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The effect of a worldwide tax system on tax management of foreign subsidiaries

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Abstract
Under a worldwide tax system, firms pay taxes on their domestic income and repatriated foreign income, whereas under a territorial tax system repatriated foreign income is exempt from taxation. We examine whether worldwide tax systems reduce the incentives of multinational corporations to engage in tax management in their foreign subsidiaries. Using two quasi-natural experiments, we show that multinationals lower the effective tax rates in their foreign subsidiaries after countries switch from a worldwide to a territorial tax system. Thus, multinationals subject to a worldwide tax system face competitive disadvantages compared to competitors from countries with a territorial tax system.

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INTRODUCTION

When a multinational corporation (MNC) subject to a worldwide tax system reduces taxes in its foreign subsidiaries, the parent company will generally be subject to additional taxes when such foreign earnings are repatriated. In light of additional home country taxation upon repatriation, the worldwide tax system may reduce the incentive for MNCs to manage taxes in their foreign subsidiaries. In contrast, if the parent company of an MNC is subject to a territorial tax system, the tax management behavior of foreign subsidiaries does not affect the parent's domestic tax liabilities, and the MNC can reap the full benefit of reducing taxes when repatriating foreign earnings. We investigate the tax management behavior of foreign subsidiaries depending on whether they are owned by a parent company located in a country that has a worldwide or territorial tax system (hereafter, worldwide-parent subsidiary versus territorial-parent subsidiary).

There are several nuances that influence the incentive of MNCs subject to a worldwide tax system to manage taxes in foreign countries. First, worldwide tax systems usually offer the possibility to defer taxation of foreign-source income until dividends are repatriated. If MNCs reinvest foreign earnings and delay

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repatriation far in the future, the difference in tax payments between a worldwide and a territorial tax system shrinks in net present value terms if the reinvestment rate of return of those tax savings is greater than the discount rate. Furthermore, MNCs might defer repatriation in anticipation of a tax holiday or a change in the tax code. Second, worldwide tax systems allow for cross-crediting, which permits firms to offset repatriation taxes on foreign earnings from low-tax subsidiary countries with taxes paid in high-tax subsidiary countries.[1] However, we expect that MNCs are less likely to engage in tax management if the parent is located in a worldwide tax system, and provide evidence that tax management in foreign subsidiaries increases after the switch to a territorial system.[2]

While evidence suggests that MNCs shift income to countries with low tax rates (e.g., Akamah, Hope, & Thomas, 2018; Beuselinck, Deloof, & Vanstraelen, 2015; Dischinger & Riedel, 2011; Dyreng & Lindsey, 2009; Klassen & Laplante, 2012; Newberry & Dhaliwal, 2001), a significant amount of income is taxed abroad. For example, US MNCs paid US$128 billion in corporate income taxes abroad on $470 billion of taxable income reported to foreign tax authorities in 2010 (Tax Foundation, 2014). Thus, the average effective tax rate (ETR) *after* income shifting on foreign taxable income was 27.2 percent.[3] Conceptually, profit shifting and tax management in foreign subsidiaries are different. Profit shifting focuses on transactions between group members that are influenced by transfer prices, whereas tax management within foreign subsidiaries focuses on the management behavior of individual subsidiaries in light of country-specific tax rules.[4] While prior research focuses on the impact of a worldwide tax system on profit shifting (Markle, 2016), the question whether, and if so to what extent, tax systems influence MNCs to engage in tax management in their foreign subsidiaries remains unanswered. Answering this question is important as foreign direct investments of MNCs from countries with a worldwide tax system may be disadvantaged compared to investments of MNCs from countries with a territorial tax system due to taxes that apply to dividend repatriations under a worldwide tax system.

Generally, MNCs have the same costs and opportunities to manage taxes within their foreign subsidiaries as resident companies in the respective country. Examples documented in prior research include minimizing non-deductible expenses, exploiting domestically available favorable tax regimes like patent boxes (Bornemann, Laplante, & Osswald, 2019), and utilizing tax credits and tax holidays (Shevlin, Tang, & Wilson, 2012). Within the boundaries of the law, MNCs can agree in advance on the tax treatment for business transactions, as most European member states allow these kinds of advance pricing agreements (European Parliament, 2015). Furthermore, anecdotal media evidence provides several examples of exploiting loopholes in the domestic tax law (Balzli & Schiessl, 2009) and of choosing a location that minimizes regional taxes and surcharges (Meisel & Schmidt, 2013; Müllender, 2015). The costs associated with domestic tax management are similar to those of cross-country tax management, as firms have to hire tax consultants, and established tax structures might be challenged by tax authorities.

In particular, we study the tax management behavior of worldwide-parent and territorial-parent subsidiaries by investigating the switch in 2009 of Japan and the UK from a worldwide to a territorial tax system. Our sample consists of 39,496 subsidiary–year observations in 19 European countries. We obtain data from Bureau van Dijk's Orbis database and keep subsidiary–year observations that are majority-owned by foreign parents from 58 countries (> 50% ownership). The sample period is 2006–2011, which comprises the 3 years before and after Japan and the UK switched from a worldwide to a territorial tax system. We compare Japanese-owned and UK-owned foreign subsidiaries before and after the tax system switch to two control groups, worldwide-parent subsidiaries and territorial-parent subsidiaries. Thus, our empirical identification strategy relies on four difference-in-differences analyses. This research design allows us to establish a causal link between the tax system in the MNC's home country and the tax management behavior of foreign subsidiaries (Reeb, Sakakibari, & Mahmood, 2012).

Our difference-in-differences analyses show that Japanese-owned subsidiaries reduced their ETRs by 2.6 (3.5) percentage points and UK-owned subsidiaries reduced their ETRs by 1.2 (1.7) percentage points compared to territorial-parent subsidiaries (worldwide-parent subsidiaries). We conduct a wide range of robustness tests and show that our results hold when controlling for income shifting, home country characteristics, aggregating all fully owned foreign subsidiaries within a country-year, and applying an entropy balancing to balance covariates among treatment and control firms. Furthermore, we alternatively compute the ETR as tax

expense deflated by total assets, which allows us to include loss affiliates. Our results are robust to any of these specifications.

We contribute to the literature on taxation of MNCs and on the determinants that affect foreign subsidiaries (e.g., Beuselinck & Pierk, 2019; Dunne & Ndubizu, 1995; Klassen & Laplante, 2012; Liu & Hsueh, 1993; Markle, 2016; Nguyen & Rugman, 2015). We provide evidence on the magnitude by which tax management in foreign subsidiaries increases after the switch to a territorial system. This increase implies that MNCs subject to a worldwide tax system face competitive disadvantages compared to competitors from countries with a territorial tax system when conducting cross-border investments. Understanding whether tax management in foreign subsidiaries is less prevalent under a worldwide tax system is important to policymakers around the world for two reasons. First, in 2017, 41 countries still applied a worldwide tax system for foreign source dividends. Excluding the US, the eight largest economies that applied a worldwide tax system in 2017 were China, India, Brazil, South Korea, Mexico, Indonesia, Argentina, and Taiwan.[5] Thus, our findings help policymakers to assess the costs and benefits of worldwide tax systems. Second, with the passing of the Tax Cuts and Jobs Act (TCJA) in 2017, the US switched to a territorial tax system for specific types of foreign source income[6] (Tax Cuts and Jobs Act, 2017), which implies that US MNCs now have more incentives to devise strategies to manage taxes in their foreign subsidiaries.

Our findings are economically relevant for policymakers and tax authorities around the world. For example, the US had $6.4 trillion outward foreign direct investments (FDI) that generate taxable income abroad (OECD, 2018b). Thus, if US-owned subsidiaries manage taxes more after the TCJA, the tax revenue of subsidiary countries is reduced. Reduced tax revenues of US-owned subsidiaries are especially relevant for countries with a high ratio of US FDI, such as Canada, which exhibited FDI of US$474 billion or 45.2 percent of all inward FDI in 2016 (Statistics Canada, 2017). Furthermore, US MNCs reported $470 billion in taxable income to foreign tax authorities in 2010 (Tax Foundation, 2014). If US MNCs reduce their ETRs in foreign subsidiaries by between 1.2 and 3.5 percentage points after the switch to a territorial tax system in line with our findings, we expect them to save between $5.64 billion (= 0.012 × 470 billion) and 16.45 billion (= 0.035 × $470 billion) in foreign corporate income taxes every year.

This paper is organized as follows. Section two reviews prior literature and develops our hypothesis. Section three explains the sample selection and the research design. Section four contains the main results, while section five contains robustness tests. Section six presents conclusions.

LITERATURE REVIEW, BACKGROUND, AND HYPOTHESIS DEVELOPMENT

International taxation is an ongoing concern of policymakers around the world. Current international taxation rules allocate taxing rights to the country where companies report their profits. This incentivizes MNCs to strategically locate subsidiaries in low tax jurisdictions, although this might be inefficient from a global value creation point of view. Foss, Mudambi and Murtinu (2019) therefore propose not to tax highly mobile corporate profits but instead to tax less mobile shareholders and consumers. Other proposals brought forward by academics are taxing worldwide profits and allocating them based on the proportion of sales to customers in each country (Ting & Gray, 2019), or based on a formula appointment that reflects the corporate groups' activity in each country (McGaughey & Raimondos, 2019). However, even today, profits are not only taxed where they are reported, as an additional layer of taxation might occur when countries apply a worldwide tax system.

A worldwide tax system imposes taxes on repatriated profits if the foreign tax burden on these profits is lower than the tax burden in the home country. This creates incentives to postpone repatriation or not to repatriate foreign profits at all. This incentive increases with repatriation taxes and decreases in the presence of domestic financial constraints (Albring, Mills, & Newberry, 2011; Desai, Foley, & Hines, 2007). In line with this, Foley, Hartzell, Titman, and Twite (2007) find that technology intensive firms in particular show a higher sensitivity towards repatriation taxes. In the case of no or low dividend repatriation taxes, MNCs with fewer investment opportunities and higher free cash flows repatriate profits (Blouin & Krull, 2009). More than 60 percent of the funds repatriated following the American Jobs Creation Act of 2004 were obtained from cash holdings abroad, resulting in shareholder payouts for MNCs with

strong corporate governance (Dharmapala, Foley, & Forbes, 2011; Graham, Hanlon, & Shevlin, 2010).

Tax systems not only shape incentives for dividend repatriation but also incentives for income shifting. Overall, firms engage less in tax management if a country has higher book-tax conformity, a worldwide tax system, and stronger enforcement (Atwood, Drake, Myers, & Myers, 2012). Similarly, MNCs located in countries with a worldwide tax system engage in less profit shifting (Markle, 2016). This observation is concentrated among parent companies and their foreign affiliates, whereas the profit-shifting behavior does not differ among the foreign affiliates of MNCs located in countries with worldwide and territorial tax systems (Markle, 2016).

Desai et al. (2004) report that foreign affiliates engage in more investments when they face lower taxes. Prior literature has also shown that MNCs' investment behavior differs depending on whether the MNC is located in a country with a worldwide tax system or a territorial tax system (Feld, Ruf, Scheuering, Schreiber, & Voget, 2014; Hines, 1996; Smart, 2010). Different investment behavior in turn affects the non-debt shield (through depreciation) and also the debt shield if these investments are financed through debt (Dammon & Senbet, 1988; DeAngelo & Masulis 1980).[7]

Between 2000 and 2012, the number of OECD member countries which applied a territorial tax system doubled (PricewaterhouseCoopers, 2013). In line with this worldwide trend, the US abolished the worldwide tax system for specific types of foreign source income (see endnote 6) for fiscal years ending after December 31, 2017, whereas Japan and the UK abolished their worldwide tax systems in 2009. In the sample period of this paper (2006–2011), Japan and the UK were relatively high tax countries, as they exhibited statutory corporate income tax rates of 41 percent and 30 percent,[8] respectively. Before switching to a territorial tax system, the Japanese government was concerned that MNCs kept a large portion of the profits earned by their foreign affiliates abroad, which in turn were not available to finance R&D investments in Japan (Hasegawa & Kiyota, 2017). To stimulate dividend repatriations, Japan introduced a foreign dividend exemption system (i.e., a territorial tax system for foreign dividends). The main reasons for the UK to switch to a territorial system were to improve the UK tax competitiveness and because of a European Court of Justice judgment in December 2006 that made it more likely that a change to a territorial tax system was necessary (Stuttaford, 2009).

Intuitively, if the average foreign tax burden is lower than the statutory tax rate in the MNC's home country, MNCs subject to a worldwide tax system will pay additional repatriation taxes (Scholes, Wolfson, Erickson, Hanlon, Maydew, & Shevlin, 2015). Upon repatriation, they pay the difference between the taxes paid in subsidiary countries and the statutory tax rate in the MNC's home country. Thus, while tax management in foreign subsidiaries may seem a tax-optimal strategy, repatriation taxes eliminate this positive effect and potentially lower the incentives to focus on tax management in foreign affiliates in the first place. However, there are two reasons why worldwide-parent subsidiaries may also manage taxes. First, the worldwide tax systems in Japan and the UK allowed de facto balancing of dividend payments from countries with high tax rates and dividend payments from countries with low tax rates.[9] Thus, even though dividends from a low tax country would result in additional repatriation taxes, the tax liability would be (partly) offset by a de facto refund for dividends from countries with a higher tax rate. Second, worldwide tax systems offer the possibility to defer additional home country taxation until dividends are repatriated, and MNCs might hope for a tax holiday to circumvent repatriation taxes.

Nevertheless, Japanese and UK MNCs have fully benefited from being tax aggressive abroad after the tax system switch, as they are no longer subject to additional repatriation taxes. If our reasoning holds, we should observe that Japanese-owned and UK-owned subsidiaries lowered their ETRs after the two countries switched from a worldwide tax system to a territorial tax system. This leads us to our hypothesis:

Hypothesis: Foreign subsidiaries reduce their ETRs after the MNC home country switches from a worldwide tax system to a territorial tax system.

SAMPLE SELECTION AND RESEARCH DESIGN

Sample Selection

We use unconsolidated financial statements of private firms from Bureau van Dijk's Orbis database, which are the starting point for determining taxable income in Europe and are amended by a few country-specific tax rules. Our sample consists

of European subsidiaries including their dynamic ownership structure (from yearly Bureau van Dijk downloads), for the years 2006–2011.[10] This sample period covers three years before and after Japan and the UK switched to a territorial tax regime in 2009.[11] We start with all subsidiary–year observations with available data on the global ultimate owner between 2006 and 2011 and delete duplicate observations in terms of shareholder, subsidiary, and year combination.[12] Furthermore, we delete subsidiary–year observations with negative pre-tax income in order to calculate the ETRs and delete observations with missing data on net income, tax expense, and missing control variables. The sample includes only majority-owned (ownership > 50%) foreign subsidiaries in Europe because we consider control of the foreign subsidiary vital for influencing business operations and financial decisions.

Furthermore, we require that we have at least one observation in the pre-period and one observation in the post-period for each foreign subsidiary. We delete observations if the parent company is located in a tax haven, because these firms might have different incentives to manage taxes in foreign subsidiaries.[13] Our sample includes only Japanese-owned and UK-owned subsidiaries if the statutory tax rate is higher than the statutory tax rate of the subsidiary country, as additional repatriation taxes apply only in this case. Thus, we make sure that firms had a reduced incentive to manage taxes in the pre-period but the same incentive as territorial firms in the post-period.[14] This provides 39,496 subsidiary–year observations from 19 subsidiary countries[15] with parents from 58 countries.

Research Design

We investigate whether the average ETR of worldwide-parent subsidiaries is higher than the average ETR of territorial-parent subsidiaries. Our main identification strategy is based on two difference-in-differences analyses, as Japan and the UK switched to a territorial tax system in 2009, and we expect that Japanese-owned and UK-owned subsidiaries reduced their ETR thereafter. We test our hypothesis using two different control samples: territorial-parent subsidiaries and worldwide-parent subsidiaries. While 41 countries still had a worldwide tax system in place in 2017, US-owned subsidiaries account for most subsidiary-observations in the worldwide-parent control group.[16] The combination of two difference-in-differences analyses using two different control samples provides us with a powerful setting to test our hypothesis. We use the following regression design for our tests:

$$\begin{aligned} ETR_t = {} & \beta_0 + \beta_1 GB_t * POST + \beta_2 JP * POST_t + \beta_3 GB_t \\ & + \beta_4 JP_t + \beta_5 ROA_t + \beta_6 SIZE_t + \beta_7 EQUITY_t \\ & + \beta_8 DIV_t + \beta_9 LAGLOSS_t + \beta_{10} INTANG_t \\ & + \sum_{i=11}^{X} \beta_I * Fixed - effects + \varepsilon_t. \end{aligned} \tag{1}$$

The dependent variable for both difference-in-differences designs is the generally accepted accounting principles (GAAP) ETR. Several measures have been established to measure corporate tax management: for example, book-tax differences, GAAP, and cash-ETRs, or tax shelter scores (Dyreng, Hanlon, & Maydew, 2008; Lisowsky, 2010; Mills, 1998; Wilson, 2009). As we are interested in tax management of foreign subsidiaries and cash-flow statements are only available for publicly listed firms in Europe, we use GAAP ETRs to measure corporate tax management (Armstrong, Blouin, & Larcker, 2012; Chen, Chen, Cheng, & Shevlin, 2010; Law & Mills, 2017; Lennox, Lisowsky, & Pittman, 2013). Our dataset allows us to identify the tax management behavior of European subsidiaries that would otherwise not be possible, as financial statement information on foreign subsidiaries is not available in consolidated financial statements. We compute the GAAP ETR as corporate income tax expense divided by pre-tax income. The ETR of worldwide-parent subsidiaries is, in the absence of cross-crediting, the basis for the foreign tax credit granted by the MNC home country with a worldwide tax system.[17]

Our main variables of interest are the interactions of the indicator variables for Japanese-owned and UK-owned subsidiaries with POST (β_1 and β_2). GB (JP) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs. POST takes on the value of one for the period from 2009 to 2011 after Japan and the UK switched to a territorial tax system and zero otherwise. Note that we omit POST in Formula (1) and in our tables, as we include subsidiary-country–year fixed effects, which are perfectly collinear with POST.[18] We use the same research design for the control sample of territorial-parent subsidiaries and worldwide-parent subsidiaries (i.e., Eq. 1). We predict that the coefficients of β_1 and β_2 will be negative for both control samples. That is, Japanese-owned and UK-owned subsidiaries show lower ETRs after the switch to a

territorial tax system and thus manage taxes more in the post-period.

As our sample consists of foreign subsidiaries, we use control variables that are available for private firms.[19] We include return on assets (ROA) to proxy for the subsidiaries' profitability. We compute ROA as pre-tax income divided by total assets. While corporate income tax schedules of a few European countries are progressive, we would not expect a positive association between ROA and ETRs, as the thresholds for a higher corporate income tax are usually low (e.g., €200,000 of profits in the Netherlands). Conversely, profitability and ETRs may be negatively associated, as more profitable firms have more resources to engage in tax management. We include size measured as the logarithm of total assets (SIZE). Similar to profitability, size relates to within-country tax management, as larger firms are likely to have more resources to engage in tax management. We control for capital-structure-related effects on tax management, as debt provides a tax shield due to tax-deductible interest payments, whereas equity does not (Graham, 2000; Graham & Tucker, 2006; Nguyen & Rugman, 2015). Thus, we control for the level of equity (EQUITY) and for interactions with shareholders via dividend distributions and equity capital injections from shareholders in relation to total assets (DIV).

LAGLOSS is an indicator variable that takes on the value of one if the firm had a negative pre-tax income in the previous year. We include LAGLOSS to control for the existence of tax loss carryforwards that may lower the ETR in the current period when offset against the current period's tax base.[20] INTANG is an indicator variable taking on the value of one if the respective firm operates in an intangible asset intensive industry. INTANG is based on a classification by the European Patent Office that classifies industries that are intellectual property rights intensive (European Patent Office, 2013). We include INTANG to control for favorable tax treatments for intangible assets that are also available for domestic firms (e.g., patent boxes).

Finally, we include industry and subsidiary-country–year fixed effects. The subsidiary-country–year fixed effects capture different investment preferences for particular subsidiary countries, country-specific tax rate changes, and macro-economic developments in each subsidiary country. We cluster standard errors at the MNC home country level to correct for correlation in the residuals arising from multiple subsidiary–year observations belonging to the same parent country. Clustering at the firm level does not affect the statistical significance of our results (untabulated).

RESULTS

Summary Statistics

Table 1 shows the MNC home countries in rows and subsidiary countries in columns. The abbreviations are the respective country ISO codes. In the interest of readability, row ZZ contains all home countries with fewer than 50 foreign subsidiary–year observations in total, and column XX contains all subsidiary countries with fewer than 500 subsidiary–year observations in total. For example, observation 16 in the upper left corner (row AT, column BE) means that our sample includes 16 observations of subsidiaries owned by Austrian parents located in Belgium. As our sample includes only foreign-owned subsidiary observations, the combinations of the same country in rows and columns is always zero (e.g., BE/BE). The most common combination is German-owned subsidiary observations located in France (DE/FR: 1468). This is not surprising as Germany is the largest economy in Europe, France is the third largest economy, and the countries are neighbors. In our sample, most foreign subsidiary observations are owned by a Swedish parent (SE/Sum: 5424), and most subsidiaries are located in France (Sum/FR: 6858)0.[21]

Table 2 reports summary statistics. Approximately 10.3 percent of the subsidiary observations in our sample are owned by MNCs from countries with a worldwide tax system, 1.5 percent of the subsidiary–year observations are Japanese-owned and 5.2 percent are UK-owned. The average ETR across all subsidiary observations is 31.5 percent. ROA and SIZE show means of 0.145 and 15.965, respectively. Furthermore, the subsidiary observations show an average equity ratio of 43.4 percent of total assets (EQUITY) and 7.8 percent incurred a loss in the previous period (LAGLOSS). Finally, 34.4 percent of the foreign subsidiary observations operate in an intangible-assets-intensive industry according to the classification of the European Patent Office (INTANG).

Table 3 presents Pearson correlation coefficients in the lower triangle and Spearman correlation coefficients in the upper triangle. Since Japan and the UK had a worldwide tax system in place in the first three years of our sample, we find the Pearson and Spearman correlation coefficients of JP and GB to be significantly positively correlated with . The

Table 1 Overview of sample

	BE	DE	DK	ES	FI	FR	GB	GR	IE	IT	LU	NL	NO	PT	SE	XX	Sum
AT	16	653	19	102	4	94	14	0	0	83	0	3	7	3	20	0	1018
AU	0	13	3	0	0	0	9	0	2	0	2	0	0	0	14	0	43
BE	0	253	38	252	40	1184	138	10	20	253	95	24	38	68	145	1	2559
CA	3	45	7	24	1	58	3	0	9	0	0	0	0	2	3	4	159
DE	239	0	351	1570	61	1468	174	14	63	421	75	27	133	112	133	11	4852
DK	147	299	0	251	283	280	142	6	15	120	5	57	846	43	835	13	3342
ES	100	131	22	0	10	477	81	28	28	303	0	27	25	1306	34	3	2575
FI	21	68	66	58	0	57	11	4	4	29	0	0	101	6	92	2	519
FR	860	538	83	1200	72	0	361	10	34	788	33	98	106	200	188	4	4575
GB	38	511	137	380	25	290	0	11	301	121	19	13	135	51	40	0	2072
IN	0	15	3	1	2	8	14	0	0	1	0	0	0	0	3	0	47
IS	0	3	12	5	2	2	0	0	0	0	0	0	8	0	0	0	32
IT	121	390	20	767	18	870	60	9	26	0	2	1	15	62	61	6	2428
JP	9	389	3	56	7	87	26	0	1	9	0	5	2	5	1	0	600
NL	867	1009	172	1073	96	744	215	18	92	395	34	0	259	91	174	0	5239
NO	16	57	165	54	15	46	20	7	8	14	1	0	0	5	40	4	452
PT	0	0	4	137	0	11	4	0	2	4	0	0	0	0	0	0	162
SE	223	274	749	214	1101	355	241	5	24	131	1	47	1980	73	0	6	5424
SI	3	15	7	0	0	11	0	0	0	0	0	0	0	0	0	0	36
US	182	580	184	505	77	739	148	9	97	243	27	13	133	38	115	10	3100
ZZ	2	80	11	38	6	77	15	2	6	8	0	5	4	2	2	4	262
Totals	2847	5323	2056	6687	1820	6858	1676	133	732	2923	294	320	3792	2067	1900	68	39,496

This table provides the locations of the MNC's home country (origin of the respective parent) in rows and the location of the subsidiary in columns. The abbreviations are the respective country ISO codes. *XX* contains all subsidiary countries with fewer than 500 observations. *ZZ* contains all home countries with fewer than 50 observations. For example, the combination of AT/BE in the *upper left corner* (row/column) means that our sample contains 16 Austrian subsidiaries located in Belgium.

Table 2 Descriptive statistics

Variable	*n*	Mean	SD	P25	P50	P75
Main variables of interest						
WW	39,496	0.103	0.304	0.000	0.000	0.000
GB	39,496	0.052	0.223	0.000	0.000	0.000
JP	39,496	0.015	0.122	0.000	0.000	0.000
ETR	39,496	0.315	0.160	0.252	0.299	0.358
Subsidiary controls						
ROA	39,496	0.145	0.139	0.048	0.103	0.194
SIZE	39,496	15.965	1.863	14.703	15.929	17.131
EQUITY	39,496	0.434	0.254	0.230	0.413	0.625
DIV	39,496	0.062	0.156	-0.015	0.014	0.084
LAGLOSS	39,496	0.078	0.268	0.000	0.000	0.000
INTANG	39,496	0.344	0.475	0.000	0.000	1.000

This table presents the descriptive statistics. *WW* takes on the value of one if the firm is majority-owned by a parent company located in a country with a worldwide tax system, and zero otherwise; *GB* (*JP*) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs, and zero otherwise; *ETR* is the GAAP effective tax rate; *ROA* is the pre-tax income divided by total assets; *SIZE* is the natural logarithm of total assets; *EQUITY* is the ratio of equity to total assets; *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year, and zero otherwise; *INTANG* is coded one if the firm operates in an intangible asset intensive industry, and zero otherwise. All non-dichotomous variables are winsorized at the 1% and 99% levels.

effective tax rate (ETR) is negatively correlated with JP, but not statistically significantly correlated with WW or GB.

Main Results

Results control sample I: Territorial-parent subsidiary observations

In Model 1 of Table 4, the coefficients of the interactions for Japanese-owned and UK-owned subsidiary observations with POST (POST * GB

Table 3 Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) WW		0.12*	0.17*	0.00	0.00	0.10*	0.07*	− 0.05*	− 0.02*	0.02*
(2) GB	0.12*		− 0.03*	− 0.05*	− 0.00	0.02*	0.05*	0.02	0.01	− 0.03*
(3) JP	0.17*	− 0.03*		0.02*	− 0.04*	0.08*	0.03*	− 0.03*	− 0.01*	0.04*
(4) ETR	0.00	− 0.04*	0.00		− 0.07*	0.00	− 0.15*	− 0.08*	− 0.09*	0.04*
(5) ROA	0.00	0.00	− 0.04*	− 0.11*		− 0.16*	0.25*	0.35*	− 0.14*	0.06*
(6) SIZE	0.10*	0.01	0.07*	− 0.03*	− 0.17*		− 0.05*	− 0.03*	− 0.04*	0.04*
(7) EQUITY	0.07*	0.05*	0.02*	− 0.17*	0.18*	− 0.04*		− 0.02*	− 0.11*	0.05*
(8) DIV	− 0.03*	0.03*	− 0.03*	− 0.09*	0.50*	− 0.08*	0.03*		− 0.11*	0.01
(9) LAGLOSS	− 0.02*	0.01	− 0.01	− 0.06*	− 0.09*	− 0.04*	− 0.11*	− 0.10*		− 0.01*
(10) INTANG	0.02*	− 0.03*	0.04*	0.03*	0.02*	0.03*	0.03*	0.01	− 0.01*	

This table presents Pearson correlations in the *lower triangle* and Spearman correlations in the *upper triangle*. *WW* takes on the value of one if the firm is majority-owned by a parent company located in a country with a worldwide tax system, and zero otherwise; *GB* (*JP*) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs, and zero otherwise; *ETR* is the GAAP effective tax rate; *ROA* is the pre-tax income divided by total assets; *SIZE* is ithe natural logarithm of total assets; *EQUITY* is the ratio of equity (dividends minus newly provided equity) to total assets; *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year, and zero otherwise; *INTANG* is coded one if the firm operates in an intangible asset intensive industry, and zero otherwise. All non-dichotomous variables are winsorized at the 1% and 99% level.
*Significant at the 1% level.

Table 4 Regression analyses of effective tax rates

Dep. Var. ETR	(1) Control: Territorial countries		(2) Control: Worldwide countries	
	Coef.	SE	Coef.	SE
*GB * POST*	− 0.012	(0.003)	− 0.017	(0.003)
*JP * POST*	− 0.026	(0.003)	− 0.035	(0.005)
GB	0.013	(0.003)	0.003	(0.003)
JP	0.017	(0.003)	0.012	(0.003)
ROA	− 0.077	(0.013)	− 0.050	(0.051)
SIZE	− 0.006	(0.001)	− 0.002	(0.001)
EQUITY	− 0.082	(0.007)	− 0.084	(0.013)
DIV	− 0.032	(0.007)	− 0.035	(0.033)
LAGLOSS	− 0.050	(0.004)	− 0.079	(0.007)
INTANG	0.009	(0.003)	0.001	(0.006)
Country-Year FE	Yes		Yes	
Ind.-FE	Yes		Yes	
N	36,294		5874	
R-squared	0.179		0.224	

The dependent variable is the GAAP effective tax rate (*ETR*). *GB* (*JP*) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs. *POST* takes on the value of one for the years 2009–2011. Please note that *POST* is omitted in our tables, as it is perfectly collinear with the country-year fixed effects. *ROA* is pre-tax income divided by total assets. *SIZE* is the natural logarithm of total assets. *EQUITY* is the ratio of equity to total assets. *DIV* can take on negative and positive values, where negative values are new equity contributions to the foreign subsidiary and positive values are dividend payments by the foreign subsidiary. *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year. All non-dichotomous variables are winsorized at the 1% and 99% level. Standard errors are clustered at the MNC's home country level and provided in brackets next to the coefficients.

and POST * JP) are statistically significant. Japanese-owned subsidiaries reduced their ETR by 2.6 percentage points in the post-period (p value < 0.001, 95% conf. interval between − 3.3 and − 1.9 percentage points). Similarly, UK-owned subsidiaries engaged in more tax management after the tax system change and reduced their ETR by 1.2 percentage points (p value < 0.001, 95% conf. interval between − 1.9 and − 0.6 percentage points). Overall, the results are in line with our hypothesis when using territorial-parent subsidiary observations as our control sample.

Results control sample II: Worldwide-parent subsidiary observations

In Model 2 of Table 4, we use the same research design but use worldwide-parent subsidiary observations as a control group. Our hypothesis predicts that Japanese-owned and UK-owned subsidiaries reduced their ETRs for the post-period. In line with

our hypothesis, Japanese-owned subsidiaries reduced their tax rates by 3.5 percentage points [p value < 0.001, 95% confidence interval (CI) between − 4.6 and − 2.4 percentage points]. Similarly, UK-owned subsidiaries reduced their tax rates by 1.7 percentage points (p value < 0.001, 95% CI between − 2.3 and − 1.1 percentage points).

The average *effective* tax rate of Japanese (UK)-owned subsidiaries was 33.0 percent (27.0%) in the pre-period. In relative terms, the percentage point reduction for Japanese-owned subsidiaries ranged between 7.8 percent (− 2.6/33.0) and 10.6 percent (− 3.5/33). For UK-owned subsidiaries, the relative reduction ranged between 4.4 percent (− 1.2/27) and 6.2 percent (− 1.7/27). Overall, the results are in line with our hypothesis. Thus, we conclude that Japanese-owned and UK-owned subsidiaries engage more in tax management after a switch from a worldwide tax system to a territorial tax system as the interactions (GB × POST and JP × POST) are statistically significantly negative in both samples.

Turning to the control variables, we find that the coefficient for ROA is significantly negative in Column 1 but not in Column 2. Similarly, SIZE is negatively related to the ETR in Column 1, which could be explained by higher resources and abilities to manage taxes. However, the coefficient in Column 2 is not statistically significant. Higher equity payments are negatively related to the ETRs. DIV shows a statistically significantly negative coefficient in column 1 and an insignificant coefficient in column 2. A loss in the previous period (LAGLOSS) is negatively correlated with ETR, as tax loss carry-forwards may be offset against the current year's taxable income.

ROBUSTNESS TESTS AND ADDITIONAL RESULTS

Entropy Balancing: Country by Country

In Table 5, we use entropy balancing to balance the covariates between the treatment and control observations (Hainmueller, 2012). Furthermore, we separately run the analyses for Japanese-owned and UK-owned subsidiary observations. The entropy balancing reweights the dataset by adjusting differences between treatment and control observations based on the first and second moment. Appendix 2 shows the mean and variance of all covariates for all subsamples before and after the entropy balancing. Before balancing (i.e., for the original sample), mean and variance of the covariates were different for the treatment and control observations, whereas after balancing there was no statistical difference between treatment and control observations. We use the entropy balanced sample and re-run our main analyses separately for Japanese-owned and for UK-owned observations. The results of Table 5 are similar to those of our main analyses in Table 4. UK-owned subsidiaries engaged in more tax management and reduced their ETR between 1.1 percentage points (Column 1: p value 0.005) and 1.5 percentage points (Column 2: p value 0.025). Japanese-owned subsidiaries reduced their ETR between 2.2 percentage points (Column 3: p value 0.002) and 2.9 percentage points (Column 4: p value 0.009). This corroborates our previous findings and is in line with our hypothesis.

Deflating by Total Assets

In line with prior literature (e.g., Dyreng et al., 2008; Gallemore & Labro, 2015), the sample does not include observations with negative pre-tax income as ETRs deflated by pre-tax income are not meaningful for those observations. As this sample selection can affect our results, we alternatively calculate the ETR as tax expense divided by total assets, instead of pre-tax income. Because total assets are strictly positive, we are also able to include all firms with negative pre-tax income.

Table 6 uses the same research design as before but the dependent variable is the ETR using total assets as a deflator. The statistically significant negative coefficients of GB × POST and JP × POST (all p values are below 0.01) confirm our findings that Japanese-owned and UK-owned subsidiaries engage in more tax management after the switch to a territorial tax system.

Profit Shifting

This paper focuses on tax management within foreign subsidiaries. Thus, our results could potentially be affected by profit shifting. Markle (2016), for example, finds that MNCs from countries with a worldwide tax system engage in less profit shifting. Tørsløv, Wier and Zucman (2018) find that foreign firms are more profitable in tax havens but less profitable in non-haven countries. To address this concern, we delete subsidiaries located in a tax haven for our analyses. Unreported analyses yield similar results when we include those subsidiaries. However, if MNCs from countries with a worldwide tax system shift most profits to low tax countries, they may not engage less in tax management in the

Table 5 Regression analyses of effective tax rates: country-by-country, entropy balanced

Dep. Var. ETR	UK			Japan		
	Pred.	TT	WW	Pred.	TT	WW
GB * POST	–	− 0.011	− 0.015			
		(0.004)	(0.005)			
GB		0.014	0.001			
		(0.003)	(0.005)			
JP * POST				–	− 0.022	− 0.029
					(0.007)	(0.009)
JP					0.002	− 0.002
					(0.007)	(0.008)
ROA		− 0.103	− 0.078		− 0.062	− 0.050
		(0.011)	(0.040)		(0.010)	(0.029)
SIZE		− 0.005	− 0.002		− 0.010	− 0.007
		(0.002)	(0.000)		(0.002)	(0.004)
EQUITY		− 0.081	− 0.072		− 0.098	− 0.086
		(0.010)	(0.007)		(0.006)	(0.006)
DIV		− 0.014	− 0.025		− 0.013	− 0.013
		(0.013)	(0.029)		(0.013)	(0.030)
LAGLOSS		− 0.056	− 0.074		− 0.064	− 0.079
		(0.005)	(0.005)		(0.011)	(0.006)
INTANG		0.012	0.006		− 0.007	− 0.009
		(0.002)	− 0.078		(0.007)	(0.006)
Country–Year-FE		Yes	Yes		Yes	Yes
Ind.-FE		Yes	Yes		Yes	Yes
n		35,980	5588		35,748	4348
R-squared		0.194	0.228		0.174	0.209

The table includes the entropy balanced sample. The summary statistics of the samples before and after entropy balancing can be found in Appendix 2. *TT* uses territorial-owned subsidiaries as control group and *WW* uses worldwide-parent subsidiaries as control group; The dependent variable is the GAAP effective tax rate (*ETR*); *GB* (*JP*) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs; *POST* takes on the value of one for the years 2009–2011; note that *POST* is omitted in our tables, as it is perfectly collinear with the country–year fixed effects; *ROA* is pre-tax income divided by total assets; *SIZE* is the natural logarithm of total assets; *EQUITY* is the ratio of equity to total assets; *DIV* can take on negative and positive values, where negative values are new equity contributions to the foreign subsidiary and positive values are dividend payments by the foreign subsidiary; *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year. All non-dichotomous variables are winsorized at the 1% and 99% level. Standard errors are clustered at the MNC's home country level and provided in parentheses.

subsidiary country, and we should observe lower pre-tax profits for worldwide-parent subsidiaries. Thus, we regress pre-tax income (ROA) on WW and control variables including fixed effects for industry and subsidiary-country–year combinations. On average across all subsidiary countries, we find a positive, but statistically insignificant, coefficient for WW in Model 1 (p value 0.247). This implies that subsidiary observations with parents from worldwide tax regimes have higher pre-tax income and are thus less likely to shift income out of Europe, which is consistent with the findings of Markle (2016). We find mixed results when we split WW into indicator variables for Japanese-owned and UK-owned subsidiary observations. For WW × GB we find an insignificantly negative coefficient (p value 0.105) and for WW × JP a significantly negative coefficient (p value < 0.001). Thus, our results suggest only Japanese-owned subsidiaries have lower pre-tax profits, which may imply that they shift more profits to low tax countries than territorial-parent subsidiaries. Overall, we conclude that profit shifting is unlikely to drive our results as we do not find a consistent pattern for countries with a worldwide tax regime (Table 7).

Consolidation

Some European countries allow consolidation of profitable and non-profitable subsidiaries for tax purposes. To account for this possibility, we aggregate all fully-owned foreign subsidiary observations of an ultimate parent company per country–year and treat this as one observation (Huizinga & Laeven, 2008; Markle, 2016).[22] This also has the benefit of including more loss subsidiary observations within a given country–year, as we only require the country–year aggregate of all entities

Table 6 Regression analyses of effective tax rates (deflated by total assets)

Dep. Var. ETR_TA	(1) Control: Territorial countries			(2) Control: Worldwide countries		
	Pred.	Coef.	SE	Pred.	Coef.	SE
GB * POST	–	− 0.002	(0.001)	–	− 0.002	(0.001)
JP * POST	–	− 0.004	(0.000)	–	− 0.004	(0.000)
GB		0.004	(0.001)		0.000	(0.001)
JP		0.002	(0.001)		− 0.002	(0.000)
ROA		0.196	(0.008)		0.178	(0.009)
SIZE		− 0.002	(0.000)		− 0.003	(0.000)
EQUITY		− 0.015	(0.001)		− 0.017	(0.002)
DIV		0.011	(0.002)		0.017	(0.001)
LAGLOSS		0.005	(0.001)		0.006	(0.001)
INTANG		0.001	(0.000)		0.002	(0.001)
Country–Year FE		Yes			Yes	
Ind.-FE		Yes			Yes	
n		43,690			7058	
R-squared		0.523			0.483	

The dependent variable is the GAAP effective tax rate calculated as tax expense divided by total assets (*ETR_TA*). *GB* (*JP*) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs; *POST* takes on the value of one for the years 2009–2011; note that *POST* is omitted in our tables, as it is perfectly collinear with the country–year fixed effects; *SIZE* is the natural logarithm of total assets; *EQUITY* is the ratio of equity to total assets; *DIV* can take on negative and positive values, where negative values are new equity contributions to the foreign subsidiary and positive values are dividend payments by the foreign subsidiary; *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year. All non-dichotomous variables are winsorized at the 1% and 99% level. Standard errors (*SE*) are clustered at the MNC's home country level and provided in parentheses.

Table 7 Regression analyses of pre-tax profits

Dep. Var. ROA	(1)		(2)	
	Coef.	SE	Coef.	SE
WW	0.004	(0.004)	0.007	(0.001)
WW * GB			− 0.003	(0.002)
WW * JP			− 0.034	(0.002)
SIZE	− 0.009	(0.001)	− 0.009	(0.001)
EQUITY	0.101	(0.005)	0.101	(0.005)
DIV	0.451	(0.016)	0.451	(0.016)
LAGLOSS	− 0.011	(0.002)	− 0.011	(0.002)
INTANG	0.006	(0.003)	0.006	(0.003)
Country-Year-FE	Yes		Yes	
Ind.-FE	Yes		Yes	
Constant	Yes		Yes	
n	39,496		39,496	
R-squared	0.337		0.337	

This table shows OLS regression results. The dependent variable is *ROA*, which is pre-tax income divided by total assets; *WW* takes on the value of one if the firm is majority-owned by a parent company located in a country with a worldwide tax system, and zero otherwise; *WW* × *GB* (*WW* × *JP*) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs when a worldwide tax system was in place in the respective country, and zero otherwise; *EQUITY* is the ratio of equity to total assets; *DIV* can take on negative and positive values, where negative values are new equity contributions to the foreign subsidiary and positive values are dividend payments by the foreign subsidiary; *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year. All non-dichotomous variables are winsorized at the 1% and 99% level. Standard errors (*SE*) are clustered at the MNC's home country level and provided in brackets next to the coefficients.

owned by one ultimate owner to be profitable to compute ETRs. Although we do not have reason to believe that consolidation rules are systematically different between territorial- and worldwide-parent subsidiary observations, we repeat our analyses with the aggregated observations. The results in Table 8 are qualitatively the same as in Table 4, suggesting that consolidation of foreign subsidiary observations does not influence our results (p values of variables of interest < 0.001). Overall, the results obtained on aggregated observations of fully-owned foreign subsidiaries support our hypothesis that foreign subsidiaries reduce their ETRs after the

Table 8 Regression analyses of effective tax rates: Consolidated sample

Dep. Var. ETR	(1) Control: Territorial countries			(2) Control: Worldwide countries		
	Pred.	Coef.	SE	Pred.	Coef.	SE
GB * POST	–	− 0.015	(0.003)	–	− 0.014	(0.002)
JP * POST	–	− 0.021	(0.004)	–	− 0.026	(0.004)
GB		0.012	(0.003)		− 0.001	(0.002)
JP		0.013	(0.003)		0.007	(0.003)
ROA		− 0.069	(0.014)		− 0.062	(0.036)
SIZE		− 0.006	(0.001)		− 0.002	(0.001)
EQUITY		− 0.077	(0.008)		− 0.079	(0.015)
DIV		− 0.031	(0.007)		− 0.026	(0.025)
LAGLOSS		− 0.049	(0.004)		− 0.074	(0.007)
Country-Year FE		Yes			Yes	
n		36,645			5924	
R-squared		0.181			0.229	

The dependent variable is the GAAP effective tax rate (*ETR*). Observations are aggregated within ultimate owner, country and year; *GB* (*JP*) takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs; *POST* takes on the value of one for the years 2009–2011; note that *POST* is omitted in our tables, as it is perfectly collinear with the country-year fixed effects; *ROA* is pre-tax income divided by total assets; *SIZE* is the natural logarithm of total assets; *EQUITY* is the ratio of equity to total assets; *DIV* can take on negative and positive values, where negative values are new equity contributions to the foreign subsidiary and positive values are dividend payments by the foreign subsidiary; *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year. All non-dichotomous variables are winsorized at the 1% and 99% level. Standard errors are clustered at the MNC's home country level and provided in brackets next to the coefficients.

MNC home country switches from a worldwide tax system to a territorial tax system.

Parent-Country Control Variables

The economic situation in the home country of the MNC parent company can potentially influence the tax management strategy of the parent company and its subsidiaries abroad. Hence, in untabulated results, we use yearly macro-economic indicators obtained from the World Bank for each MNC home country to control for incentives that arise due to the respective economic situations (World Bank, 2017). Similar to Markle (2016), we include the yearly change in gross domestic product (GDP) to control for economic growth in the MNC's home country. Furthermore, we control for the market capitalization in percent of GDP to proxy for the importance of the stock market. We control for the financial resources provided to the private sector by financial institutions as a percentage of the MNC's home country's GDP to proxy for financing possibilities. Similarly, we include the distance between the parent home country and the subsidiary country to proxy for unobservable transaction costs increasing with the distance between the parent home country and the subsidiary country (Anderson, 2011). Untabulated results show that including these variables does not change our results and none of the variables shows statistical significance.

Parallel Trend Assumptions

In Table 9, we show that the parallel trends assumption holds. First, we create indicator variables for all but one year of our sample period and interact them with indicator variables for JP and GB. We omit 2006 as the baseline category to avoid perfect collinearity. The variable TREAT represents the indicator variable JP or GB, respectively. For Japan, we find statistically significant *negative* coefficients for 2007 (p values < 0.001) and statistically significant *positive* coefficients for 2008 (p values < 0.01). The statistically significant positive coefficients in 2008 suggest that Japanese MNCs only started to manage taxes more in foreign subsidiaries as of 2009 (all p values < 0.01). The coefficients for UK-owned subsidiaries are mostly statistically insignificant in the pre-period and in one case even positive (Column 1: coefficient 0.011, p value 0.046) and are statistically significantly negative as from 2009 (all p values < 0.01, except the p value for TREAT * *2011* is 0.031 in column 1). Thus, the table shows the parallel trend assumption holds for UK-owned subsidiaries.

In line with our hypothesis, all coefficients for Japanese-owned and UK-owned subsidiaries render statistically significantly negative in the post-period from 2009 to 2011. Overall, we conclude that Japanese-owned and British-owned subsidiaries started to manage taxes more after the two countries switched to a territorial tax system, but not before.[23]

Table 9 Regression analyses of effective tax rates: Parallel trends

Dep. Var. ETR	UK			Japan		
	Prediction	TT	WW	Prediction	TT	WW
TREAT * 2007		0.011	− 0.000		− 0.029	− 0.039
		(0.005)	(0.009)		(0.003)	(0.002)
TREAT * 2008		− 0.008	− 0.004		0.014	0.017
		(0.006)	(0.004)		(0.005)	(0.002)
TREAT * 2009	–	− 0.013	− 0.018	–	− 0.017	− 0.026
		(0.005)	(0.003)		(0.005)	(0.004)
TREAT * 2010	–	− 0.024	− 0.028	–	− 0.034	− 0.039
		(0.006)	(0.002)		(0.007)	(0.011)
TREAT * 2011	–	− 0.010	− 0.020	–	− 0.057	− 0.064
		(0.005)	(0.002)		(0.005)	(0.008)
TREAT		0.016	0.007		0.021	0.013
		(0.004)	(0.003)		(0.004)	(0.003)
Controls		Yes	Yes		Yes	Yes
Country–Year-FE		Yes	Yes		Yes	Yes
Ind.-FE		Yes	Yes		Yes	Yes
n		35,694	5274		34,222	3802
R-squared		0.181	0.234		0.178	0.238

The dependent variable is the GAAP effective tax rate (*ETR*). *TT* uses territorial-owned subsidiaries as control group and *WW* uses worldwide-parent subsidiaries as control group; *TREAT* takes on the value of one if the firm is majority-owned by UK (Japanese) MNCs; 2007, 2008, 2009, 2010, and 2011 are yearly dummy variables; standard errors are clustered at the MNC's home country level and provided in parentheses.

CONCLUSION

This paper investigates the impact of a worldwide tax system in the MNC's home country on the tax management behavior of foreign subsidiaries. We find that worldwide-parent subsidiary observations show statistically and economically significantly higher ETRs than territorial-parent subsidiary observations. In line with our hypothesis, we find that worldwide-parent subsidiaries reduce their ETRs after a worldwide tax system was abolished. We argue that our findings are due to the additional repatriation tax levied on dividend distributions of worldwide-parent subsidiaries when profits are repatriated.

Our contribution to the existing literature is twofold. First, we provide evidence on the magnitude by which tax management in foreign subsidiaries increases if the home country of the MNC's parent company switches from a worldwide to a territorial tax system. This contributes to the literature by identifying the effect of a worldwide tax system on tax management in foreign subsidiaries. Taxing MNCs based on their worldwide profits leads to a reduced profitability of their foreign subsidiaries, because worldwide-parent subsidiaries engage less in tax management than territorial-parent subsidiaries. This has not only consequences when repatriating foreign profits, but also for investment and reinvestments decision of foreign subsidiaries abroad. Our results show that foreign direct investments of MNCs from countries with a worldwide tax system are disadvantaged compared to investments of MNCs from countries with a territorial tax system. Switching from a worldwide to a territorial tax system lowers the ETRs in the foreign affiliates which in turn incentivizes firms to invest more in those affiliates. Additionally, the change to a territorial tax system might impact the optimal financing structure of MNCs and their affiliates as a decrease in the ETR impacts the debt shield.

Second, our results show the impact of the recent switch to a territorial tax system in the US (TCJA 2017), and indicate that foreign subsidiaries of US MNCs will likely engage in more tax management after the switch. This finding is especially relevant for tax authorities of countries with a high number of US foreign direct investments, as more tax management of US MNCs in foreign subsidiaries generates less tax revenue in the subsidiary country. We estimate that US MNCs will generate foreign corporate income tax savings of between $5.64 billion and $16.45 billion per year after

switching to a territorial tax system due to the TCJA 2017. Overall, our results are informative for countries that still operate a worldwide tax system and for countries that recently switched to a territorial tax system.

As tax laws vary, the costs and opportunities to reduce taxes in the respective affiliate countries differ from country to country. Often, the respective laws and regulations are only available in the local language. Thus, we encourage local researchers to conduct thorough investigations into country-specific tax legislation.

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NOTES

[1]Under cross-crediting, firms can time dividend repatriations such that the repatriation tax burden on dividend payments from countries with tax rates above and below the statutory tax rate in the MNC's home country offset each other. This practice either minimizes or completely avoids repatriation taxes on foreign dividends.

[2]While deferring repatriation leads to deferring repatriation taxes, there are exceptions of the rule. In the US, subpart F is such an exception. Income subject to subpart F (e.g., dividends, interest, royalties) of a controlled foreign corporation would be taxed as if it had been repatriated immediately instead of waiting for the actual repatriation by the controlled foreign corporation.

[3]The average corporate income tax rates including sub-central government taxes across OECD member countries amounts to 25.5% in 2010 and to 24.2% in 2017 (OECD, 2018a).

[4]Beuselinck and Pierk (2019) show that tax avoidance in foreign subsidiaries significantly contributes to MNCs' overall tax avoidance, and that tax avoidance in foreign subsidiaries serves as a substitute for profit shifting.

[5]Using the EY worldwide corporate tax guides, we checked 115 countries across the globe whether they applied a worldwide or a territorial tax system in 2017. The following countries applied a worldwide tax system in 2017: Argentina, Belarus, Brazil, Bulgaria, Chile, China, Colombia, Cyprus, Ecuador, Egypt, Ghana, Greece, India, Indonesia, Ireland, Israel, Jamaica, Kenya, Kuwait, Kyrgyzstan, Mexico, Moldova, Mongolia, Montenegro, Nigeria, Pakistan, Peru, Philippines, Serbia, South Korea, Syrian Arab Republic, Taiwan, Tajikistan, Trinidad and Tobago, Turkmenistan, Ukraine, United States, Uzbekistan, Venezuela, Vietnam, Zimbabwe.

[6]The TCJA 2017 introduced a territorial tax system for profits up to 10 percent per year of the depreciable physical assets. Furthermore, the TCJA lowered the corporate income tax to 21 percent for fiscal years ending after December 31, 2017. Income above the 10 percent threshold is taxed immediately at half the US corporate income tax rate (i.e. 10.5 percent) with a credit for 80 percent of foreign taxes paid (Tax Policy Center, 2016). The 21 percent corporate income tax rate and a 100 percent tax credit for foreign income taxes apply to income from passive assets under subpart F.

[7]While DeAngelo and Masulis (1980) predict a negative correlation between non-debt tax shields and the use of debt, there can also be a positive correlation if investments of profitable firms are financed through debt (Dammon & Senbet, 1988). For more details, we refer the reader to the review on taxes and corporate taxes of Graham (2003).

[8]The UK lowered its statutory corporate income tax rate to 28% as from April 1, 2008 and now has a corporate income tax rate of 19%.

[9]UK MNCs could de facto balance the repatriation tax burden across dividend payments from countries with tax rates above and below 30% using foreign holding companies that pool income streams of foreign subsidiaries.

[10]Our results are more pronounced when we do not include the transition year 2009. Therefore, our results can be interpreted as a lower bound estimate.

[11]We do not extend the sample period because there was no change in the statutory tax rate in Japan between 2006 and 2011. However, there was an increase in 2005 and a decrease in 2012. Similarly, the UK decreased its tax rate in 2012. Thus, we do not capture incentives that are related to tax rate changes in the parent country. There was also a slight decrease in the statutory tax rate by 2 percentage points in the UK from 2007 to 2008. In untabulated results, we only used 2008 as the pre-period, thus holding the statutory tax rate constant, and our results remain qualitatively the same.

[12]We focus on the global ultimate owner in our analyses, as funds ultimately need to be available to the global ultimate owner. If we use the direct owner instead, the results remain qualitatively the same as the global ultimate owner is also the direct owner in the majority of the cases.

[13]Tax havens are defined based on Gravelle (2009). In untabulated tests, we find that our results are not sensitive to including these observations.

[14]Our results are not sensitive to these sample restrictions.

[15]The subsidiaries included in our final sample are located in Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Iceland, Ireland, Italy, Luxembourg, Monaco, the Netherlands, Norway, Portugal, San Marino, Spain, and Sweden.

[16]The US had a worldwide tax system in place during our whole sample period.

[17]Incorporating dividend withholding taxes has no effect on either our hypotheses or our empirical tests. Due to the EU Parent-Subsidiary Directive (Council Directive 90/435/EEC), no dividend-withholding taxes apply for repatriations to the UK. Furthermore, Japanese income tax treaties lower dividend-withholding taxes to 0%, 5%, or 10% depending on the country. In the case of Japanese-owned companies, dividend-withholding taxes amount to 0% for Irish subsidiaries, 5% for subsidiaries located in France and Norway, and to 10% in Austria, Belgium, Denmark, Finland, Germany, Spain, and Sweden.

[18]The country–year fixed effects also capture other country–year specific institutional changes such as the level of corruption in the subsidiary country. In unreported results, we split our sample based on the corruption level in the subsidiary country and find statistical significant results in both sub-samples. For UK-owned subsidiaries the magnitude of the coefficients is of similar size, whereas we find a more negative coefficient for Japanese-owned subsidiaries in high corruption countries.

[19]As we use private firm data from Bureau van Dijk, some variables that have been identified to explain tax management are not available (e.g., market-to-book).

[20]The actual amounts of tax-loss carry-back and carry-forward are not observable.

[21]The most subsidiary observations in our sample are located in France (6858) and most parents are located in Sweden (5424). Generally, our results are not sensitive to excluding specific countries. In unreported regressions, we show that our findings are only marginally affected if we exclude, for example, all Swedish subsidiaries. Results are also similar for other cuts of the data.

[22]We focus on fully owned foreign subsidiaries, as the thresholds to consolidate subsidiaries for tax purposes vary across countries (e.g., 50% shareholding in Germany and 95% shareholding in the Netherlands).

[23]In untabulated results, we compute the average ETRs for the pre-period for Japanese-owned and UK-owned subsidiaries and calculate what fraction of these subsidiaries decreased their ETR in the post-period. We found that 64.3% of Japanese-owned subsidiaries decreased their ETRs in 2009, 75.6% in 2010, and 73.3% in 2011, and that 76.9% of UK-owned subsidiaries decreased their ETRs in 2009, 76.2% in 2010, and 82.5% in 2011.

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APPENDIX 1: VARIABLE DEFINITIONS

Dependent variables	
ETR	Corporate income tax expense divided by pre-tax income
ROA	Pre-tax income divided by total assets
Main variables of interest	
GB	Indicator variable that takes on the value of one if a subsidiary is majority-owned by UK shareholders
JP	Indicator variable that takes on the value of one if a subsidiary is majority-owned by Japanese shareholders
POST	Indicator variable that takes on the value of one for the years 2009–2011
WW	Indicator variable that takes on the value of one if a subsidiary is majority-owned by shareholders from a country with a worldwide tax system and zero if majority-owned by shareholders from a country with a territorial tax system
Control variables	
DIV	*DIV* can take on negative and positive values, where negative values are new equity contributions to the foreign subsidiary and positive values are dividend payments by the foreign subsidiary
EQUITY	Equity divided by total assets
INTANG	Indicator variable taking on the value of one if the subsidiary operates in an intangible-asset-intensive industry based on a classification by the European Patent Office (2013)
LAGLOSS	Indicator variable that takes on the value of one if the subsidiary had a negative pre-tax income in the previous year
ROA	Pre-tax income divided by total assets
SIZE	Natural logarithm of total assets (measured in US Dollars)

APPENDIX 2: SAMPLES BEFORE AND AFTER ENTROPY BALANCING

	Original sample				Entropy balanced sample			
	Treat		Control		Treat		Control	
	Mean	Variance	Mean	Variance	Mean	Variance	Mean	Variance
Panel A: UK—territorial sample								
ROA	0.15	0.02***	0.15	0.02	0.15	0.02	0.15	0.02
SIZE	16.06***	3.41	15.90	3.47	16.06	3.41	16.06	3.41
EQUITY	0.49***	0.08***	0.43	0.06	0.49	0.08	0.49	0.08
DIV	0.08***	0.04***	0.06	0.02	0.08	0.04	0.08	0.04
LAGLOSS	0.09	0.08***	0.08	0.07	0.09	0.08	0.09	0.08
INTANG	0.28***	0.20***	0.34	0.23	0.28	0.20	0.28	0.20
Panel B: UK—worldwide sample								
ROA	0.15**	0.02***	0.14	0.02	0.15	0.02	0.15	0.02
SIZE	16.06***	3.41**	16.55	3.14	16.06	3.41	16.06	3.41
EQUITY	0.49	0.08*	0.49	0.07	0.49	0.08	0.49	0.08
DIV	0.08***	0.04***	0.05	0.02	0.08	0.04	0.08	0.04
LAGLOSS	0.09***	0.08***	0.06	0.06	0.09	0.08	0.09	0.08
INTANG	0.28***	0.20***	0.39	0.24	0.28	0.20	0.28	0.20
Panel C: Japan—territorial sample								
ROA	0.10***	0.01***	0.15	0.02	0.10	0.01	0.10	0.01
SIZE	17.11***	1.67***	15.90	3.46	17.11	1.67	17.15	1.67
EQUITY	0.48***	0.06	0.43	0.06	0.48	0.06	0.48	0.06
DIV	0.03***	0.01**	0.06	0.02	0.03	0.01	0.03	0.01
LAGLOSS	0.06*	0.06**	0.08	0.07	0.06	0.06	0.06	0.06
INTANG	0.51***	0.25*	0.34	0.22	0.51	0.25	0.51	0.25
Panel D: Japan—worldwide sample								
ROA	0.10***	0.01***	0.15	0.02	0.10	0.01	0.10	0.01
SIZE	17.11***	1.67***	16.44	3.37	17.11	1.67	17.11	1.68
EQUITY	0.48	0.06***	0.49	0.07	0.48	0.06	0.48	0.06
DIV	0.03***	0.01***	0.05	0.03	0.03	0.01	0.03	0.01
LAGLOSS	0.06	0.06**	0.07	0.06	0.06	0.06	0.06	0.06
INTANG	0.51***	0.25	0.36	0.23	0.51	0.25	0.51	0.25

ROA is pre-tax income divided by total assets; *SIZE* is the natural logarithm of total assets; *EQUITY* is the ratio of equity to total assets; *DIV* can take on negative and positive values, where negative values are new equity contributions to the foreign subsidiary and positive values are dividend payments by the foreign subsidiary; *LAGLOSS* is coded one if the pre-tax earnings were negative in the previous year

***/**/* mark significance at the 1%/5%/10% levels of a *t* test (*F* test) of differences between means (variances) of treatment and control samples

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