TERRITORIAL TAX REFORM AND PROFIT SHIFTING BY US AND JAPANESE MULTINATIONALS

Makoto Hasegawa

In 2009, Japan adopted a territorial tax regime by exempting dividends paid by Japanese-owned foreign subsidiaries to their parent firms from home-country taxation. This paper examines the impact of this tax reform on profit shifting by Japanese multinationals. I find that the semielasticity of pretax profits with respect to host-country corporate tax rates for Japanese-owned foreign subsidiaries, particularly large subsidiaries, increased after the 2008 announcement of the implementation of the territorial tax regime, relative to that for US-owned foreign subsidiaries. This suggests that large Japanese-owned foreign subsidiaries responded to the incentive for profit shifting provided by the territorial tax reform.

Keywords: international taxation, multinational corporations, profit shifting, worldwide tax system, territorial tax system

JEL Codes: H25, H26, F23

I. INTRODUCTION

Multinational corporations operate through foreign subsidiaries and branches in countries with different corporate income tax rates and thus have incentives to shift profits from high- to low-tax jurisdictions to minimize the global tax liabilities of their business groups. They can do this using intrafirm transactions among related parties (parent and foreign subsidiaries), including the manipulation of transfer prices,[1]

Makoto Hasegawa: Graduate School of Economics, Kyoto University, Sakyo-ku, Kyoto, Japan (mhasegawa@econ.kyoto-u.ac.jp)

[1] For example, when a parent company in a high-tax country imports (exports) goods or services from its foreign subsidiary in a low-tax country, the parent could shift profit to the low-tax subsidiary by setting higher (lower) prices on imported (exported) goods and services (Jacob, 1996; Clausing, 2003; Cristea and Nguyen, 2016; Liu, Schmidt-Eisenlohr, and Guo, 2020; Wier, 2020).

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intercompany loans,[2] and the transfer of intangible assets within the multinational group.[3] Profit shifting by multinational corporations has become an important policy issue around the world, with policy makers concerned that profit shifting and excessive tax avoidance by multinational corporations will erode the tax base for corporate income taxation and reduce tax revenue. In response to this concern, the Organisation for Economic Co-operation and Development (OECD) launched the so-called Base Erosion and Profit Shifting (BEPS) project, which proposed action plans to combat BEPS (OECD, 2015).[4]

As well as corporate tax rates, the design of the international tax system regarding how to tax foreign-source income affects various aspects of multinationals' business activities, including profit shifting. Prior to 2009, Japan taxed the foreign profits of Japanese multinationals upon repatriation (i.e., when these profits were brought back to Japan) while providing tax credits for the taxes paid to foreign governments. This kind of tax system is referred to as a worldwide tax system with foreign tax credit and deferral, because the taxation on foreign income is deferred until repatriation. However, in 2009, Japan began to exempt dividends paid by Japanese-owned foreign subsidiaries to their parent firms from home-country taxation, after announcing the details of this reform plan in 2008. This tax reform effectively switched Japan's worldwide tax system to a territorial tax system, which exempts foreign income from home-country taxation.

I examine the impact of Japan's territorial tax reform on the profit-shifting behaviors of Japanese multinationals. To this end, I analyze the response of the reported profits of Japanese-owned foreign subsidiaries to the tax incentive for profit shifting provided by the introduction of the territorial tax system. Because this tax reform drastically changed the way foreign income of Japanese multinationals was taxed, and also because the other two major capital-exporting countries (the United Kingdom and the United States) adopted territorial tax systems, understanding the impact of territorial tax reform on corporate activities, including profit shifting, contributes to the academic and policy debate.[5] Under a territorial tax system, foreign profits are

[2] Because interest payments are generally deductible from taxable income, if a parent company in a low-tax country lends to its foreign subsidiary in a high-tax country, interest payments from the high-tax subsidiary to the low-tax parent would shift profits from the subsidiary to the parent (Desai, Foley, and Hines, 2004; Huizinga, Laeven, and Nicodeme, 2008; Buettner et al., 2012).

[3] Firm-specific intangible assets make it difficult to determine the appropriate arm's-length prices for goods and services produced intensively using intangible assets (e.g., patents and licenses) and allow significant room for the manipulation of transfer prices and profit shifting (Dischinger and Riedel, 2011; Karkinsky and Riedel, 2012).

[4] OECD (2015) cites an estimate that 4–10 percent of the global corporate income tax revenue (US $100–240 billion) is lost as a result of BEPS.

[5] The United Kingdom and the United States adopted territorial tax regimes in 2009 and 2018, respectively. Dharmapala (2018) discusses possible consequences of the US tax reform and other provisions enacted under the Tax Cut and Jobs Act (TCJA) of 2017 in the United States. Clausing (2020) assesses the impact of the corporate tax cut and the "Global Intangible Low-Taxed Income" (GILTI) tax under the TCJA on profit shifting and the tax base.

taxed only in the host countries where multinationals' foreign subsidiaries operate. Then, the tax liabilities on foreign profits are determined essentially by the taxes imposed by the host countries. Therefore, under this system, multinationals have stronger incentives to shift profits to low-tax jurisdictions to reduce their foreign tax liabilities than is the case under a worldwide tax system.

Although many studies attempt to estimate the extent of profit shifting by multinationals in response to corporate tax rates,[6] only a few studies examine the impact of a switch in the international tax system on multinationals' profit shifting.[7] Using panel data on parents and their foreign subsidiaries domiciled in 34 countries for the 2004–2008 period, Markle (2016) finds that multinationals domiciled in countries that employ territorial tax systems shift more profits than do multinationals domiciled in countries that employ worldwide tax systems. Liu, Schmidt-Eisenlohr, and Guo (2020) analyze the intrafirm export transactions of UK multinationals and find that transfer mispricing for the purpose of tax avoidance (that is, underpricing goods exported to low-tax foreign subsidiaries) increased after the UK territorial tax reform in 2009. Consistent with the results of Liu, Schmidt-Eisenlohr, and Guo (2020), Langenmayr and Liu (2023) find that the profitability of UK-owned foreign subsidiaries located in low-tax countries increased after the territorial tax reform. However, no studies investigate the consequence of Japan's adoption of the territorial tax regime for multinationals' profit shifting.

I fill this gap in the literature by providing the first evidence on the profit-shifting response of Japanese multinationals to the territorial tax reform. Because the statutory corporate income tax rate in Japan (40.69 percent) was considerably higher than that of the United Kingdom (28 percent) around 2009, Japanese multinationals generally faced higher tax rates on repatriated foreign dividends under the worldwide tax system (i.e., before the tax reform) than UK multinationals did. Thus, Japan's tax reform would reduce the tax burdens on repatriated foreign income more significantly than the UK territorial tax reform and provide multinationals with a stronger incentive for profit shifting.[8] Therefore, investigating the Japanese tax reform is particularly useful for examining the effect of exempting foreign income from home-country taxation on profit shifting.

[6] As surveyed by Dharmapala (2014), the seminal works on this topic are by Grubert and Mutti (1991) and Hines and Rice (1994). Many studies have followed and extended their approach, as will be discussed in Section IV (Collins, Kemsley, and Lang, 1998; Huizinga and Laeven, 2008; Dischinger and Riedel, 2011; Klassen and Laplante, 2012; Dischinger, Knoll, and Riedel, 2014; Riedel, Lohse, and Hofmann, 2015; Saunders-Scott, 2015; Dowd, Landefeld, and Moore, 2017).

[7] Motivated by the territorial tax reforms of Japan and the United Kingdom in 2009, several studies examine the impacts of the territorial tax system on the activities of multinationals other than profit shifting, including profit repatriation (Egger et al., 2015; Hasegawa and Kiyota, 2017; Hasegawa and Kakebayashi, 2023), cross-border mergers and acquisitions (Feld et al., 2016), domestic investment and dividend payouts (Arena and Kutner, 2015), foreign investment (Liu, 2020), foreign cash holding (Xing, 2018), and firm value (Bradley, Dauchy, and Hasegawa, 2018).

[8] Feld et al. (2016) find that the UK and Japanese territorial tax reforms increased cross-border mergers and acquisitions by UK and Japanese multinationals but also find that the Japanese tax reform had a

Before 2009, Japan's worldwide tax system was similar to that of the United States, with both countries having tax rates of around 40 percent when subnational income taxes were included (taxes at the national level were 30 percent in Japan and 35 percent in the United States), which were the highest rates among the OECD member countries.[9] Japan switched to a territorial tax regime from 2009, whereas the United States continued to employ a worldwide tax system until 2017. I construct panel data on Japanese- and US-owned foreign subsidiaries from 2004 to 2016 and examine how the sensitivity of the pretax profits of Japanese-owned foreign subsidiaries to host countries' corporate income tax rates changed in response to the tax reform, using US-owned foreign subsidiaries as a comparison group.

As a measure of the tax sensitivity of pretax profits, I estimate the semielasticity of pretax profits of foreign subsidiaries with respect to host-country corporate tax rates (referred to as the tax semielasticity) conditional on their labor and capital inputs. This tax semielasticity indicates the percentage decrease in reported profits in response to a 1 percentage point increase in the corporate tax rate in the host country. This measure is employed in the literature as an indicator of the extent of profit shifting given the output decisions of the firm. I investigate how the tax semielasticity of pretax profits for Japanese multinationals changed relative to that for US multinationals around the time of the tax reform.

I find that the profits of US-owned foreign subsidiaries are more sensitive to host countries' tax rates compared with those of Japanese-owned foreign subsidiaries. In other words, on average, the tax semielasticity of pretax profits is larger for US-owned foreign subsidiaries than for Japanese-owned foreign subsidiaries over the study period from 2004 to 2016. This suggests that the average Japanese-owned foreign subsidiary engaged in profit shifting to a lesser extent than did the average US-owned foreign subsidiary.

However, the tax semielasticity of pretax profits for Japanese-owned foreign subsidiaries, particularly for large subsidiaries, sharply increased after the announcement of implementation of the territorial tax regime in 2008, relative to that for US-owned foreign subsidiaries. As a result, the difference in the tax semielasticities between large Japanese-owned subsidiaries and US-owned subsidiaries became larger from 2008 to 2012 than it had been in 2007, before becoming smaller from 2013. These results suggest that Japanese multinationals that owned large foreign subsidiaries intensified profit shifting in response to the 2008 announcement of the territorial tax reform for several years. The data do not display such a clear response in the later years of the study period, possibly because other policies, including the revisions in Japan's controlled foreign corporation (CFC) rules and the introduction

greater impact than the UK tax reform. They estimate that it increased Japanese cross-border mergers and acquisitions by 16.1 percent, whereas the UK tax reform increased British cross-border mergers and acquisitions by 1.6 percent.

[9] According to KPMG's Corporate Tax Rates Table, the corporate tax rates including subnational taxes were 40.69 percent in Japan for 2005–2011 and 40 percent in the United States for 2005–2017.

of the country-by-country reporting (CbCR) system, might affect the profit-shifting behavior of Japanese multinationals.

The rest of the paper is organized as follows. Section II describes Japan's territorial tax reform and its expected impact on profit shifting by Japanese multinationals. Section III explains the data used for the empirical analysis. Section IV explains the estimation method. Section V conducts the preliminary analysis to estimate the tax semielasticity using the samples of US- and Japanese-owned subsidiaries separately. Section VI examines how the tax semielasticities for US- and Japanese-owned subsidiaries changed around the time of the tax reform, using the full sample that includes both US- and Japanese-owned subsidiaries. Section VII adopts alternative specifications to test whether the difference in the tax semielasticities between Japanese- and US-owned subsidiaries became larger after the 2008 announcement of the tax reform. Section VIII concludes.

II. JAPAN'S TERRITORIAL TAX REFORM AND THE EXPECTED IMPACT ON PROFIT SHIFTING

Under the worldwide tax system that prevailed in Japan until 2008, the Japanese government taxed the foreign-source income of multinational corporations upon repatriation (e.g., when Japanese parents receive dividends, royalties, and interest from their foreign subsidiaries). To alleviate international double taxation, foreign tax credits were granted for corporate taxes paid and other related taxes paid to host-country governments. As a result of this tax regime, repatriating foreign earnings triggered additional tax burdens that amounted to the difference between Japanese and foreign tax liabilities on foreign income.

For example, consider a parent company in Japan with a corporate income tax rate of 40 percent that owns a subsidiary in Singapore with a corporate income tax rate of 18 percent. Suppose that the subsidiary earns \$100 and then remits the aftertax profit of \$82 to the Japanese parent via dividends, after paying corporate income tax of \$18 to the Singaporean government. Under the worldwide tax system, the Japanese government imposes the 40 percent corporate income tax on the pretax income of \$100 when the parent receives dividends of \$82. Then, the tax liability of the parent is \$40, but it can claim foreign tax credits for the corporate income tax of \$18 paid by the subsidiary to the Singapore government. Thus, the net tax liability in Japan is \$22 ($= 40 - 18$). The total tax liability for the multinational in these two countries is \$40; that is, \$22 in Japan and \$18 in Singapore.[10]

[10] If the host country's tax rate is higher than Japan's tax rate, the foreign tax liability could exceed that in Japan. Then, the parent earns foreign tax credits that exceed the Japanese tax liability upon repatriation. In this case, the parent can use the foreign tax credits to completely offset the Japanese tax liability. The residual foreign tax credits can be used to reduce the tax liabilities on foreign-source income earned within the next three years.

Around 2008, the Japanese government was concerned that, under the worldwide tax system, Japanese multinationals were retaining abroad the profits earned by their foreign subsidiaries to avoid additional taxation in Japan. Japanese firms arguably had a strong incentive to do so because the Japanese corporate tax rate was high compared with those of other countries and was the highest among the 34 OECD members. In keeping with the government's concern, the stock of retained earnings of Japanese-owned foreign subsidiaries had accumulated in the early 2000s (METI, 2008).

To remove the tax-induced distortions of profit repatriation decisions by Japanese multinationals, the Japanese government began seriously to consider changing its system of worldwide taxation (METI, 2008). On May 9, 2008, the government announced that it had examined implementation of a territorial tax system under the tax reform for 2009.[11] The Ministry of Economy, Trade, and Industry of Japan (METI) released the interim report that described the details on the design of a territorial tax system on August 22, 2008 (METI, 2008). This report proposes implementing a territorial tax regime by exempting the dividends that Japanese firms receive from their foreign subsidiaries from taxation, which is referred to as foreign dividend exemption. In the report, the METI argues that the foreign dividend exemption would help to (1) remove the tax distortions on profit repatriation and stimulate dividend repatriations, (2) increase domestic capital investment and research and development investment financed by repatriated foreign profits, and (3) simplify the international tax system by abolishing the foreign tax credit system for repatriated dividends.

Following the METI (2008) report, the proposals for adopting a territorial tax regime were sequentially approved and released by the Government Tax Commission on November 28, 2008; the Liberal Democratic Party (the ruling party in the Japanese House of Representatives) on December 12, 2008; the Ministry of Finance on December 19, 2008; and the cabinet on January 23, 2009. Finally, the legislative bill including the territorial tax reform passed into law on March 27, 2009, and came into effect on April 1, 2009 (Bradley, Dauchy, and Hasegawa, 2018).[12]

The Japanese version of the territorial tax regime (i.e., a foreign dividend exemption system) enacted under the 2009 tax reform exempts 95 percent of dividends received by Japanese resident corporations from their foreign subsidiaries from home-country taxation in accounting years starting on or after April 1, 2009.[13] This tax

[11] At the interview immediately after the cabinet meeting on May 9, 2008, Akira Amari, the minister of Economy, Trade, and Industry of Japan, announced that he had instructed his ministry to consider implementing a territorial tax regime under the 2009 tax reform (Bradley, Dauchy, and Hasegawa, 2018).

[12] In Japan, the fiscal year runs from April 1 to March 31 in the following year.

[13] The remaining 5 percent of dividends are not exempt from Japanese taxation. The tax law assumes that multinationals deducted interest and other expenses from their taxable income when they invested in foreign subsidiaries. Those expenses are assumed to correspond to 5 percent of repatriated dividends and thus are not allowed to be deducted twice.

reform effectively switched the Japanese corporate tax system from a worldwide tax system to a territorial tax system that exempts active foreign business income from home-country taxation. Note that the exemption applies only to repatriated dividends. Other types of foreign income, including royalties and interest paid by foreign subsidiaries to Japanese parents, foreign capital gains, and profits of foreign branches, are still taxed by the Japanese government, and foreign tax credits are granted for the taxes on those incomes paid to foreign governments.[14]

Under the foreign dividend exemption system, only 5 percent of repatriated dividends are taxed by the Japanese government. In the above example, if the Singaporean subsidiary remits dividends of $82 to the Japanese parent, the tax liability in Japan is $1.64 (= 0.05 × 82 × 0.4), which is much lower than the repatriation tax of $22 under the previous worldwide tax system. The total tax liability on $100 of foreign income under the new system is $19.64 ($1.64 in Japan and $18 in Singapore), much lower than the $40 under the worldwide tax system.

This tax reform could alter the multinationals' incentives for profit shifting. Under the worldwide tax system that was in place before 2009, if a Japanese-owned foreign subsidiary earned profits in a low-tax country such as Singapore and remitted them to the parent in Japan, the parent faced additional Japanese taxation, and the total effective tax rate on foreign earnings became the same as the Japanese tax rate, regardless of the foreign tax rates. By contrast, under the territorial tax system, foreign income of multinationals is taxed only in the host country because their foreign income repatriated via dividends is exempt from taxation in Japan (except for the Japanese tax on 5 percent of the dividends). Then, multinationals can reduce their tax payments by earning profits in lower-tax countries. As a result, multinationals should have stronger incentives to establish their subsidiaries in low-tax countries and, given the location decisions of foreign subsidiaries, to shift more profits to existing subsidiaries in low-tax countries. Therefore, I hypothesize that Japanese multinationals would intensify profit shifting in response to the tax reform.

Some studies investigate the consequences of this tax reform on the activities of Japanese multinationals, although none examine profit shifting. Feld et al. (2016) show that cross-border mergers and acquisitions by Japanese multinationals significantly increased in the countries where the tax costs of dividend repatriations were lowered by the tax reform (i.e., countries with low corporate tax rates). Hasegawa and Kiyota (2017) find that foreign affiliates with a large stock of retained earnings strongly responded to this tax reform by increasing dividends paid to their Japanese parents. They also find that Japanese-owned foreign affiliates located in host countries that impose a lower withholding tax rate on dividends increased dividends after the tax reform. This is because, under the foreign dividend exemption system,

[14] In this sense, the Japanese tax system is still distinct from a "pure" territorial tax system that exempts any type of foreign income from home-country taxation. Clausing (2015) points out that none of the OECD countries have adopted a pure territorial tax system or a pure worldwide tax system and that their tax systems lie on a spectrum somewhere between the two.

foreign tax credits no longer apply for the withholding taxes imposed by host-country governments on dividend payments, and thus the withholding taxes are additional costs for Japanese multinationals to repatriate dividends. Hasegawa and Kakebayashi (2023) find that Japanese-owned foreign affiliates increased dividend payouts in response to the reduction in the effective tax rate on foreign income resulting from the tax reform, but they did not change royalty or other payments to their parents. Xing (2018) shows that Japanese-owned foreign subsidiaries that had higher tax costs of profit repatriation under the worldwide tax system reduced their cash holdings after the tax reform. Arena and Kutner (2015) conclude that Japanese parents spent foreign cash repatriated by the tax reform to increase corporate payouts (dividends and share repurchases) but not to increase domestic capital investment.

Finally, it is worth describing the CFC rules, which are designed to prevent Japanese multinationals from reporting profits in low-tax countries solely for the purpose of tax avoidance. The CFC rules were revised several times after the 2009 tax reform. The Japanese CFC rules set the so-called trigger tax rate; if a foreign subsidiary faces an effective tax rate lower than (or equal to) the trigger tax rate, the subsidiary's income is added to the income of the Japanese parent and immediately taxed by the Japanese government. The threshold for the trigger tax rate was 25 percent or less in 2009, when Japan implemented the territorial tax reform.

After the tax reform, this threshold was reduced to 20 percent or less in 2010 and to less than 20 percent in 2015. These modifications were intended to exempt certain multinationals from the CFC rules and were a response to the declining trend in corporate tax rates in foreign countries. Moreover, even if a subsidiary operates in a country with a tax rate lower than the trigger tax rate, the subsidiary is exempt from the CFC regulation as long as it proves that it conducts real business activities in the host country.[15]

At the same time, the CFC rules were tightened in the direction of taxing passive income without exemption. In 2010, some forms of passive foreign income (such as royalties and interest) became subject to Japanese taxation even if a subsidiary was exempt from immediate taxation by the CFC regulations. The types of passive income subject to taxation were fairly limited at that time. However, to meet the requirements from the BEPS project, the Japanese CFC rules were significantly tightened in 2017 by expanding the coverage of passive foreign income subject to Japanese taxation. Therefore, although the revisions to the CFC rules were relatively modest during my study period, they were gradually tightened after the 2009 tax reform.

[15] There are several criteria for exemption from the CFC regulation including (1) the main business of the subsidiary is not shareholding, trade of patent rights, or lease of vessels and aircraft; (2) the subsidiary has fixed facilities (such as offices, stores, and plants) in the host country; (3) the subsidiary is controlled, managed, and operated in the host country (e.g., company meetings and board meetings take place in the host country); and (4) the subsidiary's main business is held in the host country, or the subsidiary trades mainly with nonrelated parties.

III. DATA

I collect financial information on profit and loss statements and balance sheets for Japanese-owned foreign subsidiaries from 2004 to 2016 from the Orbis database, which is provided by Bureau van Dijk (BvD). A Japanese-owned foreign subsidiary is defined as a company located outside Japan and owned by a Japanese parent, which Orbis refers to as a "global ultimate owner" (GUO) resident in Japan. A GUO is a company of which more than 50.01 percent is not owned by any other company or whose owner is unknown.

I use the two hard disk drive versions of Orbis released in December 2013 and December 2017. Each version of Orbis contains the previous 10 years' information. I collect the financial information on Japanese-owned foreign subsidiaries for 2004–2012 from the 2013 version of Orbis, which I use as the main data set.[16] To extend the data period up to 2016, I collect the financial information for 2013–2016 from the 2017 version of Orbis. Then, I merge the two data sets using the unique identification code for each subsidiary, its BvD ID, as a key.[17] When I merge the data for 2004–2012 and those for 2013–2016, I restrict the sample to foreign subsidiaries that were in both data sets because of my interest in analyzing the change in the profit-shifting behavior of Japanese multinationals after the 2009 tax reform.[18]

As described in more detail in the next section, I use US-owned foreign subsidiaries as a comparison group to evaluate the change in the tax sensitivity of Japanese multinationals' reported profits around the time of the Japanese territorial tax reform. Thus, I collect the financial information of US-owned foreign subsidiaries from 2004 to 2016 using the same procedures as for the Japanese-owned foreign subsidiaries. By appending the US-owned subsidiary data to the Japanese data, I construct a panel data set of Japanese- and US-owned foreign subsidiaries. The information on corporate income tax rates is obtained from KPMG's Tax Rates Online (Corporate Tax Rates Table). I obtain macroeconomic variables, including gross domestic product (GDP) per capita, population, unemployment rates, and annual GDP growth rates of host countries from the World Bank's World Development Indicators (World Bank, 2020).

From this sample, I exclude the foreign subsidiaries in the financial, insurance, and real estate sectors (i.e., sectors for which the first two digits of the Nomenclature of Economic Activities [NACE] Rev. 2 codes are 64, 65, 66, and 68) because

[16] In the Orbis database, the information on ownership and industry classifications is recorded only at the time of the data release. Thus, I use the information on ownership and industry classifications as of 2013.

[17] For a few countries (e.g., Italy), BvD IDs changed between the two versions of Orbis and thus could not serve as a key variable to merge the two data sets. In such cases, I use an alternative firm ID number (such as the European Union value added tax number, trade register number, or the international securities identification number) as a key variable to merge these two data sets.

[18] If the financial information of subsidiaries for some years is unavailable in the main data set for 2004–2012 but it is available in the 2017 version of Orbis, I update the missing information in the main data using the information obtained from the 2017 version of Orbis.

the tax treatment and incentives for profit shifting are quite different in these sectors compared with others, following the treatment of prior studies (e.g., Markle, 2016; De Simone, Klassen, and Seidman, 2017; Dowd, Landefeld, and Moore, 2017). Moreover, subsidiaries in these sectors were likely to be especially affected by the financial crisis of 2008. Thus, this sample selection would help mitigate the concern that the financial crisis confounds the analysis of the response of Japanese-owned subsidiaries to the 2009 tax reform.[19] To investigate the profit-shifting behavior of each sole subsidiary, I use the unconsolidated financial information. Thus, I remove subsidiaries for which unconsolidated accounts were not available.

I further restrict the sample for four additional reasons. First, I exclude subsidiary-year observations that lack information on pretax profits, tangible fixed assets, costs of employees, the host-country tax rate, or one-digit industry codes (i.e., the first digit of the NACE Rev. 2 code), because these are required for all specifications in the analysis. Second, the estimation equations use the natural logarithm of pretax profits as the dependent variable, which cannot be defined for subsidiaries in loss. Thus, I restrict the sample to subsidiary-year observations with positive pretax profits, following previous studies (e.g., Huizinga and Laeven, 2008; Dharmapala and Riedel, 2013; Dowd, Landefeld, and Moore, 2017).[20] Third, because the objective of my analysis is to examine the change in the profit-shifting behavior around the 2009 tax reform, I restrict the sample to subsidiaries for which there is at least one observation both before the tax reform (i.e., for 2004–2008) and after the tax reform (i.e., for 2009–2016), with no missing values for any of the variables used in the regression analysis. Finally, because I use US-owned subsidiaries as a comparison group, I restrict the sample to subsidiary-year observations located in the countries where both US- and Japanese-owned subsidiaries are observed.[21]

The final data consist of 72,327 US-owned subsidiary-year observations (7,729 subsidiaries) and 20,980 Japanese-owned subsidiary-year observations (2,232 subsidiaries), thus making a total of 93,307 subsidiary-year observations (9,961 subsidiaries) in the full sample that includes both US- and Japanese-owned subsidiaries. Table 1 summarizes the distribution of those subsidiaries across jurisdictions. The distribution is similar for the Japanese and US multinationals and is heavily skewed to European countries in both cases, because the Orbis coverage is better for European countries than for other countries.

[19] Nonetheless, I have confirmed that the inclusion of subsidiaries in these sectors does not affect the results.

[20] Although it is beyond the scope of my analysis, De Simone, Klassen, and Seidman (2017) and Hopland et al. (2018) show that the profit-shifting behavior of loss-making subsidiaries is quite different from that of profitable subsidiaries, because multinationals have incentives to shift profits into loss-making subsidiaries regardless of the corporate tax rates of their host countries.

[21] The first two sample restrictions do not affect the estimation results at all. The last two sample restrictions exclude 19,166 subsidiary-year observations. However, the results remain qualitatively unchanged when these observations are included.

Table 1

Distribution of US- and Japanese-Owned Foreign Subsidiaries across Host Countries

	US-Owned		Japanese-Owned		Total	
	Number	%	Number	%	Number	%
Austria	965	(1.33)	233	(1.11)	1,198	(1.28)
Belgium	4,013	(5.55)	1,176	(5.61)	5,189	(5.56)
Bulgaria	392	(0.54)	26	(0.12)	418	(0.45)
Croatia	302	(0.42)	45	(0.21)	347	(0.37)
Czech Republic	2,549	(3.52)	878	(4.18)	3,427	(3.67)
Denmark	946	(1.31)	149	(0.71)	1,095	(1.17)
Estonia	260	(0.36)	50	(0.24)	310	(0.33)
Finland	1,178	(1.63)	295	(1.41)	1,473	(1.58)
France	10,785	(14.91)	2,760	(13.16)	13,545	(14.52)
Germany	6,849	(9.47)	3,310	(15.78)	10,159	(10.89)
Hungary	536	(0.74)	221	(1.05)	757	(0.81)
Ireland	1,299	(1.80)	147	(0.70)	1,446	(1.55)
Italy	7,144	(9.88)	1,720	(8.20)	8,864	(9.50)
Luxembourg	234	(0.32)	35	(0.17)	269	(0.29)
Netherlands	1,292	(1.79)	492	(2.35)	1,784	(1.91)
New Zealand	140	(0.19)	39	(0.19)	179	(0.19)
Norway	1,239	(1.71)	300	(1.43)	1,539	(1.65)
Pakistan	25	(0.03)	6	(0.03)	31	(0.03)
Poland	2,019	(2.79)	569	(2.71)	2,588	(2.77)
Portugal	883	(1.22)	250	(1.19)	1,133	(1.21)
Republic of Korea	1,392	(1.92)	1,531	(7.30)	2,923	(3.13)
Romania	569	(0.79)	120	(0.57)	689	(0.74)
Serbia	570	(0.79)	55	(0.26)	625	(0.67)
Slovakia	726	(1.00)	222	(1.06)	948	(1.02)
Slovenia	300	(0.41)	77	(0.37)	377	(0.40)
Spain	5,579	(7.71)	1,448	(6.90)	7,027	(7.53)
Spain (Canary Islands)	16	(0.02)	13	(0.06)	29	(0.03)
Sweden	1,965	(2.72)	360	(1.72)	2,325	(2.49)
Ukraine	328	(0.45)	25	(0.12)	353	(0.38)
United Kingdom	17,832	(24.65)	4,428	(21.11)	22,260	(23.86)
Total	72,327	(100.00)	20,980	(100.00)	93,307	(100.00)

Note: This table reports the numbers and fractions of US- and Japanese-owned subsidiary-year observations across host countries.

One limitation on the use of the Orbis database is that it substantially misses the financial information on foreign subsidiaries in tax havens. Using US tax return data that comprehensively cover US-owned foreign subsidiaries located in tax havens, Dowd, Landefeld, and Moore (2017) show that the reported profits of subsidiaries in tax havens or low-tax countries are much more sensitive to the host-country tax rate than those of subsidiaries in other countries, suggesting that US multinationals engage in profit shifting by intensively using tax-haven subsidiaries. Therefore, as Clausing (2020) points out, the analysis using the Orbis database could underestimate the extent of profit shifting and possibly the response to the territorial tax reform by Japanese multinationals that invest in tax havens.[22]

Finally, Table 2 provides the summary statistics of financial and macroeconomic variables used in the empirical analysis for US-owned subsidiaries, Japanese-owned subsidiaries, and all subsidiaries. Although the sample size is smaller for Japanese-owned subsidiaries than for US-owned subsidiaries, they share many similar characteristics. In particular, both Japanese- and US-owned subsidiaries face a mean (median) host-country tax rate of approximately 28 percent (30 percent), suggesting that they have similar incentives for profit shifting in terms of corporate income tax rates.

IV. ESTIMATION METHOD

A large body of literature measures the extent of profit shifting by multinationals using the methodology first used by Hines and Rice (1994).[23] The key idea of this approach is to decompose the pretax profit of a foreign subsidiary into the "true profit," which is generated from the actual business activities of the subsidiary (unrelated to profit-shifting activities), and the "shifted profit," which is the profit shifted in and out of the foreign subsidiary in response to tax incentives for the purpose of tax avoidance. Investigating tax-motivated profit shifting requires examining the response of the shifted profit to the corporate tax rate.

The challenge is that researchers can observe only the pretax profit; they cannot observe the true profit and the shifted profit separately. Hines and Rice (1994) tackle this problem by assuming that the true profit is a Cobb-Douglas function of labor and capital inputs and by imposing some other assumptions on the costs of profit shifting.[24] They show that under these assumptions, the logarithm of the subsidiary's

[22] Another limitation is that it lacks the financial information on foreign subsidiaries in Asian jurisdictions (e.g., China, Hong Kong, Indonesia, Malaysia, Singapore, Taiwan, Thailand, and Vietnam), where Japanese multinationals locate many subsidiaries.

[23] See footnote 6 for the list of studies that use this approach. Hines and Rice (1994) use the cross-sectional financial data of US-owned foreign subsidiaries aggregated at the country level, whereas recent studies tend to use firm-level panel data.

[24] Hines and Rice (1994) assume that the costs of profit shifting increase with the amount of shifted profits in a quadratic manner and are deductible from taxable income.

Table 2

Summary Statistics

Variable	Mean	Std. Dev.	Median	*N*
US-owned subsidiaries				
Log of pretax profit	7.39	2.01	7.45	72,327
Corporate tax rate (Tax_{it})	0.282	0.0594	0.297	72,327
Log of tangible fixed assets	6.63	2.72	6.69	71,070
Log of compensation	8.46	1.68	8.5	72,314
Log of GDP per capita	10.5	0.484	10.6	72,327
Log of population	17.4	0.977	17.9	72,327
Unemployment rate	8.39	4.03	7.74	72,327
GDP growth rate	1.5	2.64	1.79	72,327
Total assets	137,936	950,126	18,988	72,327
Japanese-owned subsidiaries				
Log of pretax profit	7.23	1.85	7.31	20,980
Corporate tax rate (Tax_{it})	0.286	0.0555	0.296	20,980
Log of tangible fixed assets	6.76	2.56	6.77	20,829
Log of compensation	8.23	1.45	8.24	20,979
Log of GDP per capita	10.5	0.43	10.6	20,980
Log of population	17.5	0.901	17.9	20,980
Unemployment rate	7.98	3.92	7.54	20,980
GDP growth rate	1.68	2.44	1.95	20,980
Total assets	91,172	347,190	21,847	20,980
Total				
Log of pretax profit	7.35	1.98	7.41	93,307
Corporate tax rate (Tax_{it})	0.282	0.0586	0.297	93,307
Log of tangible fixed assets	6.66	2.69	6.71	91,899
Log of compensation	8.41	1.64	8.43	93,293
Log of GDP per capita	10.5	0.473	10.6	93,307
Log of population	17.4	0.962	17.9	93,307
Unemployment rate	8.3	4.01	7.73	93,307
GDP growth rate	1.54	2.6	1.92	93,307
Total assets	127,421	852,784	19,665	93,307

Note: Financial characteristics, including pretax profit, tangible fixed assets, compensation, and total assets, are measured in thousands of US dollars. GDP per capita is measured in US dollars. Unemployment rate and GDP growth rate are measured in percentage points. Tax_{it} is the corporate income tax rate faced by subsidiary i in year t in the host country.

pretax profit can be expressed as a linear function of the host country's corporate tax rate and the logarithms of capital and labor inputs. Then, by regressing the pretax profit on the corporate tax rate, while including proxies for capital and labor inputs as control variables, we can estimate the response of the shifted profit to the

corporate tax rate, holding the true profit fixed. Thus, this response is deemed to indicate the extent of tax-motivated profit shifting.[25]

The baseline regression equation that incorporates the above idea can be expressed as follows:

$$\ln\pi_{it} = \alpha_i + \beta Tax_{it} + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \boldsymbol{X}_{it}\boldsymbol{\gamma} + Industry_i \times Year_t + u_{it}, \quad (1)$$

where the subscripts i and t indicate the subsidiary and the fiscal year, respectively.[26] π_{it} represents the pretax profit of foreign subsidiary i in year t. Subsidiary i's capital inputs are represented by K_{it} and proxied by tangible fixed assets. Its labor inputs are represented by L_{it} and proxied by employee compensation (referred to as costs of employees in the Orbis database). The log transformation is applied to these variables in the above equation. The key independent variable is Tax_{it}, which represents the statutory corporate income tax rate faced by subsidiary i in year t in the host country.

The vector of country-level control variables, $\boldsymbol{X}_{it}$, captures the impacts on the subsidiary's profit of the country's affluence level (proxied by the log of GDP per capita), market size (proxied by the log of total population), macroeconomic conditions (proxied by the unemployment rate), and investment opportunities (proxied by the annual GDP growth rate).[27] $Industry_i$ denotes the set of dummy variables that indicate the one-digit industry code to which subsidiary i belongs. The set of year dummy variables is denoted by $Year_t$. In Equation (1), I include industry-year fixed effects using the interaction terms of these two sets of dummy variables ($Industry_i \times Year_t$) to control for the industry-specific shocks for each year that affect the subsidiary's profit. The subsidiary fixed effect, denoted by α_i, controls for all time-invariant factors specific to subsidiary i that affect the subsidiary's profit. The error term is u_{it}. This equation can be estimated by fixed-effects ordinary least squares.

The estimated coefficient β indicates the percentage change in pretax profits in response to a 1 percentage point increase in corporate tax rates. A negative estimate for β implies tax-motivated profit shifting. Many studies consistently find negative estimates for β, suggesting that a higher tax rate reduces reported income as a result of profit shifting. The absolute value of β is the semielasticity of subsidiary pretax profits with respect to corporate tax rates (referred to as the tax semielasticity). Heckemeyer and Overesch (2017) conduct a meta-regression analysis using 203 estimates from 27 papers and suggest that a consensus (average) estimate of the tax semielasticity is about 0.8. Beer, De Mooij, and Liu (2020) conduct similar meta-regressions

[25] Dharmapala and Riedel (2013) develop an alternative approach in which they identify profit shifting by investigating how exogenous positive earnings shocks to the parent firm propagate to its own affiliates in low-tax countries (relative to those in high-tax countries).

[26] For consistency with Japan's fiscal years, the data for year t contain the information of subsidiaries with accounting years that end between April 1 in year t and March 31 in year $t + 1$ for both US and Japanese multinationals.

[27] These macroeconomic variables are commonly used as control variables in the profit-shifting literature (e.g., Dharmapala and Riedel, 2013; Riedel, Lohse, and Hofmann, 2015; Dowd, Landefeld, and Moore, 2017).

including more recent studies and find that the consensus tax semielasticity is around 1 and is larger in recent years.

To investigate the extent of profit shifting by US and Japanese multinationals on average over the entire data period, I first estimate Equation (1) separately for US- and Japanese-owned foreign subsidiaries and analyze the average tax semielasticity of reported profits for each of the US and Japanese multinational groups.

I further investigate whether the enactment of the territorial tax regime encouraged profit shifting by Japanese multinationals by examining whether the tax semielasticity of reported profits for Japanese-owned foreign subsidiaries increased in response to the tax reform. The Japanese government announced the introduction of a territorial tax regime in May 2008 and released detailed information on the design of the new system in August 2008. Therefore, it is possible that Japanese multinationals began to shift more profits to low-tax jurisdictions in response to the announcement of the tax reform in 2008, in anticipation of the enactment of the new tax regime, which occurred in April 2009.[28]

Using the full sample that includes both US- and Japanese-owned foreign subsidiaries, I examine the change in the tax semielasticity of pretax profits for Japanese-owned subsidiaries relative to that for US-owned subsidiaries by extending Equation (1) as follows:

$$\begin{aligned}\ln \pi_{it} = \alpha_i + \sum_{j=2004}^{2016} \beta_{US,j} US_i \times Tax_{it} \times Year_j + \sum_{j=2004}^{2016} \beta_{JP,j} JP_i \times Tax_{it} \times Year_j \\ + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \boldsymbol{X}_{it}\boldsymbol{\gamma} + Home\ Country_i \times Industry_i \times Year_t + u_{it},\end{aligned} \tag{2}$$

where US_i (JP_i) is a dummy variable that equals 1 if subsidiary i is owned by a US (Japanese) parent and 0 otherwise. $Year_j$ is the dummy variable for year j, which takes a value of 1 if $t = j$ and 0 otherwise for $j = 2004, 2005, \ldots, 2016$. In this specification, the absolute value of the estimated coefficient on $US_i \times Tax_{it} \times Year_j$, or $|\beta_{US,j}|$ indicates the tax semielasticity for US-owned foreign subsidiaries in year j. Similarly, the absolute value of the estimated coefficient on $JP_i \times Tax_{it} \times Year_j$, or $|\beta_{JP,j}|$ is the tax semielasticity for Japanese-owned foreign subsidiaries in year j.

To control for the industry-specific shocks that could differ between Japanese- and US-owned subsidiaries, in the above equation I include home country–industry–year fixed effects, denoted by $Home\ Country_i \times Industry_i \times Year_t$, which indicate all combinations of the three categorical variables (JP_i or US_i, $Industry_i$, and $Year_t$).[29]

[28] For example, Japanese multinationals possibly shifted more profits to subsidiaries in low-tax countries from fiscal year 2008 to increase dividend repatriations from those subsidiaries from the beginning of fiscal year 2009.

[29] Because these interaction terms absorb the effects of the corporate income tax rates of the United States and Japan, the estimates of the tax semielasticities ($|\beta_{US,j}|$ and $|\beta_{JP,j}|$) are unchanged when replacing the host-country tax rate (Tax_{it}) with the tax differential between the parent and the foreign subsidiary in Equation (2). In other words, in this specification, I use the variations in host-country tax rates to estimate the tax semielasticities, holding the corporate tax rates of the United States and Japan fixed.

These fixed effects also take into account the impacts of the 2008 financial crisis, which could vary across industries for Japanese- and US-owned subsidiaries.

If Japan's 2009 tax reform encouraged profit shifting by Japanese multinationals, the tax semielasticity for Japanese-owned foreign subsidiaries would start to increase relative to that for US-owned foreign subsidiaries in response to the announcement or enactment of the territorial tax regime.

It is worth noting that both Equations (1) and (2) control for unobserved time-invariant heterogeneity by including subsidiary fixed effects, but the variations in host-country tax rates used to estimate tax semielasticities differ between the two equations. On the one hand, in Equation (1), the tax semielasticity of pretax profits, the absolute value of β, is estimated using the within-unit variation in tax rates (i.e., changes in host-country tax rates over time). On the other hand, in Equation (2), the tax semielasticities for US- and Japanese-owned subsidiaries in each year ($|\beta_{US,j}|$ and $|\beta_{JP,j}|$) are the absolute values of the coefficients on $US_i \times Tax_{it} \times Year_j$ and $JP_i \times Tax_{it} \times Year_j$, respectively. These triple interaction terms vary over time (they can take a nonzero value only for year j) even if there is no variation in tax rates over time. Therefore, the yearly tax semielasticities in Equation (2) are estimated using the between-unit variation in tax rates (i.e., differences in tax rates across host countries).[30]

The specification of Equation (2) is useful to see how the level of the tax semielasticity changed around the time of the tax reform. However, it is not clear whether the difference in the tax semielasticities between Japanese- and US-owned subsidiaries becomes significantly larger in response to the tax reform. To investigate the responses to the territorial tax reform more directly, I examine the change in the tax semielasticity for Japanese-owned subsidiaries after the announcement of the tax reform, using US-owned subsidiaries as a control group in a difference-in-differences manner.

To this end, I modify Equation (2) and estimate the following equation:

$$\ln\pi_{it} = \alpha_i + \beta_1 Tax_{it} + \beta_2 JP_i \times Tax_{it} + \sum_{j\neq 2007}^{2016} \beta_{JP,j} JP_i \times Tax_{it} \times Year_j + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \boldsymbol{X}_{it}\gamma + Home\ Country_i \times Industry_i \times Year_t + u_{it}. \quad (3)$$

In this specification, the absolute value of the coefficient on Tax_{it} (i.e., $|\beta_1|$) is the tax semielasticity for US-owned subsidiaries (control group). The absolute value of the coefficient on the interaction term of $JP_i \times Tax_{it}$ (i.e., $|\beta_2|$) indicates the difference in the tax semielasticities between Japanese- and US-owned subsidiaries in the base year of 2007. The coefficients of interest are those on the triple interaction terms of $JP_i \times Tax_{it} \times Year_j$ ($\beta_{JP,j}$). The absolute value of $\beta_{JP,j}$ indicates the change in the difference in the tax semielasticities between Japanese- and US-owned subsidiaries in year j from that in 2007, where $2004 \leq j \leq 2016$ and

[30] Giesselmann and Schmidt-Catran (2018) clarify the variation in interaction terms used in fixed-effects regression models.

$j \neq 2007$. I expect that if Japanese multinationals respond to the announcement or enactment of the territorial tax reform, the difference in the tax semielasticities between Japanese- and US-owned subsidiaries would become larger in 2008 or later years than in 2007 and thus that $\beta_{JP,j}$ would become negative for $j \geq 2008$.[31]

US-owned foreign subsidiaries serve as a reasonable comparison group to evaluate the change in the tax semielasticity for Japanese-owned foreign subsidiaries resulting from the territorial tax reform, for the following reasons. First, Japanese multinationals experienced the switch in the international tax system from worldwide taxation to territorial taxation in 2009, whereas US multinationals did not experience such a shift during the data period from 2004 to 2016. Second, both Japan and the United States had the highest corporate tax rates among OECD countries, of around 40 percent including subnational taxes, and both employed worldwide tax regimes before Japan's 2009 tax reform. Moreover, the worldwide tax systems of Japan and the United States were quite similar in many respects. In particular, both countries allowed for deferral of taxation on foreign dividends until repatriation (tax deferral) and calculated the maximum amount of foreign tax credits available in each year (foreign tax credit limit) based on the home country's tax liabilities on the total amount of foreign income repatriated at the parent level.[32] Therefore, even though the magnitude of profit shifting by Japanese and US multinationals prior to the tax reform may differ, the incentive for profit shifting provided by their worldwide tax systems would be similar, or at least comparable. If the trend in the tax semielasticity for Japanese-owned foreign subsidiaries drastically changed around the time of the tax reform relative to that for US-owned subsidiaries, the gap in the trends between the two subsidiary groups would reflect the impact of the tax reform on the profit-shifting behavior of Japanese-owned subsidiaries.[33]

V. PRELIMINARY ANALYSIS

Before focusing on the change in the tax semielasticity of pretax profits following the tax reform, I begin by estimating Equation (1) separately for US- and Japanese-owned

[31] As in Equation (2), the coefficients on the triple interaction terms of $JP_i \times Tax_{it} \times Year_j$ ($\beta_{JP,j}$) are estimated using the between-unit variation in tax rates. A possible limitation of this specification is that other coefficients on the host-country tax variables (i.e., Tax_{it} and $JP_i \times Tax_{it}$) are estimated using the within-unit variation in tax rates. In other words, I rely on different types of variations in tax rates to estimate the coefficients.

[32] This feature of calculating the foreign tax credit limit allows multinationals to reduce the total tax liabilities on foreign income by offsetting the tax liabilities on foreign income repatriated from low-tax countries with excess foreign tax credits earned by repatriating foreign income from high-tax countries. This tax avoidance method is referred to as cross crediting (Hines, 1999).

[33] Hines (2001) compares US and Japanese outbound foreign direct investment to examine the impact of tax-sparing provisions on Japanese outbound foreign direct investment. More recently, Xing (2018) and Bradley, Dauchy, and Hasegawa (2018) use US multinationals as a comparison group to evaluate the impact of Japan's territorial tax reform on the foreign cash holdings and the investor valuation of Japanese multinationals, respectively.

subsidiaries to investigate the extent of their profit shifting on average over the entire data period. Table 3 presents the estimation results. Columns 1 and 2 provide the results when using the sample of US-owned foreign subsidiaries, whereas Columns 3 and 4 present the results when using the sample of Japanese-owned foreign subsidiaries. All specifications include industry-year fixed effects and subsidiary fixed effects. The macroeconomic control variables are excluded in Columns 1 and 3 but included in Columns 2 and 4. Standard errors are clustered at the subsidiary level to account for the serial correlation of the error term within each subsidiary and are shown in parentheses below the estimated coefficients.

For the sample of US-owned foreign subsidiaries, the coefficient on Tax_{it} is negative and statistically significant at the 1 percent level in both specifications in

Table 3

Tax Sensitivity of the Pretax Profits of US- and Japanese-Owned Foreign Subsidiaries

	Dependent Variable: Log of Pretax Profit			
	US-Owned		Japanese-Owned	
	(1)	(2)	(3)	(4)
Tax_{it}	−1.2248***	−0.9564***	−1.0040**	−0.2119
	(0.2661)	(0.2714)	(0.4844)	(0.4999)
Log of tangible fixed assets	0.0631***	0.0621***	0.0625***	0.0624***
	(0.0071)	(0.0071)	(0.0152)	(0.0153)
Log of compensation	0.4876***	0.4898***	0.4972***	0.5041***
	(0.0204)	(0.0209)	(0.0376)	(0.0385)
Log of GDP per capita		−0.1020		−0.2904*
		(0.0845)		(0.1548)
Log of population		0.2451		2.4979***
		(0.4443)		(0.8415)
Unemployment rate		−0.0144***		−0.0296***
		(0.0033)		(0.0064)
GDP growth rate		0.0064**		0.0246***
		(0.0028)		(0.0068)
Industry-year fixed effects	Yes	Yes	Yes	Yes
Subsidiary fixed effects	Yes	Yes	Yes	Yes
Observations	71,063	71,063	20,828	20,828
Within R^2	0.0894	0.0905	0.0725	0.0776
Number of subsidiaries	7,729	7,729	2,232	2,232

Note: Tax_{it} is the corporate tax rate faced by subsidiary i in year t in the host country. Standard errors clustered at the subsidiary level are in parentheses.

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

Columns 1 and 2. In the preferred specification that includes macroeconomic control variables in Column 2, the semielasticity of pretax profits with respect to corporate tax rates is 0.96, suggesting that a 1 percentage point lower corporate tax rate in the host country increases the subsidiary's reported profit by 0.96 percent.[34] This is consistent with tax-motivated profit shifting, and the size of the estimate is close to the consensus tax semielasticity range (0.8–1.0) reported by Heckemeyer and Overesch (2017) and Beer, De Mooij, and Liu (2020). As expected, the significantly positive coefficients on tangible fixed assets and employee compensation imply that labor and capital inputs contribute to increasing the true profit generated from business activities other than profit shifting.

For the sample of Japanese-owned foreign subsidiaries, the estimated coefficient of −1.00 is statistically significant at the 5 percent level, as shown in Column 3. However, in the preferred specification that includes time-variant macroeconomic variables in Column 4, the coefficient loses statistical significance, and its absolute value (semielasticity) decreases to 0.21. Compared with the result for US-owned foreign subsidiaries in Column 2, the tax semielasticity of the pretax profits of Japanese-owned foreign subsidiaries is small and not statistically significant. These results imply that the reported profits of Japanese multinationals are less sensitive to the tax incentive for profit shifting (measured by host-country tax rates) than are those of US multinationals.

The baseline specifications in Table 3 estimate the tax sensitivity of the pretax profits of the average subsidiary. However, the response of reported profits to tax incentives may be heterogeneous, depending on firm characteristics. The models of Hines and Rice (1994) and Huizinga and Laeven (2008) assume that the marginal cost of shifting profits rises in proportion to the ratio of the shifted profits to the true profits (i.e., the profits before shifting) of an individual firm. This assumption implies that shifting additional profits is less costly if true profits are large, because then a company does not need to distort its financial account greatly relative to its large true profits. Huizinga and Laeven (2008) and Markle (2016) use sales or total assets as a proxy for true profits.[35] Thus, I expect that the profit-shifting behavior is heterogeneous depending on firm size (which is a proxy for true profits), and that larger subsidiaries would exhibit a larger tax semielasticity.[36] To test this hypothesis, I split

[34] The preferred specifications chosen in this paper include macroeconomic control variables. As Slemrod (2004) discusses, corporate tax rates are highly likely to be correlated with macroeconomic conditions and the size of the economy in host countries. Therefore, excluding these control variables may cause omitted variable bias.

[35] Although true profits are unobservable in the data, total assets are positively correlated with pretax profits with the correlation coefficient of 0.64, suggesting that firm size is a reasonable measure of true profits.

[36] In addition, profit shifting would entail fixed costs for multinationals, such as costs for establishing international tax-planning divisions in foreign subsidiaries and for learning tax practices in host countries. To the extent that these fixed costs matter for profit shifting, larger firms are expected to take advantage of scale economies and shift profits successfully by avoiding the regulations regarding transfer-pricing rules, which is another reasoning for the hypothesis.

the full sample of US- and Japanese-owned foreign subsidiaries into two subgroups: large subsidiaries and small subsidiaries. The subsidiary size is defined as the mean of total assets over the sample period. The median subsidiary size defined in this way for the full sample including both US- and Japanese-owned subsidiaries is US$19,548,283. I classify subsidiaries with mean total assets that are greater than this value into the large subsidiary group and classify other subsidiaries into the small subsidiary group. As a result, 3,947 US-owned subsidiaries and 1,034 Japanese-owned subsidiaries (4,981 subsidiaries in total) are classified as small, whereas 3,782 US-owned subsidiaries and 1,198 Japanese-owned subsidiaries (4,980 subsidiaries in total) are classified as large.

Table 4 presents the estimation results for Equation (1) when the US and Japanese samples are split into the small and large subsidiary groups. All specifications include macroeconomic control variables, industry-year fixed effects, and subsidiary fixed effects. The estimated tax semielasticity of pretax profits for large US-owned foreign subsidiaries is 1.44 and statistically significant at the 1 percent level, as shown in Column 2, which is larger than that for small US-owned subsidiaries, estimated to be statistically insignificant at 0.51 in Column 1. This suggests that larger subsidiaries are more sensitive to tax incentives for profit shifting, as expected. I find a similar pattern for the estimated coefficient on Tax_{it} for Japanese-owned foreign subsidiaries, although it is not statistically significant. The tax semielasticity for large subsidiaries is estimated at 0.69 in Column 4, whereas the coefficient on the host-country tax rate for small subsidiaries is close to zero (0.13) and positive in Column 3. Thus, there appears to be a tendency for large Japanese-owned foreign subsidiaries to be more responsive to the incentive for profit shifting than are small Japanese-owned foreign subsidiaries.

In summary, US-owned foreign subsidiaries are more sensitive, on average, to the tax incentive for profit shifting than are Japanese-owned foreign subsidiaries. The pretax profits of US-owned foreign subsidiaries, particularly those of a large size, exhibit strong responses to host-country tax rates that are consistent with profit-shifting motives. Similarly, large Japanese-owned foreign subsidiaries have larger tax semielasticities than small Japanese-owned foreign subsidiaries. Thus, in the following sections, I investigate the heterogeneous responses to the tax reform depending on firm size.

One may be concerned that the size of the multinational group (or the parent firm) may also matter for profit shifting. I collect consolidated account information on parent companies for Japanese- and US-owned subsidiaries and split the sample based on parents' consolidated total assets into the two subsamples: subsidiaries owned by large multinational groups and those owned by small multinational groups. When the sample is split at the median of mean total assets of parents, both US- and Japanese-owned subsidiaries in the large multinational group exhibit a larger tax semielasticity than those in the small multinational group, as expected. However, the difference in the responses to the tax reform between the two groups is less clear than the results when I split the sample based on the subsidiary size in Sections VI and VII. I interpret these results as suggesting that although the size of a multinational group might better capture the extent of profit shifting at the multinational group level, the size of

Table 4

Heterogeneous Tax Sensitivity Depending on Firm Size

	Dependent Variable: Log of Pretax Profit			
	US-Owned		Japanese-Owned	
	Small	Large	Small	Large
	(1)	(2)	(3)	(4)
Tax_{it}	−0.5100	−1.4371***	0.1342	−0.6862
	(0.4097)	(0.3652)	(0.7445)	(0.6693)
Log of tangible fixed assets	0.0564***	0.0696***	0.0468**	0.0780***
	(0.0091)	(0.0114)	(0.0182)	(0.0244)
Log of compensation	0.4743***	0.5069***	0.4666***	0.5364***
	(0.0269)	(0.0323)	(0.0545)	(0.0535)
Log of GDP per capita	−0.2043*	−0.0128	−0.3444	−0.3023
	(0.1214)	(0.1176)	(0.2234)	(0.2140)
Log of population	−0.2806	0.9618	2.2231*	3.1955***
	(0.6565)	(0.6079)	(1.2257)	(1.1699)
Unemployment rate	−0.0152***	−0.0145***	−0.0241***	−0.0353***
	(0.0045)	(0.0047)	(0.0088)	(0.0091)
GDP growth rate	0.0082**	0.0048	0.0267***	0.0241**
	(0.0038)	(0.0042)	(0.0086)	(0.0106)
Industry-year fixed effects	Yes	Yes	Yes	Yes
Subsidiary fixed effects	Yes	Yes	Yes	Yes
Observations	34,602	36,461	9,310	11,518
Within R^2	0.0941	0.0919	0.0721	0.0959
Number of subsidiaries	3,947	3,782	1,034	1,198

Note: Tax_{it} is the corporate tax rate faced by subsidiary i in year t in the host country. The subsidiary size is defined as the mean of total assets over the sample period. Large subsidiaries are defined as subsidiaries with mean total assets that exceed US$19,548,283 (the median subsidiary size for the full sample). Other subsidiaries are classified as small subsidiaries. Standard errors clustered at the subsidiary level are in parentheses.

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

individual subsidiaries matters for profit shifting by each subsidiary. Therefore, I focus on the size of individual subsidiaries in the remaining analyses.

VI. CHANGE IN THE TAX SEMIELASTICITY AFTER THE TERRITORIAL TAX REFORM

I estimate Equation (2) to investigate the change in the tax semielasticity for Japanese multinationals after the announcement in 2008 or the enactment of the territorial tax

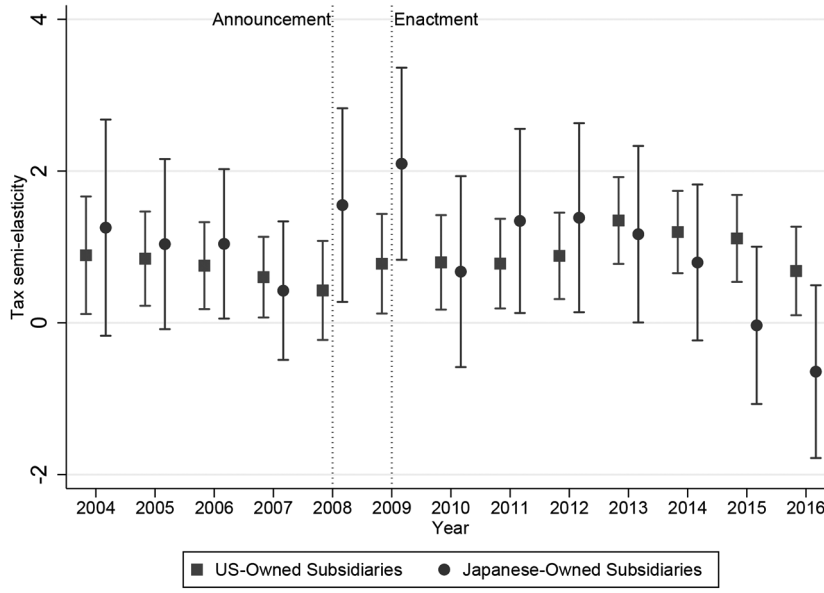

Figure 1. Tax semielasticity for US- and Japanese-owned foreign subsidiaries, 2004–2016. This figure plots the tax semielasticity and its 90 percent confidence interval for US- and Japanese-owned subsidiaries in each year from 2004 to 2016, estimated from Equation (2). The tax semielasticities are calculated by multiplying the estimated coefficients on the interaction terms of $US_i \times Tax_{it} \times Year_j$ and $JP_i \times Tax_{it} \times Year_j$ by -1 (i.e., $-\beta_{US,j}$ and $-\beta_{JP,j}$). Standard errors clustered by subsidiary are used when calculating the confidence intervals. A color version of this figure is available online.

regime in 2009. Figure 1 plots the tax semielasticities for US- and Japanese-owned subsidiaries in each year from 2004 to 2016 with 90 percent confidence intervals. I calculate these tax semielasticities by multiplying the estimated coefficients on the interaction terms of $US_i \times Tax_{it} \times Year_j$ and $JP_i \times Tax_{it} \times Year_j$ by -1 (i.e., $-\beta_{US,j}$ and $-\beta_{JP,j}$) to allow for the cases where the coefficients take a positive value.[37] Table A1 (Appendix is available online) reports the point estimates and standard errors for all $\beta_{US,j}$ and $\beta_{JP,j}$ coefficients. Standard errors clustered at the subsidiary level are used to calculate the upper and lower bounds of the confidence interval. In the figure, the squares indicate the estimated tax semielasticities for US-owned foreign subsidiaries, whereas the circles indicate those for Japanese-owned foreign subsidiaries.

[37] In this specification, the estimated tax semielasticities for Japanese multinationals tend to be larger than the tax semielasticity in Table 3 (0.21, shown in Column 4). This is possibly because of the difference in the variations in tax rates used for estimating tax semielasticities. More specifically, Equation (2) uses the between-unit variation in tax rates, whereas Equation (1) uses the within-unit variation in tax rates. Another possible reason is that, as shown in Figure 1, the tax semielasticity for Japanese-owned subsidiaries is quite low compared with that for US-owned subsidiaries in the later years of the study period (i.e., 2014–2016), which may decrease the average tax semielasticity over the entire study period.

The tax semielasticities for both US- and Japanese-owned subsidiaries are similar and tend to decrease slightly from 2004 to 2007. However, they show a sudden divergence in 2008, when the introduction of the territorial tax system was announced. The tax semielasticity for Japanese-owned subsidiaries sharply increases from 0.42 in 2007 to 1.55 in 2008 and 2.10 in 2009, whereas that for US-owned subsidiaries fluctuates moderately from 0.60 in 2007 to 0.43 in 2008 and 0.78 in 2009. Although the tax semielasticity for Japanese-owned subsidiaries is not statistically significantly different from that for US-owned subsidiaries in 2008 and 2009, the former ($|\beta_{JP,j}|$) is larger than the latter ($|\beta_{US,j}|$) at the 10 percent level based on the one-sided test rejecting the null hypothesis of $\beta_{JP,j} - \beta_{US,j} \geq 0$. The tax semielasticity for Japanese-owned subsidiaries decreases in 2010 but begins to increase from 2011 to 2012 relative to that for US-owned subsidiaries.

The tax semielasticities for both US- and Japanese-owned subsidiaries exhibit a downward trend from 2013 to 2016. In particular, the tax semielasticity for Japanese-owned subsidiaries substantially decreases in 2015. However, it seems unlikely that this decrease was caused by Japan's territorial tax reform, because it was implemented six years earlier and the downward trend is observed not only for Japanese-owned subsidiaries but also for US-owned subsidiaries. It is possibly related to the international pressure to reduce profit shifting, most notably the development of the BEPS project. The OECD launched the BEPS project in 2012 to combat excessive profit shifting and tax avoidance by multinational corporations. The final report that proposed 15 BEPS action plans was released in 2015 (OECD, 2015).

Japan revised its transfer-pricing documentation requirements in fiscal year 2016 following the recommendations made in Action 13 of the BEPS action plans, and it introduced the CbCR system.[38] The discussion of the revisions in the transfer-pricing documentation requirements under the 2016 tax reform started in fiscal year 2015. Most OECD members, including Belgium, the Czech Republic, France, Germany, Italy, Spain, the United Kingdom, and the United States, introduced the CbCR system in 2016. Joshi (2020) finds that the consolidated effective tax rates are higher for EU multinationals subject to CbCR, which suggests that the CbCR system reduces the overall tax avoidance by EU multinationals (although Joshi [2020] concludes that CbCR has a limited impact in terms of reducing profit shifting). These internationally coordinated measures against profit shifting might have caused the reduction in the tax semielasticity for Japanese-owned subsidiaries that occurred from 2015 to 2016.

In addition, Figure 1 shows that the estimated tax semielasticity for US-owned foreign subsidiaries is statistically significant at the 10 percent level in all years except for 2008.[39] By contrast, the estimated tax semielasticity for Japanese-owned

[38] This system requires Japanese multinationals to report financial information to the Japanese government on business activities in foreign countries (including sales, profits, and tax liabilities), which is shared with other countries' tax authorities.

[39] The estimated tax semielasticity is statistically significant at the 5 percent level for 2005–2006 and 2010–2012, and at the 1 percent level for 2013–2015.

foreign subsidiaries is statistically significant only in the years after the announcement of the territorial tax regime (2008–2009 and 2011–2013), except for 2006.[40] These patterns in the significance of tax semielasticities suggest that the profits of Japanese-owned subsidiaries became more sensitive to the host-country tax rates in response to the territorial tax reform.

Given the differences in tax semielasticity by subsidiary size found in the previous section, I examine whether the responses to the tax reform differ by subsidiary size by splitting the US- and Japanese-owned subsidiaries based on total assets. By extending Equation (2), I estimate the following equation:

$$\begin{aligned}\ln \pi_{it} = \alpha_i &+ \sum_{j=2004}^{2016} \beta_{US,j} US_i \times Tax_{it} \times Year_j + \sum_{j=2004}^{2016} \beta_{JP,j}^{S} Small_i \times JP_i \times Tax_{it} \times Year_j \\ &+ \sum_{j=2004}^{2016} \beta_{JP,j}^{L} Large_i \times JP_i \times Tax_{it} \times Year_j + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \boldsymbol{X}_{it}\boldsymbol{\gamma} \\ &+ Size_i \times Home\ Country_i \times Industry_i \times Year_t + u_{it},\end{aligned} \tag{4}$$

where the dummy variable $Large_i$ is equal to 1 if subsidiary i is in the large subsidiary group and 0 otherwise. Similarly, the dummy variable $Small_i$ is equal to 1 if subsidiary i is in the small subsidiary group and 0 otherwise. The definitions of large and small subsidiaries are the same as in the previous section.

To control for the industry-specific shocks that could differ between Japanese- and US-owned subsidiaries and between large and small subsidiaries, in Equation (4) I include subsidiary size–home country–industry–year fixed effects denoted as $Size_i \times Home\ Country_i \times Industry_i \times Year_t$, which indicate all combinations of the four categorical variables ($Large_i$ or $Small_i$, JP_i or US_i, $Industry_i$, and $Year_t$). These fixed effects also take into account the impacts of the financial crisis that could differ across industries for Japanese- and US-owned subsidiaries of different sizes. The definitions of other variables are the same as in Equation (2).

This equation estimates the tax semielasticity of pretax profits, which is the absolute value of the estimated coefficient on the host country's tax rate, for three groups of foreign subsidiaries: US-owned subsidiaries, small Japanese-owned subsidiaries, and large Japanese-owned subsidiaries, in each year from 2004 to 2016. Because large subsidiaries are more responsive to the tax incentive for profit shifting, as found in the previous section, I expect that the pretax profits of large Japanese-owned subsidiaries would become more responsive to host-country tax rates in response to the announcement or enactment of the territorial tax regime, compared with US-owned subsidiaries.

[40] The estimated tax semielasticity is statistically significant at the 5 percent level for 2008 and at the 1 percent level for 2009.

Figure 2 plots the tax semielasticities for US-owned subsidiaries and large Japanese-owned subsidiaries from 2004 to 2016 with 90 percent confidence intervals. I calculate these tax semielasticities by multiplying the estimated coefficients on the interaction terms of $US_i \times Tax_{it} \times Year_j$ and $Large_i \times JP_i \times Tax_{it} \times Year_j$ by -1 (i.e., $-\beta_{US,j}$ and $-\beta^{L}_{JP,j}$) to allow for the cases where the coefficients take a positive value. Table A2 reports the point estimates and standard errors for all the coefficients $\beta_{US,j}$, $\beta^{L}_{JP,j}$, and $\beta^{S}_{JP,j}$. In this figure, the squares indicate the tax semielasticities for US-owned subsidiaries from 2004 to 2016, whereas the circles indicate those for large Japanese-owned subsidiaries. Compared with Figure 1, the tax semielasticity for large Japanese-owned subsidiaries increases more sharply from 0.88 in 2007 to 2.61 in 2008, with a further increase to 2.88 in 2009. The estimated tax semielasticities are statistically significant in most years after the announcement of the tax reform (at the 5 percent level for 2008–2011, the 1 percent level for 2012, and the 10 percent level for 2014), whereas they are not significant for 2004–2007 (except for 2006).

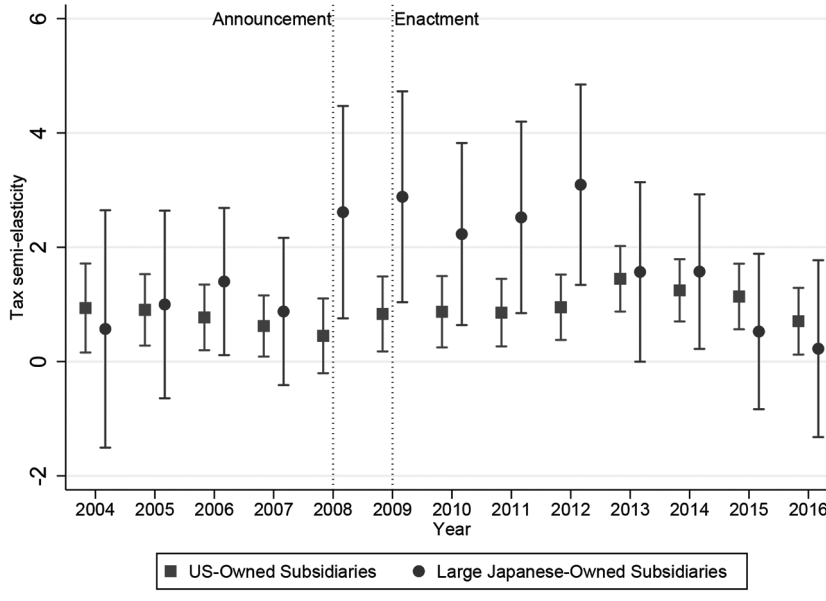

Figure 2. Tax semielasticity for US-owned and large Japanese-owned foreign subsidiaries, 2004–2016. This figure plots the tax semielasticity and its 90 percent confidence interval for US- and large Japanese-owned subsidiaries in each year from 2004 to 2016, estimated from Equation (4). The tax semielasticities are calculated by multiplying the estimated coefficients on the interaction terms of $US_i \times Tax_{it} \times Year_j$ and $Large_i \times JP_i \times Tax_{it} \times Year_j$ by -1 (i.e., $-\beta_{US,j}$ and $-\beta^{L}_{JP,j}$). Standard errors clustered by subsidiary are used when calculating the confidence intervals. A color version of this figure is available online.

The tax semielasticity for large Japanese-owned subsidiaries is larger than that for US-owned subsidiaries from 2008 to 2012. By rejecting the null hypothesis of $\beta^{L}_{JP,j} - \beta_{US,j} = 0$, the tax semielasticity for large Japanese-owned subsidiaries is statistically significantly different from (larger than) that for US-owned subsidiaries in 2008, 2009, and 2012 at the 10 percent level. By rejecting the null hypothesis of $\beta^{L}_{JP,j} - \beta_{US,j} \geq 0$, the former ($|\beta^{L}_{JP,j}|$) is larger than the latter ($|\beta_{US,j}|$) in 2010 and 2011 at the 10 percent level based on the one-sided test. Moreover, the gap in the tax semielasticities between large Japanese-owned subsidiaries and US-owned subsidiaries from 2008 to 2012 in Figure 2 is larger than the gap between all Japanese- and US-owned subsidiaries in Figure 1. This suggests that large Japanese-owned subsidiaries responded more strongly to the territorial tax reform, by intensifying profit shifting, than did the average subsidiaries. Figure 2 also shows a decrease in the tax semielasticity from 2014 to 2016 for both US- and large Japanese-owned subsidiaries, which implies that this reduction is unlikely to be the consequence of Japan's 2009 tax reform.

Figure 3 plots the estimated tax semielasticities for US-owned subsidiaries ($-\beta_{US,j}$) and small Japanese-owned subsidiaries ($-\beta^{S}_{JP,j}$) from 2004 to 2016 with 90 percent

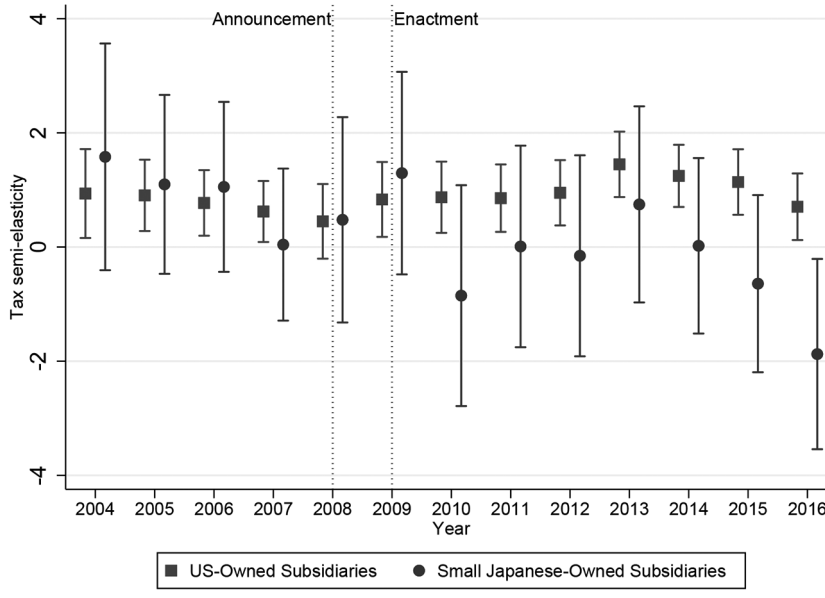

Figure 3. Tax semielasticity for US-owned and small Japanese-owned foreign subsidiaries, 2004–2016. This figure plots the tax semielasticity and its 90 percent confidence interval for US- and small Japanese-owned subsidiaries in each year from 2004 to 2016, estimated from Equation (4). The tax semielasticities are calculated by multiplying the estimated coefficients on the interaction terms of $US_i \times Tax_{it} \times Year_j$ and $Small_i \times JP_i \times Tax_{it} \times Year_j$ by -1 (i.e., $-\beta_{US,j}$ and $-\beta^{S}_{JP,j}$). Standard errors clustered by subsidiary are used when calculating the confidence intervals. A color version of this figure is available online.

confidence intervals. None of the tax semielasticities for small Japanese-owned subsidiaries are statistically significantly positive. The tax semielasticity for small Japanese-owned subsidiaries increases in 2009, but then decreases in 2010 and stays around zero until 2014. This implies that they did not respond to the tax incentive for profit shifting provided by the territorial tax reform.

VII. CHANGES IN THE TAX SEMIELASTICITY DIFFERENCES BETWEEN JAPANESE- AND US-OWNED SUBSIDIARIES

In this section, I adopt alternative specifications to examine the change in the tax semielasticity for Japanese-owned subsidiaries after the announcement of the tax reform, using US-owned subsidiaries as a control group in a difference-in-differences manner. By doing so, I check the robustness of the results and implications obtained from my analysis in the previous section. I first estimate Equation (3), where the coefficient of interest is that on $JP_i \times Tax_{it} \times Year_j$ for $2004 \leq j \leq 2016$ and $j \neq 2007$. It indicates the change in the difference in the tax semielasticities between Japanese- and US-owned subsidiaries in year j from the base year of 2007.

Figure 4 plots the coefficient on $JP_i \times Tax_{it} \times Year_j$ with a 90 percent confidence interval for each year, where the coefficient for 2007 is omitted and normalized to zero. Table A3 reports the point estimates and standard errors of all the coefficients $\beta_{JP,j}$. The coefficient is close to zero and not statistically significant from 2004 to 2006. However, it suddenly decreases and becomes more negative with statistical significance at the 10 percent level in 2008 and at the 5 percent level in 2009. The point estimates suggest that the difference in the tax semielasticities between Japanese- and US-owned subsidiaries increases by 1.13 points in 2008 and 1.69 points in 2009 compared with the base year of 2007. In 2010, the coefficient goes back to the base-year level, which is caused by small subsidiaries as shown below. Although statistically insignificant, it then turns negative again and becomes larger in absolute value in 2011 and 2012 than it was from 2004 to 2006. These results are in line with those in Figure 1 and suggest the strong response of the average Japanese-owned subsidiary to the announcement and implementation of the tax reform in 2008 and 2009, respectively.

To examine the heterogeneous response, I estimate the difference in the tax semielasticities between large and small Japanese-owned subsidiaries and US-owned subsidiaries in each year by extending Equation (3) as follows:

$$\begin{aligned}\ln \pi_{it} = {} & \alpha_i + \beta_1 Tax_{it} + \beta_2 Small_i \times JP_i \times Tax_{it} + \beta_3 Large_i \times JP_i \times Tax_{it} \\ & + \sum_{j \neq 2007}^{2016} \beta^S_{JP,j} Small_i \times JP_i \times Tax_{it} \times Year_j + \sum_{j \neq 2007}^{2016} \beta^L_{JP,j} Large_i \times JP_i \times Tax_{it} \times Year_j \quad (5) \\ & + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \boldsymbol{X}_{it}\gamma + Size_i \times Home\ Country_i \times Industry_i \times Year_t + u_{it},\end{aligned}$$

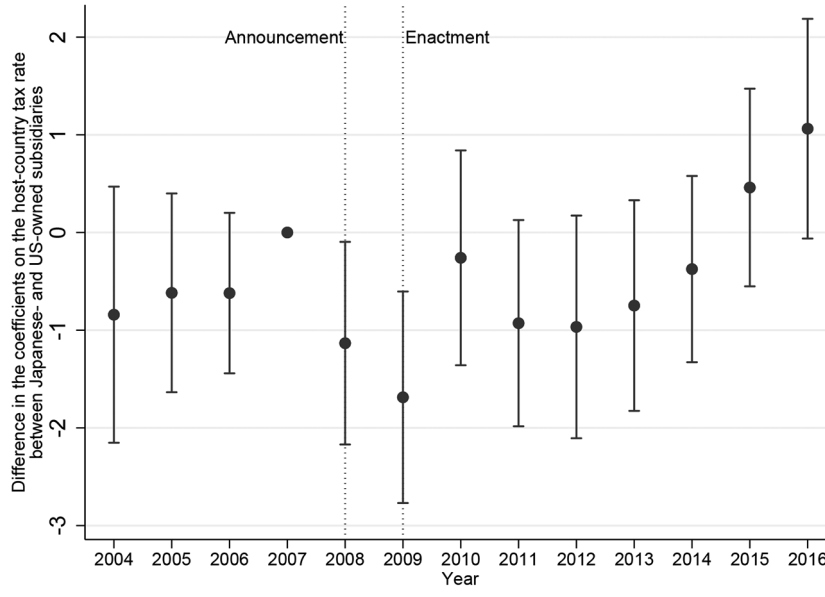

Figure 4. Difference in the tax semielasticities between Japanese- and US-owned foreign subsidiaries, 2004–2016. This figure plots the coefficient on $JP_i \times Tax_{it} \times Year_j$ and its 90 percent confidence interval for each year from 2004 to 2016, estimated from Equation (3). The coefficient for 2007 is normalized to 0. Standard errors clustered by subsidiary are used when calculating the confidence intervals. A color version of this figure is available online.

where the notations of the variables are the same as those in Equation (4). The key parameter of interest is the coefficient on $Large_i \times JP_i \times Tax_{it} \times Year_j$ (i.e., $\beta^L_{JP,j}$). The absolute value of $\beta^L_{JP,j}$ indicates the change in the difference of the tax semielasticities between large Japanese-owned subsidiaries and US-owned subsidiaries in year j from the base year of 2007. The absolute value of $\beta^S_{JP,j}$ can be interpreted similarly for small Japanese-owned subsidiaries.

Figure 5 plots the point estimate of $\beta^L_{JP,j}$ with a 90 percent confidence interval for each year, where that for 2007 is omitted and normalized to zero. Table A4 reports the point estimates and standard errors of all the coefficients $\beta^L_{JP,j}$ and $\beta^S_{JP,j}$. The coefficient is close to zero and statistically insignificant from 2004 to 2006. However, it suddenly drops in 2008 and takes a negative value from 2008 to 2014. In particular, the coefficients for 2008–2012 are larger in absolute value than those in Figure 4 and statistically significant except for 2010. The point estimates indicate that the difference in the tax semielasticities between large Japanese-owned subsidiaries and US-owned subsidiaries increases by around 1.8 points for 2008–2012 compared with the base year of 2007.[41] This result is in line with the results shown in Figure 2

[41] The coefficient is −1.75 in 2008, −2.02 in 2009, −1.36 in 2010, −1.66 in 2011, and −2.22 in 2012.

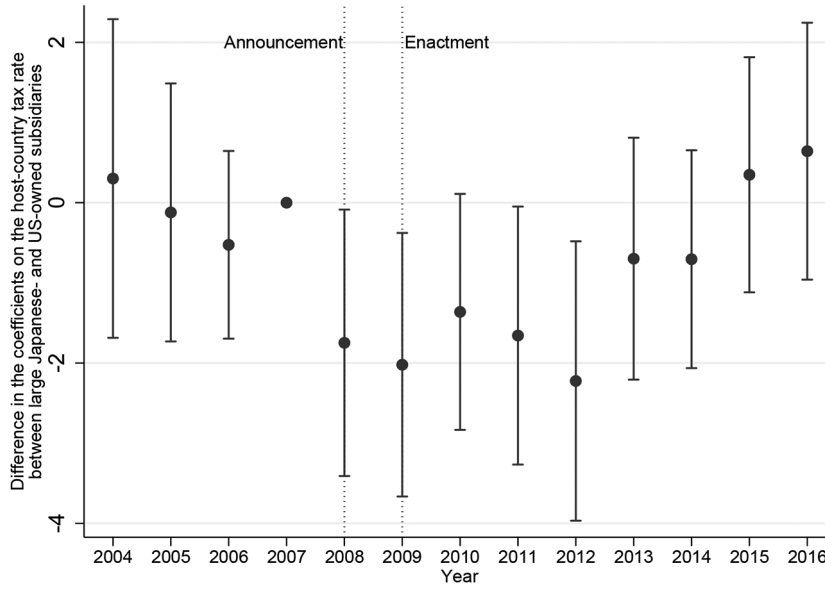

Figure 5. Difference in the tax semielasticities between large Japanese-owned subsidiaries and US-owned subsidiaries, 2004–2016. This figure plots the coefficient on $Large_i \times JP_i \times Tax_{it} \times Year_j$ and its 90 percent confidence interval for each year from 2004 to 2016, estimated from Equation (5). The coefficient for 2007 is normalized to 0. Standard errors clustered by subsidiary are used when calculating the confidence intervals. A color version of this figure is available online.

and suggests that large Japanese-owned subsidiaries responded to the tax incentive for profit shifting provided by the territorial tax system for several years after the announcement and implementation of the reform (at least until 2012).

Figure 6 plots the point estimate and confidence interval of $\beta^S_{JP,j}$ for each year. The absolute value of this coefficient indicates the change in the difference in the tax semielasticities between small Japanese-owned subsidiaries and US-owned subsidiaries in year j from the base year of 2007. In this figure, none of the coefficients is statistically significantly negative after 2008. In contrast to the case for large subsidiaries, the estimated coefficient is close to zero for most years from 2008 to 2016 and yields a relatively large positive value in 2010 and 2015–2016, suggesting that small subsidiaries did not clearly respond to the territorial tax reform by engaging in profit shifting.

Table A5 reports the number of US- and Japanese-owned foreign subsidiaries for each year in the sample. Note that subsidiary-year observations involving losses (or zero profit) are excluded from the sample. One concern is that because the analyses in this and the previous sections investigate the yearly changes in the tax semielasticities for Japanese-owned subsidiaries relative to US-owned subsidiaries, the results might

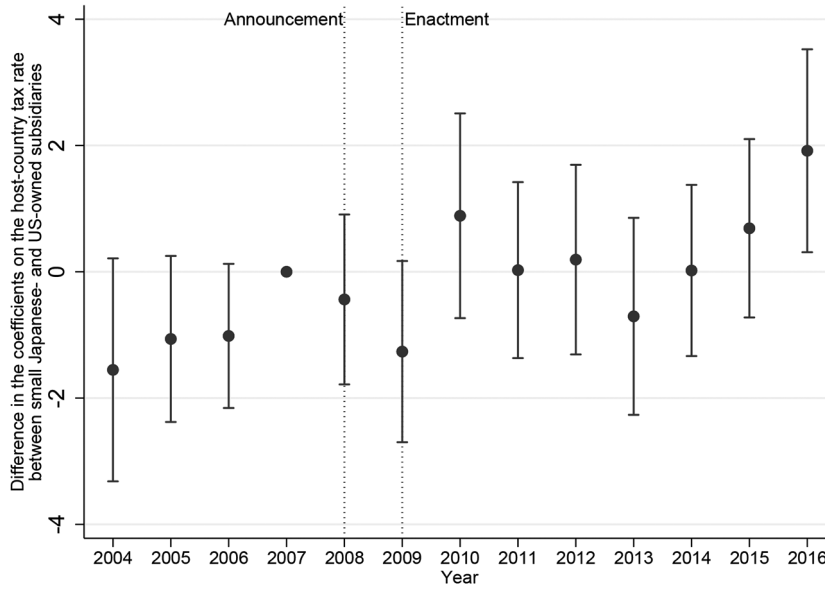

Figure 6. Difference in the tax semielasticities between small Japanese-owned subsidiaries and US-owned subsidiaries, 2004–2016. This figure plots the coefficient on $Small_i \times JP_i \times Tax_{it} \times Year_j$ and its 90 percent confidence interval for each year from 2004 to 2016, estimated from Equation (5). The coefficient for 2007 is normalized to 0. Standard errors clustered by subsidiary are used when calculating the confidence intervals. A color version of this figure is available online.

be sensitive to the composition of subsidiaries observed in the sample in each year.[42] To examine this issue, I restrict the sample to only subsidiaries that are included in the regression sample (i.e., subsidiaries with no missing values for any of the dependent and independent variables) at least 7 times, which is more than half of the 13-year period from 2004 to 2016.

Figure A1 presents the result from estimating Equation (3), the difference in the tax semielasticities between Japanese- and US-owned subsidiaries, whereas Figures A2 and A3 present the results from estimating Equation (5), the difference in the tax semielasticities between large and small Japanese-owned subsidiaries and US-owned subsidiaries. The results in Figures A1–A3 are consistent with those in Figures 4–6, respectively. Moreover, Figure A2 shows a somewhat stronger response of large Japanese-owned subsidiaries to the tax reform than shown in Figure 5. Therefore, the results are robust when using the more balanced panel.

There are two caveats regarding the interpretation of the results. First, my analysis identified the short-lived response of only a fraction of Japanese-owned subsidiaries:

[42] A potential concern is that many subsidiaries incurred losses because of the financial crisis, leading to a large reduction in the sample size for 2008–2009. However, I find that the numbers of US- and Japanese-owned subsidiaries remain almost unchanged or decrease only slightly for these years, as shown in Table A5.

large subsidiaries. The tax semielasticity for large subsidiaries sharply increased in 2008, began to decrease in 2013, and then returned to the level prior to the tax reform. Second, because my analysis focuses on the change in the profit-shifting behavior before and after the tax reform, I restrict the sample to subsidiaries that were included in the Orbis database in December 2013. The territorial tax reform would provide incentives for Japanese multinationals to invest in low-tax countries, as shown by Feld et al. (2016). However, my analysis does not capture the profit shifting by foreign subsidiaries established or incorporated by Japanese multinationals more recently. The extent of profit shifting by those subsidiaries may differ from my findings in this study.

VIII. CONCLUSION

This paper examines the sensitivity of the reported profits of Japanese multinationals to host-country corporate tax rates and its change following the enactment of a territorial tax system, using US multinationals as a comparison group. I find that on average, the tax semielasticity of pretax profits is larger for US-owned foreign subsidiaries than for Japanese-owned foreign subsidiaries over the entire study period from 2004 to 2016. This suggests that the average Japanese-owned subsidiary engaged in profit shifting to a lesser extent than did the average US-owned subsidiary.

However, the tax semielasticity for Japanese-owned foreign subsidiaries, particularly large subsidiaries, sharply increased after the announcement of the territorial tax regime in 2008, relative to that for US-owned foreign subsidiaries. By contrast, small subsidiaries did not show such a clear response. These results imply that the introduction of the territorial tax system encouraged profit shifting by Japanese multinationals that owned large foreign subsidiaries.

The caveat is that the profit-shifting response of Japanese multinationals diminished from 2013. This may reflect other policy changes, such as the revisions in the CFC rules, the introduction of the CbCR, or possibly the development of the BEPS project. Clarifying the causes of this phenomenon is beyond the scope of this paper. However, it is worth noting that Japanese multinationals became more sensitive to the tax incentive for profit shifting for several years after the announcement and implementation of the territorial tax reform.

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DISCLOSURES

The author has no financial arrangements that might give rise to conflicts of interest with respect to the research reported in this paper.

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