF >0	STRDIFF <0
STRDIFF	-0.202	0.024	-0.223***	0.066	-0.809	0.070	0.057
	(-1.29)	(0.18)	(-2.85)	(0.23)	(-1.38)	(0.62)	(0.56)
PRIVATE			-0.013				
			(-0.90)				
STRDIFF×PRIVATE			-0.073				
			(-0.84)				
WEAKTAX_SUBS	-0.007			0.058		-0.105	
	(-0.11)			(0.52)		(-1.56)	
STRDIFF×WEAKTAX_SUBS	-0.554*			-1.064**		0.110	
	(-1.82)			(-2.13)		(0.76)	
WEAKTAX_MNC		-0.013			0.049		-0.015**
		(-0.99)			(1.42)		(-2.03)
STRDIFF×WEAKTAX_MNC		-0.255**			0.741		-0.240***
		(-2.23)			(1.23)		(-3.23)
JOINT EFFECT	-0.756**	-0.221**	-0.296***	-0.998**	-0.068	0.180	-0.183***
[*p-value*]	[p<0.05]	[p<0.05]	[p<0.01]	[p<0.05]	[p=0.31]	[p=0.18]	[p<0.01]
ASSET T/O	0.072***	0.061***	0.068***	0.075***	0.069***	-0.008***	-0.018***
	(10.10)	(5.65)	(10.88)	(10.20)	(7.75)	(-3.05)	(-6.02)
LEVERAGE	-0.205***	-0.091***	-0.142***	-0.325***	-0.223***	-0.163***	-0.173***
	(-5.13)	(-3.20)	(-5.97)	(-3.85)	-(1.96)	(-7.42)	(-9.96)
ROS_{MNC}	0.005*	0.001	0.003**	0.002	0.002	0.119**	0.197***
	(1.91)	(0.96)	(2.22)	(0.67)	(1.47)	(2.28)	(3.25)
$Ln(SALES_{MNC})$	0.008***	0.003**	0.004***	0.016***	0.004*	0.004***	0.001
	(5.31)	(2.37)	(3.42)	(3.35)	(1.69)	(2.81)	(0.84)
$INTANGIBILITY_{MNC}$	0.101**	0.061	0.086**	0.089	0.024	-0.014	-0.010
	(2.11)	(1.03)	(2.01)	(1.59)	(0.44°	(-0.30)	(-0.20)
GDPG	0.015**	0.001	0.004	0.028*	0.003	0.000	0.002
	(2.17)	(0.23)	(1.62)	(1.69)	(0.098)	(0.03)	(0.80)

Constant	-0.174**	-0.036	-0.089*	-0.340**	-0.164**	-0.007	0.121***
	(-2.15)	(-0.67)	(-1.84)	(-2.15)	(-2.48)	(-0.18)	(3.10)
Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	16,202	19,542	35,744	6,723	5,380	9,479	14,162
R-squared	0.218	0.181	0.202	0.238	0.258	0.137	0.139

Results for a robust OLS regression on income shifting in response to tax rate differences (STRDIFF) and weak tax enforcement (WEAKTAX) in the country that misses out on shifted profits and expressed as below. Results are robust to two-way clustered standard errors as in Petersen (2009) at the MNC and year level while controlling for subsidiary country, industry (SIC1), and year fixed effects. Robust *t*-statistics in parentheses; standard errors two-way clustered by MNC/year (Robust t-statistics in parentheses. standard errors: 2-way clustered by MNC/year *** p<0.01, ** p<0.05, * p<0.1)

$$ROS_S = \alpha_0 + \beta_1 STRDIFF + \beta_2 WEAKTAX + \beta_3 STRDIFF \times WEAKTAX + \Theta_S CTRLS_s + \Theta_P CTRLS_p + \varepsilon \quad (1)$$

Table 7: Propensity-score Matched Sample Results

Panel A: Pre-Post PSM sample Descriptive Statistics

VARIABLE		Unmatched Mean	*t*-test (Signif)	PSM Matched Mean	*t*-test Signif.	PSM Matched $N_{SUBS/MNC}$
Ln(TOAS)	PUBLIC	6.146	-17.02	1.057	-0.41	11,926/2,289
	PRIVATE	1.008	(p<0.01)		(0.83)	28,860/2,216
ΔSales	PUBLIC	24.89%	-5.60	7.48%	3.21	11,926/2,289
	PRIVATE	10.63%	(p<0.01)		(<0.01)	28,860/2,216
Intangibility	PUBLIC	17.82%	-25.69	4.61%	0.14	11,926/2,289
	PRIVATE	4.66%	(p<0.01)		(0.94)	28,860/2,216

Panel B: PSM Regression Output

	(13)	(14)	(15)	(16)	(17)	(18)
	ALL		**PUBLIC**		**PRIVATE**	
	>0	**<0**	**>0**	**<0**	**>0**	**<0**
STRDIFF	-0.381**	0.283*	-0.796*	-0.940	0.000	0.001
	(-2.03)	(1.72)	(-1.70)	(-1.05)	(0.01)	(1.30)
WEAKTAX_SUBS	0.031		0.078			
	(0.42)		(0.99)			
STRDIFF×WEAKTAX_SUBS	-0.209		-0.487		-0.001	
	(-0.72)		(-0.81)		(-0.54)	
WEAKTAX_MNC		-0.035***		-0.017		-0.019**
		(-2.71)		(-0.30)		(-2.38)
STRDIFF×WEAKTAX_MNC		-0.438***		0.820		-0.273***
		(-3.64)		(0.89)		(-3.28)
JOINT EFFECT	-0.590***	-0.155**	-1.283***	-0.120	-0.001	-0.272*
p-value	[p<0.01]	[p<0.05]	[p<0.01]	[p=0.59]	[p=0.93]	[p<0.10]
Controls	Included	Included	Included	Included	Included	Included
Industry/Country/Year Effects	Y/Y/Y	Y/Y/Y	Y/Y/Y	Y/Y/Y	Y/Y/Y	Y/Y/Y
Observations	11,263	13,961	3,304	2,737	7,959	11,224
R-squared	0.137	0.117	0.166	0.219	0.042	0.045

Panel A reports descriptive statistics on the pre- versus post propensity score matched sample of public and private MNC subsidiary observations. Panel B reports OLS regression results for income shifting models with two-way cluster-robust standard errors as in Petersen (2009) at the MNC and year level while controlling for subsidiary country, industry (SIC1 digit), and year fixed effects for the PSM sample. Robust t-statistics in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table 8: Composite Tax Score Results
Panel A: Overview Main Variables

VARIABLE	PRIVATE=1 PUBLIC=0	N	Mean	Std	Q1	Q3
C	1	6,987	-0.01	0.06	-0.04	0.02
	0	6,131	0.02	0.08	-0.02	0.06
C_parent	1	3,639	-0.01	0.06	-0.04	0.02
	0	3,132	0.02	0.08	-0.01	0.05
Ln(Pretax Income)	1	6,987	4.71	3.34	0.00	7.34
	0	6,131	10.27	6.53	0.00	15.13
Ln(Fixed Assets)	1	6,987	6.80	2.73	5.03	8.72
	0	6,131	14.38	3.38	12.93	16.59
Ln(Employees)	1	6,987	3.01	2.04	1.39	4.45
	0	6,131	3.86	2.07	2.71	5.37
Ln(GDP)	1	6,987	13.88	0.85	13.12	14.71
	0	6,131	14.16	0.92	13.18	14.77

Panel A of this table reports descriptive statistics on a composite (i.e., family-level) tax incentive and opportunities variable for the MNC as a whole (C) and vis-à-vis the parent (C_parent) as well as test and control variables as employed in Huizinga and Laeven (2008). Panel B reports OLS regressions results of the following estimation model:

$$Ln(\text{EBIT})_{i,t} = \alpha_0 + \beta_1.C_{i,t} + \beta_2.Ln(\text{Capital})_{i,t} + \beta_3.Ln(\text{Labor})_{i,t} + \beta_4.Ln(\text{GDP})_{j,t} + \varepsilon_{i,t} \quad (2)$$

where Ln(EBIT) = natural logarithm of earnings before interest and taxes; Ln(Capital) = natural logarithm of total fixed assets; Ln(Labor) = natural logarithm of number of employees; Ln(GDP) = natural logarithm of country GDP; and $_{i,t}$ refers to MNC subsidiary-country firm-year subscripts. C stands for the composite tax variable and is calculated as follows:

$$C_{i=} \quad \left(\frac{1}{(1-t_i)} \times \frac{\sum_{k\neq i}^{n} \frac{B_k}{(1-t_k)} \times (t_i - t_k)}{\sum_{k=1}^{n} \frac{B_k}{(1-t_k)}}\right) \quad (3)$$

Panel B: Composite Tax Score Regressions

VARIABLES	(19) ALL	(20) PUBLIC	(21) PRIVATE	(22) PUBLIC C>0	(23) PUBLIC C<0	(24) PRIVATE C>0	(25) PRIVATE C<0	(26) PUBLIC C_parent>0	(27) PUBLIC C_parent>0	(28) PRIVATE C_parent>0	(29) PRIVATE C_parent>0
C	-1.561**	-1.929*	-3.016***	-0.542***	-0.600***	-0.687***	-0.684***				
	(-2.33)	(-1.91)	(-5.01)	(-3.28)	(-3.63)	(-9.02)	(-8.99)				
Log(FixedAssets)	0.342***	0.122***	0.167***	0.120***	0.119***	0.162***	0.162***	0.109***	0.119***	0.163***	0.155***
	(21.85)	(4.23)	(8.85)	(4.16)	(4.14)	(8.68)	(8.67)	(2.93)	(3.19)	(7.24)	(6.81)
Log(#Employees)	0.199***	0.414***	0.236***	0.408***	0.407***	0.226***	0.225***	0.461***	0.454***	0.208***	0.221***
	(7.79)	(8.89)	(9.40)	(8.75)	(8.73)	(9.04)	(9.03)	(8.05)	(7.92)	(6.98)	(7.35)
Log(GDP)	0.067	0.046	0.138***	0.052	0.041	0.151***	0.140***	0.053	0.031	0.255***	0.253***
	(1.47)	(0.45)	(3.16)	(0.51)	(0.41)	(3.53)	(3.26)	(0.45)	(0.26)	(5.24)	(5.18)
C_parent								-0.923***	-0.542	-0.052	0.062
								(-4.09)	(-1.55)	(-0.54)	(0.52)
WEAKTAX_SUBS									0.964**		0.471***
									(2.53)		(3.24)
C_parent ×WEAKTAX_SUBS									-0.594		-0.202
									(-1.34)		(-1.09)
JOINT EFFECT									-1.136***		-0.264
[p-value]									[p<0.01]		[p=0.35]
Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,118	6,131	6,987	6,131	6,131	6,987	6,987	3,132	3,132	3,639	3,639
R-squared	0.713	0.730	0.703	0.730	0.730	0.705	0.705	0.730	0.730	0.699	0.700

Table 9: Territorial Regimes, Tax Enforcement and Income Shifting

VARIABLES	ALL	PUBLIC	PRIVATE
	(30)	(31)	(32)
STRDIFF	0.112	-0.802***	0.073
	(0.50)	(-1.93)	(0.42)
WEAKTAX_MNC	0.006	0.067	-0.009
	(0.36)	(1.66)	(-1.02)
STRDIFF×WEAKTAX_MNC	-0.123	0.979**	-0.289**
	(-0.43)	(2.22)	(-2.35)
JOINT EFFECT	-0.011	0.177	-0.216
[*p*-value]	[p=0.87]	[p=0.56]	[p<0.05]
ASSET T/O	0.084***	0.092***	-0.009
	(3.41)	(3.47)	(-1.44)
LEVERAGE	-0.120**	-0.260***	-0.166***
	(-2.21)	(-3.01)	(-3.27)
ROS_{MNC}	0.003*	0.002**	0.213***
	(1.76)	(2.19)	(3.40)
$Ln(SALES_{MNC})$	0.008***	0.004	0.001
	(3.16)	(0.84)	(0.85)
$INTANGIBILITY_{MNC}$	0.040	0.022	0.015
	(1.46)	(0.49)	(0.22)
GDPG	0.005	0.008	0.006**
	(1.97)	(1.10)	(2.05)
CONSTANT	-0.079	-0.027	0.025*
	(-1.20)	(-0.56)	(-2.58)
Observations	10,384	4,020	6,364
R-squared	0.312	0.374	0.041

This table reports ROS income shifting regression results with two-way cluster-robust standard errors as in Petersen (2009) at the MNC and year level while controlling for subsidiary country, industry (SIC1 digit), and year fixed effects for the sample of observations where territorial regimes apply (i.e., where foreign income is exempted from any other domestic income tax) and for the situations where foreign statutory tax rates are below domestic tax rates. Robust t-statistics in parentheses (*** p<0.01, ** p<0.05, * p<0.1)