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by

Athiphat Muthitacharoen

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Athiphat Muthitacharoen*

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ABSTRACT

This study uses a firm-level dataset to examine the impacts of taxation on multinationals' decisions to set up new foreign subsidiaries in developing ASEAN countries. It finds that while taxes play a critical role in MNEs' location choice decision, there is an important heterogeneity in the tax responsiveness. First, the tax sensitivity for high-tech firms is significantly lower than that for low-tech firms. Second, having a prior presence in the respective host country is associated with substantially lower tax responsiveness. Finally, in accordance with international-tax-avoidance considerations, the tax responsiveness is significantly diminished for affiliates with a connection to tax-haven countries.

Keywords: Tax incentive; FDI; Multinational firms; Developing countries

JEL classifications: H25; H87; F21; F23; C25

* Corresponding author: Athiphat Muthitacharoen: Faculty of Economics, Chulalongkorn University, 254 Phyathai road, Patumwan, Bangkok Thailand 10400 (e-mail athiphat.m@chula.ac.th).

1. Introduction

For decades, developing countries often compete to attract foreign direct investment (FDI) using tax incentives. Examples of those tax preferential treatments are outright tax exemptions for a specific period (tax holiday), reduced tax rates, and investment tax credit. Such tax incentives, however, can incur large fiscal cost and may sometimes be ineffective and subject to abuse (de Mooij et al., 2020). By elevating fiscal sustainability concern around the world, the Covid-19 pandemic has pressured many governments to evaluate their expenditures as well as tax incentives in order to enhance their cost-effectiveness (International Monetary Fund, 2021). The needs to re-think such tax policy are also exacerbated by the second pillar of the 2021 global tax agreement which aims to set the floor on international tax competition.[1]

Central to this issue is the question of how multinational enterprises (MNEs) respond to taxes in their investment location choice decision. Improving design of tax-incentive policy requires an understanding of such responses and how they may vary for different groups of firms. For developing countries, however, there is limited firm-level empirical evidence on the tax responsiveness of MNEs.

This paper assesses the extent to which multinationals' location choice decision responds to taxation in the context of developing countries and explores the heterogeneity of the tax responsiveness. The empirical analysis is based on the conditional logit model (McFadden, 1974, 1976). It draws on the location choice data of multinationals which established their affiliates in five developing ASEAN countries (Indonesia, Malaysia, the Philippines, Thailand and Vietnam), hereafter the ASEAN5, over the period 2000-2016. To capture both host-country and international taxation, it constructs the bilateral effective average tax rate (EATR) using the methodology proposed by Devereux and Griffith (2003).

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[1] Pillar 2 of the 2021 global tax agreement applies the 15% global minimum tax rate to large multinational companies. This affects many developing countries because their tax incentives may lower tax burden and push effective tax rate of a multinational company in their countries to be below 15%. That company will then need to pay top-up taxes in the country in which its headquarter is registered.

ASEAN5 represents a good candidate for the study of taxation and MNEs' location choice decision for at least three reasons. First, ASEAN constitutes the largest recipient of FDI in the developing world—accounting for 14% of the global FDI flows in 2020 (ASEAN Secretariat, 2021). Over 90% of the world's 100 biggest non-financial MNEs (in term of foreign assets) also possess at least one subsidiarity in ASEAN in 2016 (ASEAN Secretariat, 2017). Second, the governments of these five countries have provided tax incentives to attract foreign multinationals with important variations in the tax treatment over time and across the host-home pair (Muthitacharoen, 2019). This allows us to test the impacts of taxation on the location choice decision. Finally, corporate income tax is a crucial source of revenue for most developing countries. Findings from this study, thus, provides important policy implications for developing-country governments.

Consistent with previous studies for advanced economies, the study finds that tax plays an important role on the location choice decision for MNEs entering ASEAN. To shed additional light on how firm heterogeneity may impact the tax responsiveness, I conduct a series of heterogeneity analyses. This yields three important findings.

First, high-tech firms are substantially less responsive to taxes than low-tech firms. One explanation is that high-tech firms are likely to prioritize non-tax factors, such as regulatory quality and political stability, and consequently put less importance on the tax consideration. This suggests that tax incentives may not be particularly effective if the goal is to attract technologically-intensive firms.

Second, the role of taxation is significantly lower for firms that have a prior presence in the host country, i.e., having owned at least one subsidiary in the host country prior to the observed location decision. With prior presence, return investors are likely to have developed understanding of opportunities and risks as well as relationships within the host countries. This thus lowers the importance of tax consideration for such firms. This finding highlights the potential redundancy of tax incentives and raises important concerns for policymakers who want to use them to encourage existing MNEs to set up a new establishment.

Third, the tax responsiveness is much smaller for firms with a tax-haven connection, i.e., having at least one firm in its corporate group located in a tax-haven country. One explanation is that firms with such connection have greater opportunities to shift their accounting profits abroad to lower their tax burden—making them less tax

sensitive. This finding suggests that international tax avoidance opportunities may blunt the tax responsiveness of MNEs. For tax incentives to attract MNEs as intended, the developing-country policymakers need to step up their efforts to address international tax avoidance.

This paper is closely related to two strands of literature. First, it contributes to the literature that employ firm-level data to investigate the role of taxation on the location decision of MNEs. Devereux and Griffith (1998), for example, studies the location decisions of US multinationals and find that the effective average tax rate has a significantly negative effect on the FDI location choice. Barrios et al. (2012) finds that in European countries both the host and parent country taxation have a negative impact on the location of MNEs' foreign subsidiaries, while Lawless et al. (2017) finds that in Europe there are large variations in the tax sensitivity across different groups of firms. Other examples include Dyreng et al. (2015) and Davies et al. (2018), while extensive reviews of the literature are given in de Mooij and Ederveen (2006) and Devereux and Maffini (2007).

Perhaps due to limited availability of data, little attention in the taxation literature has been paid to the firm-level empirical evidence for developing countries. Most studies that focus on those countries rely on aggregate country data. Van Parys and James (2010), for example, studies 12 CFA Franc Zone countries over 1994-2006. It finds no robust positive association between tax holidays and investment. Klemm and Van Parys (2012), employs a panel dataset of 47 countries in Africa, the Caribbean and South America over 1985-2004. It finds that cutting tax rates and extending tax holidays are effective in attracting FDI in some regions. Muthitacharoen (2019) examines the influence of taxation on FDI using FDI inflows data from South-East Asia over 2002-2013. It finds that tax is important but its economic significance is relatively smaller than that of other fundamental factors such as labor quality and governance. This study deviates from those studies by using firm-level data and focusing on location choice decisions of MNEs.

Empirical findings in developed countries may not directly apply to emerging markets since MNEs' tax responsiveness is likely to interact with the development level of locations. (e.g. Mutti and Grubert, 2004; Azémar and Delios, 2008; Goodspeed et al., 2011). This study is also related to papers that examines tax and investment response in Southeast Asia using firm-level data (e.g. Pham, 2020; Muthitacharoen, 2021a, 2021b). In addition to providing firm-level empirical evidence for developing countries, my study

also contributes to this literature by providing evidence suggesting the importance of a prior presence in the host countries on the MNEs' tax responsiveness.

Second, my paper contributes to the growing pool of studies that investigate the relationship between international tax avoidance opportunities and FDI. The theoretical literature has illustrated that having settings that are favourable to tax planning may provide effects on FDI in a similar manner to establishing a preferential tax regime (e.g. Keen, 2001; Janeba and Smart, 2003; Becker and Fuest, 2012; Hong and Smart, 2010). Within this literature, my finding underlines the relevance of international tax avoidance opportunities on the tax sensitivity of MNEs' location choice. In addition, it complements those of Buettner et al. (2018) which uses the German MNE data and shows that imposing anti profit-shifting legislations is associated with a stronger response of FDI to changes in the host-country tax rate.

The remainder of this paper is organized as follows. Focusing on inherent characteristics of MNEs, Section 2 examines factors that may influence how MNEs' location choice decision responds to taxation. Section 3 describes the firm-level data and the construction of tax variables, while Section 4 illustrates the methodology. The results and their policy implications are discussed in Section 5. Section 6 concludes the study.

2. Theoretical considerations and related literature

A large and growing body of theoretical literature has investigated the increasing competitive pressure on governments to lower their corporate income tax rates.[2] This tax competition literature is rooted in the models developed by Zodrow and Mieszkowski (1986) and Wilson (1986). The tax competition is generally viewed as a game where players choose a tax level in order to attract a mobile tax base. The literature typically focuses on the cross-border flow of capital. One important general finding is that FDI tends to be sensitive to taxation.

In the context of international tax competition, this section discusses factors that may influence how MNEs' location choice decision responds to taxation. It focuses on those related to inherent characteristics of FDI and MNEs. The discussion is based on

[2] For an extensive survey of literature on tax competition, see, for example, Fuest, Huber and Mintz (2005), Zodrow (2010), Genschel and Schwarz (2011), and Heimberger (2021).

theoretical studies and empirical evidence. I classify those factors into two main groups: real-activity factors and profit-shifting ability.

2.1 Real-activity factors

Theoretical international economics studies generally distinguish MNEs' location choice decisions based on their motivation (see, for example, Helpman, 1984; Markusen, 2002). The literature broadly divides FDI motivation into two main types: 1) Horizontal investments where MNEs are principally motivated by access to domestic markets and 2) Vertical investments where MNEs are seeking efficiency.

Empirical studies tend to find that vertically-motivated FDI is more responsive to taxation than horizontally-motivated investment. Mutti and Grubert (2004), for example, considers foreign affiliates of US MNEs and documents larger tax elasticities among efficiency-seeking affiliates compared to market-seeking affiliates. Overesch and Wamser (2009) studies foreign affiliates of German MNEs and finds that vertical-investment projects are more tax-responsive than their horizontal counterparts. Coherently, Andersen et al. (2018) illustrates that, in industries dominated by vertical FDI, tax competition for MNEs tends to be strong especially among developing countries.

In addition to motivation, location choice decisions associated with certain types of investment projects may exhibit less responsiveness to corporate taxation than others. The degree of technological intensity may represent one source of such difference in the tax responsiveness. High-tech investment generally requires workers with a specific set of skills as well as accommodating innovation ecosystem (e.g. Woodward et al., 2006; Arauzo-Carod, 2021). Consequently, it is expected that high-tech FDI is less responsive to tax compared to low-tech investment.

The extent to which investment projects can be relocated may also determine their tax responsiveness (Overesch and Wamser, 2009). Investment projects with larger relocation difficulties are generally considered less physically mobile. Consequently, I expect those with larger share of fixed assets to be less responsive to tax.

2.2 Profit-shifting ability

Subsequent studies on tax competition have extended the workhorse model developed by Zodrow and Mieszkowski (1986) and Wilson (1986) in various ways. I highlight one which is the mobility of tax base. In practice, the tax base that governments compete over

is not absolutely tied to real activity. MNEs can shift paper profits to their affiliates in low-tax jurisdictions (see Hines and Rice, 1994; Huizinga and Laeven, 2008; Muthitacharoen and Sampantharak, 2020).

Such international profit shifting can reduce the extent to which MNEs' location choice decision responds to taxation and affect international tax competition (Keen and Konrad, 2013). This suggests that MNEs' tax responsiveness may depend on their ability to engage in international profit shifting and those MNEs with profit-shifting ability are likely to care less about statutory tax rates and tax incentives (Overesch and Wamser, 2009).

Tax havens represent an important tool facilitating MNEs' shifting of profits to low tax jurisdictions. Desai et al. (2006) focuses on US firms and illustrates that MNEs operating in industries with extensive intrafirm trade are more likely to operate in tax havens. Its analysis indicates that MNEs establish tax-haven subsidiaries as part of their international tax avoidance strategies. Jones and Temouri (2016) expands the focus to cover MNEs in 12 OECD countries and demonstrates that MNEs with significant intangible assets are more likely to use tax haven operations to exploit cross-country tax differences. Hence, I expect lower tax responsiveness for the location choice decisions of MNEs with tax-haven subsidiaries.

3. Data

3.1 MNE data

The study uses firm-level financial account data and ownership information from Bureau van Dijk's Orbis database. Firms' financial account data have been actively used in many academic studies in the international tax area (e.g. Huizinga and Laeven, 2008; Voget 2011; Dharmapala and Riedel, 2013). The Orbis database is based on information from different sources, such as the chambers of commerce, local public authorities and credit institutions, and has been standardized to improve consistency across countries.

By design, the sample used in this study reflects the location decisions of newly-established foreign subsidiaries. A firm is defined to be a foreign subsidiary if at least 50% of the shares are ultimately owned by a foreign firm. The sample includes subsidiaries that were incorporated over the 2000-2016 period.

The study focuses on new subsidiaries in the middle-income ASEAN5 counties. According to Davies and Voget (2008), multinational firms are expected to follow a sequential location decision when setting up subsidiaries abroad. That is, an MNE first decides which region to set up its subsidiary and then chooses which country. Given that the ASEAN5 countries are of similar development stage, it is likely that an MNE consider them as candidates when deciding to invest in ASEAN. In order to make the analysis tractable, also on subsidiaries from the top 25 parent countries in term of the number of subsidies in ASEAN5.[3] After the application of these selection criteria and the elimination of observations with missing information, I arrive at a total sample of 6,616 foreign affiliates that were established during the 2000-2016 period in ASEAN5 (Table 1). This sample is used for the baseline analysis.

Panel A of Table 1 provides a breakdown of the sample in terms of the parent and host countries. The top five parent countries in term of the number of firms are Japan, Singapore, US, UK and Germany. These five countries account for 66% of the sample. In term of host countries, the top two host countries are Thailand and Malaysia, which account for 74% of all subsidiaries.

Although Orbis is a rich source of corporate financial and ownership data, certain limitation should be noted. First, the Orbis database only reports subsidiary information as of the most recent update. For example, if an MNE had a subsidiary in a host country in 1996 and then liquidated that subsidiary in 2002, I would erroneously treat that MNE as not having a prior presence in the host country. This is a well-known and common problem in all studies in the international tax literature using Orbis.

Second, the low share of foreign subsidiaries in Indonesia is at odds with the distribution of host-country inward FDI based on the aggregated balance of payments data. This is largely due to weak compliance and enforcement with respect to the company regulations for filing in Indonesia.[4] The sensitivity of the baseline estimate with

[3] These countries are Australia, Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, Hong Kong, India, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom, and United States.

[4] See, for example, Ikhsan et al. (2005).

respect to the low coverage of foreign subsidiaries in Indonesia is, therefore, examined in one of the robustness tests.

Table 1: Descriptive statistics

Panel A: Breakdown in terms of parent and host countries			
Parent countries	**%**	**Host countries**	**%**
Japan	32.4	Indonesia	4.3
Singapore	12.8	Malaysia	27.6
US	10.2	Philippines	10.8
UK	5.7	Thailand	46.3
Germany	4.5	Vietnam	10.9
Others	**65.6**	**Total**	**100**

Panel B: Summary statistics for variables used in the baseline regression analysis				
Variable	**N**	**Mean**	**Median**	**SD**
Bilateral EATR	33,080	0.157	0.133	0.078
Distance	33,080	6,497	5,329	4,143
Colonial relationship	33,080	0.045	0.000	0.207
Host-country real GDP	33,080	317,700	244,600	227,900
Host-country governance quality	33,080	0.000	-0.751	1.984
Host-country subscription rate	33,080	83.531	88.984	47.109
Additional tax variables				
Host-country EATR	33,080	0.081	0.096	0.035
International EATR	33,080	0.076	0.040	0.078
EATR without tax incentives	33,080	0.284	0.275	0.048

Note: Distance is measured in kilometre. Colonial relationship is an indicator variable that signals any colonial relationship between each country pair. Real GDP is in millions of constant of 2010 US dollar. Mobile subscription is per 100 people. Governance quality is the first principal component of WGI's six governance indicators.
Source: Author's estimate

3.2 EATRs

I use the bilateral EATR in the baseline analysis, while employing the alternative tax variables in the robustness tests. As a forward-looking tax rate, the EATR is a measure of the proportion of the net present value of profitable investment projects that is taxed away by the government. The net present value considered is that of a hypothetical investment project which perturbates the capital stock for one period. It is considered a

relevant tax indicator for locational attractiveness as it presupposes an indivisible, infra-marginal investment rather than a marginal investment.

The EATR It is generally the preferred tax measure for studying the impact of taxation on investment location choice (e.g. Devereux and Maffini, 2007; Lawless et al., 2017). The computation of the bilateral EATR here is based on the methodology proposed by Devereux and Griffith (2003) and later modified by Klemm (2012) to incorporate incentives that are typically used in developing countries such as tax holidays. The modification replaces the assumption of a one-period investment with a permanent investment where only depreciation lowers the amount of productive capital. This converts the EATR to an infinite investment horizon and allows me to incorporate the tax holiday in the analysis.

The tax computation in the baseline analysis takes into account the relevant host-country and international tax code. For host-country taxation, it incorporates standard and preferential tax treatments, including the standard depreciation deduction, withholding taxes on repatriated profits, tax holidays and post-holiday tax reduction. For international taxation, it takes into account the treatment of foreign income in the parent countries and both unilateral and bilateral measures to relieve double taxation (as specified in the double tax agreements), including underlying tax credit, territorial exemption and tax sparing provision.

The computation of the bilateral EATR necessarily requires a few assumptions. The bilateral EATR in the baseline analysis is based on the maximum publicly announced tax incentives. Since only a subset of firms was qualified to receive such preferential tax treatment, I show the results with the bilateral EATR based on the standard tax treatment in one of the robustness tests. In line with Suzuki (2014), I assume that the investment is financed with retained earnings and that the profits associated with the investment project are immediately repatriated as dividend to the parent company.[5] The analysis focuses on

[5] Specifically, I assume that a parent company in the home country decides to invest in a host country by setting up a wholly-owned foreign subsidiary. That subsidiary finances its investment using retained earnings. Therefore, the dividend to its parent is reduced by the same amount. In turn, the subsidiary's profits associated with the investment are immediately sent to the parent company. Without tax reliefs, this consequently results in

taxation at the corporate level and does not take into account divided taxation at the personal income tax level.

The assumptions regarding the investment project are consistent with previous studies that compute the EATR for the region (e.g. Botman et al., 2010; Suzuki, 2014). The profit rate is assumed to be 20% while the economic depreciation rates for machinery and buildings are 12.25% and 3.6%, respectively. I also assume the real interest rate of 5% and the inflation rate of 2% for consistency with the region's historical macroeconomic data.[6] The investment project consists of 59% machinery and 41% of buildings. These shares correspond to an average investment project based on the Office of National Economics and Social Development Board's Input-Output Table of Thailand (2010).

For illustrative purposes, Tables 2 and 3 show key tax provisions that were applicable to an investment by a foreign multinational in ASEAN5 for 2016.[7] The data on the tax parameters is obtained from Suzuki (2014) and the PricewaterhouseCoopers' Bangkok office. The statutory corporate income tax rates, for example, range from 20% to 30% in 2016. All of the host countries provide generous tax holiday with additional tax incentives after the holiday expires. There is also a considerable variation in the withholding tax rates across ASEAN5, which is largely due to bilateral tax agreements and unilateral methods of double taxation relief. Additionally, although most home countries have adopted territorial tax system and therefore exempt foreign dividend income, a few countries still tax foreign dividends.

Table 2: Key tax provisions applicable to foreign subsidiaries in ASEAN5 (2016)

double taxation of profits. I also assume that a home country exempts foreign divided when it exempts foreign dividends up to at least 95%.

[6] Using the same macroeconomic assumption across the region is consistent with the literature and allows the bilateral EATR to abstract from macroeconomic conditions and represent the differences in tax policy. It also avoids potential endogeneity problem.

[7] Although Tables 2 and 3 report the key tax provisions only for 2016, the computation of the effective tax rate variables is based on the tax provisions for the entire study period (2000-2016).

Host country	Statutory corporate income tax rate (%)	Maximum tax incentive	Withholding tax rates on foreign dividend (%)
Indonesia	25	Tax holiday of 8 years with 50% tax reduction for additional 2 years	5%-20%
Malaysia	24	Tax holiday of 8 years with 20% tax reduction for additional 5 years	0
Philippines	30	Tax holiday of 8 years with the tax rate reduced to 5% after the holiday ends	10%-30%
Thailand	20	Tax holiday of 8 years with 50% tax reduction for 5 years	10% (except Taiwan: 5%)
Vietnam	20	Tax holiday of 4 years with the rate reduced to 5% for 9 years after the holiday ends and to 10% for the next 2 years	0

Source: Suzuki (2014) and the PricewaterhouseCoopers' Bangkok office

Table 3: Treatment of foreign dividend income from host country in ASEAN5 (2016)

Home countries	Host countries				
	Indonesia	**Malaysia**	**Thailand**	**Philippines**	**Vietnam**
Australia	Exemption	Exemption	Exemption	Exemption	Exemption
Austria	Exemption	Exemption	Exemption	Exemption	Exemption
Belgium	Exemption	Exemption	Exemption	Exemption	Exemption
Canada	Exemption	Exemption	Exemption	Exemption	Exemption
China	Indirect	Indirect; Tax sparing	Indirect; Tax sparing	Direct	Indirect; Tax sparing
Denmark	Exemption	Exemption	Exemption	Exemption	Exemption
Finland	Exemption	Exemption	Exemption	Exemption	Exemption
France	Exemption	Exemption	Exemption	Exemption	Exemption
Germany	Exemption	Exemption	Exemption	Exemption	Exemption
Hong Kong	Exemption	Exemption	Exemption	Exemption	Exemption
India	Direct; Tax sparing	Direct; Tax sparing	Direct; Tax sparing	Direct; Tax sparing	Direct; Tax sparing
Ireland	Direct	Indirect; Tax sparing	Indirect; Tax sparing	Direct	Indirect; Tax sparing
Italy	Exemption	Exemption	Exemption	Exemption	Exemption
Japan	Exemption	Exemption	Exemption	Exemption	Exemption
Luxembourg	Exemption	Exemption	Exemption	Exemption	Exemption
Netherlands	Exemption	Exemption	Exemption	Exemption	Exemption
Norway	Exemption	Exemption	Exemption	Exemption	Exemption
Singapore	Exemption	Exemption	Exemption	Exemption	Exemption
South Korea	Indirect; Tax sparing	Indirect; Tax sparing	Indirect; Tax sparing	Indirect	Indirect; Tax sparing
Spain	Exemption	Exemption	Exemption	Exemption	Exemption
Sweden	Exemption	Exemption	Exemption	Exemption	Exemption
Switzerland	Exemption	Exemption	Exemption	Exemption	Exemption
Taiwan	Direct; Tax sparing	Direct; Tax sparing	Direct; Tax sparing	Direct	Direct; Tax sparing
UK	Exemption	Exemption	Exemption	Exemption	Exemption
US	Indirect	Indirect	Indirect	Indirect	Indirect

Note: Exemption refers to exemption of foreign dividends up to at least 95%. Direct refers to direct (ordinary) tax credit. Indirect refers to indirect (underlying) tax credit. Tax sparing refers to tax sparing credit.
Source: The PricewaterhouseCoopers' Bangkok office.

3.3 Summary statistics

For each of the firms in the sample, I construct observations that represent alternative host countries that may be chosen. I also construct an indicator variable that takes on a value of one for observations which represent the actual location choice and zero otherwise. This results in five observations for each firm in the sample.

Summary statistics on the tax variables and control variables are provided in panel B of Table 1. The mean bilateral EATR is 0.157, while its median is 0.133. The information on bilateral distance and colonial relationship is taken from the CEPII database. Distance is measured in km. Colonial relationship is an indicator variable that signals any colonial relationship between each country pair. Information and communication infrastructure is represented by the ratio of mobile cellular subscription per 100 people. Both real GDP (in millions of constant of 2010 US dollar) and mobile subscription ratio are taken from the World Bank's World Development Indicators (WDI). The governance quality variable is based on the information from the World Bank's Worldwide Governance Indicators (WGI).[8] Since the WGI's individual governance indicators are highly correlated, I use their first principal component as an index of the host countries' governance quality.

4. Conceptual framework

The primary purpose of this study is to examine the effect of tax on the choice of a foreign subsidiary location for MNEs in ASEAN5. The study draws on the existing literature by using the conditional logit model (McFadden, 1974, 1976) to model the location choice as a function of tax and other factors. While this model has been widely applied in the literature that focuses on the impact of taxation on the location choice (e.g. Barrios et al., 2012; Dyreng et al. 2015; Lawless et al., 2017), it imposes the assumption of independence of irrelevant alternatives (IIA), which implies that adding or removing

[8] This includes six indicators of governance: 1) control of corruption, 2) government effectiveness, 3) political stability and absence of violence, 4) regulatory quality, 5) rule of law, and 6) voice and accountability.

alternatives does not affect the relative probability among the remaining alternatives.[9]

The fundamental premise of the conditional logit model is that an MNE chooses the location choice that maximizes its profit over all other choices. The profit for firm *i* can be described as a function of the observable country characteristics (tax and other factors) and an unobservable component of profit, written as Eq. (1);

$$\Pi_{ij} = \beta' X_{ij} + \varepsilon_{ij} \,, \tag{1}$$

where Π_{ij} is the profit for firm i if located in country j, X_{ij} is a vector of location-specific control variables, and ε_{ij} is the error term.

Assuming that the error term ε_{ij} follows a type 1 extreme value distribution and is independent and identically distributed across all firms and alternative locations, the probability of host country *h* being chosen by firm *i* can be written as Eq. (2):

$$P_i(h) = \frac{e^{X'_{ih}\beta}}{\sum_{j \in J} e^{X'_{ij}\beta}} \,, \tag{2}$$

where J is the set of location choices faced by firm i, and $\sum_{j \in J} P_i(j) = 1$.

In addition to taxation, prior research documents five major categories of country characteristics that likely influence the foreign subsidiary location decisions of MNEs. This includes: 1) Size of the economy, 2) Geographical proximity, 3) Cultural proximity, 4) Governance quality, and 5) Infrastructure adequacy (see, for example, Barrios et al., 2012; Blanco and Rogers, 2012; Grubert and Mutti, 2000; Mutti and Grubert, 2004).

Consequently, the baseline model specification includes the log of real GDP, the log of bilateral distance, the colonial link between the country pair, the governance quality, and the mobile subscription rate.[10] Throughout the paper, all standard errors are heteroscedasticity robust and clustered at the firm level. As discussed in detail in the next section, I also perform the Extreme Bounds Analysis (Sala-i-Martin 1997) as a robustness

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[9] The test of IIA, however, may not be particularly useful since ones can almost always obtain some tests that accept the null hypothesis and others that reject it using the same model with the same data (Fry and Harris, 1996, 1998; Cheng and Long, 2007; Long and Freese, 2014).

[10] Infrastructure adequacy in the MNEs' decision is likely to go beyond the mobile subscription rate employed in the baseline model. I address this concern by adding variables related to physical infrastructure (e.g. airport and railway) in the sensitivity analyses.

test regarding the choice of the control variables in the baseline specification. This test essentially considers the distribution of estimates on the basis of all possible combinations of other control variable.

5. Results and Discussions

In this section, I first provide and discuss the findings on the impacts of taxation on the location choice. I then proceed to investigate the heterogeneity in the tax responsiveness with respect to MNEs' characteristics.

5.1 Baseline estimate and sensitivity analyses

I begin the analysis by estimating the baseline impacts of taxation on MNEs' location choice (Table 4). Variables are added incrementally in Column 1 through Column 3 in order to illustrate the robustness of the estimate. The estimate in Column 4 represents the baseline estimate and is the most general model including economy size, geographical and cultural links, governance quality and infrastructure.

The EATR variable constitutes the main focus point of the analysis. Its coefficient is negative and statistically significant at the 1% level across Columns 1 to 4. It enters the baseline specification with a coefficient of -5.33. Its direct marginal effect, evaluated at the mean of all regressors, is -0.85. [11] This implies that an increase in the EATR by 1 percentage point lowers the conditional probability of locating in a particular country by 0.85%.[12]

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[11] Following Davies, Greenwood and Li (2001) and Lawless et al. (2017), the marginal effect of the tax variable evaluated at the means of all control variables can be computed as $\frac{1}{J}(1-\frac{1}{J})\beta_{tax}$, where J is the number of host countries and β_{tax} is the coefficient of the tax variable.

[12] It is important to note that this interpretation of the marginal effect is for illustrative purpose. Since the probability curve is non-linear, a marginal change is the instantaneous rate of change that does not exactly correspond to the change in the probability associated with a one-percentage point increase in the EATR.

Comparing the elasticity estimate with those obtained by previous studies is a little difficult due to different model specifications as well as assumptions on EATR construction and marginal-effect computation. Nevertheless, this EATR elasticity estimate for ASEAN is slightly lower than Lawless et al. (2017)'s comparable estimate of -1.26 for European countries.[13]

The other coefficients generally have the expected signs. A country's economy size (real GDP) is estimated to increase the probability of location with significance at the 1% level. The same is true for the colonial relationship, governance quality and infrastructure. Countries with a longer distance are also significantly less likely to be chosen as foreign subsidiaries.

Table 4: Base model specification

VARIABLES	(1) Tax only	(2) (1)+proximity	(3) (2)+economic factors	(4) Baseline (3)+Infrastructure
Bilateral EATR	-2.101***	-2.028***	-5.166***	-5.331***
	(0.332)	(0.347)	(0.562)	(0.563)
Distance (L)		-0.709***	-0.688***	-0.701***
		(0.032)	(0.038)	(0.038)
Colonial		0.144**	0.199***	0.229***
		(0.062)	(0.063)	(0.064)
Real GDP (L)			0.305***	0.350***
			(0.027)	(0.029)
Governance			0.206***	0.159***
			(0.005)	(0.007)
Mobile Subscription				0.009***
				(0.001)
Observations	33,080	33,080	33,080	33,080
Marginal effects of the tax variable				
Bilateral EATR	-0.336	-0.324	-0.827	-0.853

Notes: 'L' indicates log. Numbers in parentheses indicate standard errors which are heteroscedasticity robust and clustered at the firm level. ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all

[13] Although Lawless et al. (2017)'s assumptions behind its elasticity estimate are comparable to this study in many ways, its preferred model includes the squared term of the bilateral EATR variable. In its model that includes only the linear term of the bilateral EATR variable, the bilateral EATR coefficient is positive and not significant.

regressors.
Source: Author's analysis

Sensitivity analyses

A number of sensitivity tests were performed to study the robustness of the baseline results. First, the entire distribution of estimates on the basis of all possible combinations of other control variables was evaluated, rather than the ones included in the baseline specification by employing the EBA (Leamer, 1983; Levine and Renelt, 1992) but following the approach of Sala-i-Martin (1997) to take into account the whole distribution of the estimated coefficients rather than only the lower and upper extreme bounds.[14]

The EBA is based on 4,096 regressions and the results indicate that the EATR variable is a robust determinant of the location choice (Table 5). It is statistically significant at the 0.05 level in over 96% of the regressions. The average EATR is -6.077. Its 95% confidence interval is fairly small and encompasses only negative values. This provides a strong robustness check of the estimate of the EATR variable to the selection of controls.

Table 5: Descriptive statistics for the distribution of the EATR coefficients

Variable	Number of regressions	Avg. beta	Avg. SE	% Sig	CDF	95% CI	
						Lower Bound	Upper Bound
EATR	4,096	-6.077	0.831	95.5	0.963	-5.999	-6.155

Notes: 'Avg. beta' indicates the average coefficient, while 'Avg. SE' refers to the average standard error of all regressions. '%Sig indicates the percent of regressions in which the coefficient is statistically different from zero at the 5% level at least. 'CDF' reports the unweighted mass of the distribution of the estimated coefficient on the left side of zero. '95% CI' reports the lower- and upper-bounds of the 95% Confidence Interval for the average coefficient.
Source: Author's analysis

Second, I examine separately the roles of host-country and international taxation on the location choice decision by dividing the bilateral effective tax variable into two respective components. The host-country EATR reflects domestic tax provisions including the statutory tax rate, allowance depreciation and tax holidays. The

[14] The summary statistics of additional control variables used in the extreme bounds analysis is provided in Table A1 of the appendix.

international EATR is the difference between the bilateral EATR and the host-country EATR and reflects both non-resident withholding taxation in the host country and additional taxation at the parent country. The estimated coefficients of both tax variables were found to be statistically significant at the 1% level and to have roughly the same size (Table 6).[15]

This finding is in line with the study using European data (Barrios et al., 2012) and indicates that both the host-country and international taxation play a significant role in the ASEAN location choice decision of MNEs. Thus, although deferral of foreign income until dividend repatriation is available in a few countries, MNEs exhibit significant incentives to choose subsidiary locations that make them internationally tax-efficient.

Third, the computation of the bilateral EATR in the baseline specification is based on the assumption that firms receive host-country maximum tax incentives from host countries. Although the tax incentives are often prevalent, not all firms are eligible for the maximum tax incentives. As an alternative effective tax measure, I perform the robustness test where I use instead the bilateral EATR under the standard tax treatment (removing the host-country preferential tax treatment such as tax holidays). As indicated in Table 6, the EATR variable obtains a statistically negative coefficient, which is consistent with the baseline estimate.

Table 6: Robustness tests: EATR coefficients and corresponding marginal effects

	Coefficients	Marginal effects
Separating components of EATR		
Host-country EATR	-5.855***	-0.937
International EATR	-5.306***	-0.849
Removing tax incentives		
Bilateral EATR	-3.558***	-0.569
Excluding Indonesian subsidiaries		
Bilateral EATR	-3.513***	-0.659

Notes: ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all regressors. Full results are provided in Table A2 of the appendix.
Source: Author's analysis

[15] Full results of the robustness tests are provided in Table A2 of the appendix.

Finally, I examine any potential bias in the baseline model estimation due to the under-representativeness of Indonesian foreign subsidiaries. I re-estimate the baseline model excluding the Indonesian subsample, which lowered the number of host-country choices to four. The corresponding results confirm the sign and significance of the parameter estimate for the EATR obtained earlier in the baseline model although its magnitude is slightly smaller (Table 6).

5.2 Heterogeneity of the taxation impact

In order to gain additional insight in the heterogeneity impact of taxation on foreign subsidiary location, I conduct a set of heterogeneity tests with respect to various firm characteristics. Table 7 provides breakdown in terms of firm numbers across 6 dimensions: sector, technological intensity, size, prior presence, tax-haven connection and mobility.

Table 7: Breakdown across dimensions used in heterogeneity analysis (%)

Sector		**Tech intensity**		**Size**	
Manufacturing	43.5	Low	75.7	Small	75.0
Services	44.0	High	24.3	Large	25.0
Others	12.4				
Prior presence		**Tax-haven connection**		**Mobility**	
Without	70.5	Without	40.5	Low	75.0
With	29.5	With	59.5	High	25.0

Source: Author's analysis

The analysis begins with the heterogeneity with respect to sector. I focus on manufacturing and services, since those two sectors account for almost 90% of the sample (Table 7). The results show that the tax sensitivity is roughly similar between the two sectors, with no significant difference between them (Table 8).[16]

[16] Full results of the heterogeneity analysis are provided in Tables A3-A4 of the appendix.

Next, I divide the sample of manufacturing and services firms by their technology intensity into two groups.[17] Approximately 24% of the sample are classified as high-tech (Table 7). The findings indicate that the EATR coefficient associated with the high-tech affiliates are not significantly different from zero (Table 8). This is in sharp contrast to that associated with the low-tech firms, which maintains its significance. [18] The result is consistent with Woodward et al. (2006), Lawless et al. (2017) and Arauzo-Carod (2021). High-tech firms are likely to prioritize labor quality and innovation ecosystem over the tax cost.

In term of size, I divide the sample into two groups based on their total assets using the 75th percentile as the cut-off. The findings reveal that small subsidiaries are significantly less tax responsive than their large counterparts (Table 8).[19]

Table 8: Heterogeneity of the tax responsiveness with respect to prior presence, tax-haven connection and mobility

	EATR Coefficients	**Marginal effects**
Sector:		
Manufacturing	-4.516***	-0.723
Services	-4.812***	-0.770
Tech intensity:		
Low	-5.259***	-0.841
High	-2.161	-0.346
Asset size:		
Small	-3.847***	-0.616
Large	-7.543***	-1.207
Prior presence:		

[17] I distinguish between firms that belong to sectors with low and high technology intensity using information from the Eurostat aggregation. High-tech group include manufacturing firms that are classified as high-technology and services firms that are classified as high-tech knowledge-intensive and knowledge intensive. For further details, see https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf.

[18] A Wald test indicate that the coefficients on the effective tax variables are significantly different across the two regressions (Low-/High-tech firms).

[19] A Wald test indicate that the coefficients on the effective tax variables are significantly different across the two regressions (Small/Large Firms).

Without	-5.740***	-0.918
With	-3.898***	-0.624
Tax-haven connection:		
Without	-7.789***	-1.246
With	-3.420***	-0.547
Mobility:		
Low	-1.829	-0.293
High	-5.647***	-0.904

Notes: ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all regressors. Full results are provided in Tables A3 and A4 of the appendix.
Source: Author's analysis

Next, I investigate whether the tax sensitivity is different for firms that have prior establishment in the respective host country. This will shed some light on the relative effectiveness of tax incentives in attracting new MNEs and in stimulating further investment for those that already had a presence. Specifically, I divide MNEs into two groups: those that have at least one subsidiary in the host country prior to the observed location decision and those that do not.[20] Roughly 30% of firms have prior presence (Table 7).

The findings indicate that, although the EATR coefficient is negative and statistically significant for both groups, it is significantly lower in absolute term for the subsidiaries with a prior presence (Table 8).[21] The elasticity for those firms with a prior presence is about 70% of that for subsidiaries without a prior presence. This finding suggests that the effectiveness of the tax incentives in influencing the location choice is significantly lower for MNEs that already have their presence in the host country.

I also examine the extent to which the importance of tax incentives is undermined by MNEs' international tax avoidance opportunities. I split the sample into two groups based on their connection with tax haven countries. A firm is considered having a tax-haven connection if it has at least one firm in its corporate group located in a tax-haven

[20] The classification is based on the information of subsidiaries incorporated since 1990. I also tested the robustness of the results by using the information of subsidiaries incorporated since 2000. The results are qualitatively consistent (Table A5 of the appendix).

[21] A Wald test indicates that the coefficients on the effective tax variables are significantly different across the two regressions (Not having/ Having a prior existence).

country. The list of tax-haven countries is based on Gravelle (2015).[22] Roughly 60% of firms in the sample have tax-haven connection (Table 7). Those MNEs with a tax-haven connection are expected to have more opportunities to reallocate profit; making the taxation less relevant.

The findings indicate that the role of taxation is significantly smaller for firms with a tax-haven connection (Table 8).[23] [24] The implied tax elasticity for firms with a tax-haven connection is less than half of that for firms without the connection. Consistent with earlier theoretical and empirical studies (e.g. Desai, 2006; Keen and Konrad, 2013), this evidence suggests that tax incentives are significantly less relevant for MNEs that have greater opportunities to shift profit.

Finally, I consider the heterogeneity of tax responsiveness in terms of mobility. Firms with a greater share of fixed assets are expected to find it difficult to physically relocate and may be less sensitive to tax incentives. Thus, I proxy the degree of mobility with the ratio of fixed assets to total assets. The upper 25th percentile of this ratio is then used to split subsidiaries into the two groups of high- and low-mobility.

Consistent with Barrios et al. (2012) for the European countries, the results reveal that high-mobility firms are particularly tax sensitive (Table 8). The implied tax elasticity associated with the high-mobility group roughly triples that of the low-mobility firms.[25] This finding raises questions about the merits of providing tax incentives to attract MNEs since it may be essentially drawing companies that tend to be foot-loose.

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[22] As a robustness test, I modify the tax haven classification by excluding Hong Kong and Singapore which are large tax-haven economies in the region. The results are qualitatively consistent (Table A6 of the appendix).

[23] A Wald test indicates that the coefficients on the effective tax variables are significantly different across the two regressions (Without/With a tax-haven connection).

[24] Muthitacharoen and Samphantharak (2020) illustrates that tax-motivated profit shifting among MNEs in ASEAN5 is statistically and economically significant.

[25] A Wald test indicates that the coefficients on the effective tax variables are significantly different across the two regressions (High/Low mobility). The EATR coefficient for the low-mobility group is also not significantly different from zero.

5.3 Tax policy simulation

For policy purpose, it is useful to understand how changes in the tax policy may affect the location choice probabilities. In this subsection, the coefficients reported in the base model specification (Table 4) are used in simulations to predict the impact of changes in tax policy on location choice probabilities.

The impact is computed by predicting for each observation the probability of choosing a host country at a given EATR and the probability of choosing that host country if its EATR is changed by the specified tax policy while the EATRs of all other host countries remained constant. The difference between these two predictions is computed for each observation and then averaged over the estimation sample. The average change in the predicted probability is reported in the first column of table 9 and its change in percent of initially predicted probability is shown in the second column. It is important to note that, by design, the probability change in each scenario will merely reflect shifting to or from the other four countries in the region.

One way to gauge the effectiveness of tax incentives intended to attract MNEs is to estimate the location choice probabilities in absence of tax incentives. In the first scenario, I thus consider the scenario where each host country removes tax incentives so the EATR becomes that under the standard tax treatment. The simulations indicate that, in absence of tax incentives, the probability that a host country is chosen would fall by 7.4 percentage points on average (Table 9). Relative to predicted probabilities based on observed EATRs, this constitutes an average loss of 39.0%. These results suggest that the importance of tax incentives is quite substantial, which is not surprising given the generosity of the tax incentives in the region.

Table 7: Simulated changes location choice probabilities under different tax policy scenarios

	Average change in probability	Change in % of initially predicted probability
Scenario 1: Absence of tax incentives		
Indonesia	-0.048	-37.3%
Malaysia	-0.114	-30.7%
Philippines	-0.069	-48.0%
Thailand	-0.082	-36.5%
Vietnam	-0.056	-42.4%
Average over all host countries	-0.074	-39.0%
Scenario 2: Increasing statutory corporate income tax rate by 5%		
Indonesia	-0.015	-11.8%
Malaysia	-0.033	-8.8%
Philippines	-0.007	-4.8%
Thailand	-0.023	-10.3%
Vietnam	-0.012	-9.2%
Average over all host countries	-0.018	-9.0%
Scenario 3: Extending length of initial tax holiday by 1 year		
Indonesia	0.009	6.9%
Malaysia	0.011	2.9%
Philippines	0.006	4.5%
Thailand	0.011	4.9%
Vietnam	0.004	3.1%
Average over all host countries	0.008	4.5%

Notes: The simulated effects are based on the conditional logit estimate in the baseline specification. Column 1 reports estimated change in the location choice probability for a host country that implements the specified tax policy change while EATRs of all other hosts remain constant. In Column 2, change in percent of initially predicted probability is computed relative to predicted probabilities based on observed EATRs.
Source: Author's analysis

Next, I consider the scenario where each host country raises its statutory corporate income tax rate by 5%. This scenario yields the reduction of the location choice probability by 1.8 percentage points on average (Table 9). This represents an average decline of 9.0% relative to initial predicted probability.

Finally, to illustrate the potential impacts of policies that extend generosity of tax incentives, I consider the scenario where the length of initial tax holiday is increased by 1 year. The simulation results indicate that the probability of choosing a host country increases by 0.8 percentage points on average, which represents an increase of 4.5% relative to initial predicted probability (Table 9).

6. Conclusion

Understanding how MNEs respond to taxation in their location choice decision is instrumental in shaping the tax-based investment policy in developing countries. This paper enhances that set of knowledge using the dataset of foreign affiliates that set up their establishments in ASEAN5 over 2000-2016. While the study finds that the taxation has a significant and negative impact on the location choice decision, it emphasizes that firm heterogeneity is highly relevant for the impact of taxation in a developing country context. It shows that the tax sensitivity is substantially lower for high-tech firms, incumbent MNEs and those with tax-haven operation.

Besides enhancing the knowledge set about the tax responsiveness of MNEs in the developing-countries context, the results provided policy implications related to how to align tax incentives for investment with sustainable public finance. Policymakers should distinguish among different types of FDI since there is a clear heterogeneity in MNEs' tax responsiveness. Tax incentives are likely to be redundant for MNEs with prior presence as well as those which are technologically intensive. Additionally, the tax responsiveness of location choice decision is smaller in settings that are favourable to international tax planning. Hence, for tax incentives to be effective, policymakers need to pay attention to anti-tax avoidance measures that address abusive tax-planning schemes.

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Appendix

Table A1: Descriptive statistics of additional control variables used in the extreme bounds analysis

Variable	N	Mean	Median	SD
Real GDP per capita	33,080	4,007	2,970	2,803
Common language	33,080	0.118	0.000	0.322
Labor productivity	30,250	1.338	1.290	0.219
Host-country trade openness (%)	33,080	116.417	127.250	47.980
Host-country financial openness (%)	24,893	0.562	0.417	1.646
Air transport ratio	30,250	0.538	0.507	0.318
Railway ratio	33,080	0.446	0.336	0.316

Notes: Common language is an indicator variable signalling common official language between each country pair and is taken from the CEPII database. Labor productivity is based on hours worked and is taken from the APO Productivity Database. Host-country trade openness is defined as the share of exports and imports to GDP (%). Host-country financial openness is defined as the share of net inflows of portfolio equity to GDP (%). Air transport ratio is the ratio of registered air carrier departures to country size. Railway ratio is the ratio of railway distance to country size. All variables except the labor productivity and the common language variables are based on the WDI.
Source: Author's analysis

Table A2: Robustness tests for the baseline result

VARIABLES	(1) Separating components of EATR	(2) Removing tax incentives	(3) Excluding Indonesian subsidiaries
Bilateral EATR		-3.558***	-3.513***
		(0.701)	(0.479)
Host-country EATR	-5.855***		
	(0.790)		
International EATR	-5.306***		
	(0.558)		
Distance (L)	-0.697***	-0.687***	-0.687***
	(0.039)	(0.040)	(0.036)
Colonial	0.222***	0.238***	0.399***
	(0.064)	(0.065)	(0.066)
Real GDP (L)	0.367***	0.189***	1.776***
	(0.036)	(0.023)	(0.053)
Governance	0.161***	0.158***	0.001
	(0.007)	(0.007)	(0.009)
Mobile Subscrip-	0.009***	0.006***	0.001
tion	(0.001)	(0.001)	(0.001)
Observations	33,080	33,080	25,320
Marginal effects of the tax variable			
Bilateral EATR		-0.569	-0.659
Host-country EATR	-0.937		
International EATR	-0.849		

Notes: 'L' indicates log. Numbers in parentheses indicate standard errors which are heteroscedasticity robust and clustered at the firm level. ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all regressors.
Source: Author's analysis

Table A3: Heterogeneity of the tax responsiveness with respect to sector, technological intensity and asset size

VARIABLES	(1) Manufacturing	(2) Services	(3) Low-tech	(4) Hi-tech	(5) Small	(6) Large
Bilateral EATR	-4.516***	-4.812***	-5.259***	-2.161	-3.847***	-7.543***
	(0.830)	(0.967)	(0.698)	(1.386)	(0.768)	(1.119)
Distance (L)	-0.392***	-0.450***	-0.382***	-0.543***	-0.780***	-0.523***
	(0.070)	(0.064)	(0.058)	(0.080)	(0.059)	(0.075)
Colonial	-0.443**	-0.042	-0.516***	0.220	-0.074	0.190
	(0.194)	(0.129)	(0.152)	(0.152)	(0.090)	(0.144)
Real GDP (L)	0.272***	0.483***	0.401***	0.253***	0.598***	0.027
	(0.053)	(0.050)	(0.043)	(0.066)	(0.045)	(0.060)
Governance	0.008	-0.111***	0.046***	0.079***	0.102***	0.158***
	(0.011)	(0.012)	(0.009)	(0.019)	(0.008)	(0.016)
Mobile Subscrip-	0.012***	0.033***	0.022***	0.024***	0.036***	0.009***
tion	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Observations	9,220	9,325	14,035	4,510	20,910	6,825
Marginal effects of the tax variable						
Bilateral EATR	-0.723	-0.770	-0.841	-0.346	-0.616	-1.207

Notes: 'L' indicates log. Numbers in parentheses indicate standard errors which are heteroscedasticity robust and clustered at the firm level. ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all regressors. Standard errors are heteroscedasticity robust and clustered at the firm level.
Source: Author's analysis

Table A4: Heterogeneity of the tax responsiveness with respect to prior presence, tax-haven connection and mobility

VARIABLES	(1) Without prior presence	(2) With prior presence	(3) Without tax-haven connection	(4) With tax-haven connection	(5) Low mobility	(6) High mobility
Bilateral EATR	-5.740***	-3.898***	-7.789***	-3.420***	-1.829	-5.647***
	(0.654)	(1.106)	(0.862)	(0.734)	(1.123)	(0.741)
Distance (L)	-0.616***	-0.827***	-1.277***	-0.557***	-0.748***	-0.691***
	(0.046)	(0.073)	(0.118)	(0.041)	(0.092)	(0.054)
Colonial	0.052	0.562***	-0.465***	0.495***	-0.100	0.006
	(0.081)	(0.107)	(0.137)	(0.075)	(0.175)	(0.084)
Real GDP (L)	0.314***	0.433***	0.700***	0.160***	0.415***	0.419***
	(0.033)	(0.058)	(0.057)	(0.037)	(0.071)	(0.043)
Governance	0.139***	0.204***	0.127***	0.192***	0.088***	0.123***
	(0.008)	(0.014)	(0.011)	(0.010)	(0.013)	(0.009)
Mobile Subscrip-	0.009***	0.011***	0.013***	0.007***	0.020***	0.031***
tion	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)
Observations	23,655	9,425	13,390	19,690	6,925	20,750
Marginal effects of the tax variable						
Bilateral EATR	-0.918	-0.624	-1.246	-0.547	-0.293	-0.904

Notes: 'L' indicates log. Numbers in parentheses indicate standard errors which are heteroscedasticity robust and clustered at the firm level. ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all regressors.
Source: Author's analysis

Table A5: Robustness test for the heterogeneity of the tax responsiveness with respect to prior presence (Using the information of subsidiaries incorporated since 2000)

VARIABLES	(1) Without prior presence	(2) With prior presence
Bilateral EATR	-5.605***	-3.375**
	(0.612)	(1.416)
Distance (L)	-0.645***	-0.832***
	(0.044)	(0.080)
Colonial	0.105	0.620***
	(0.074)	(0.132)
Real GDP (L)	0.340***	0.359***
	(0.032)	(0.071)
Governance	0.147***	0.201***
	(0.008)	(0.016)
Mobile Subscription	0.009***	0.010***
	(0.001)	(0.003)
Observations	26,595	6,485
Marginal effects of the tax variable		
Bilateral EATR	-0.897	-0.540

Notes: 'L' indicates log. Numbers in parentheses indicate standard errors which are heteroscedasticity robust and clustered at the firm level. ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all regressors.
Source: Author's analysis

Table A6: Robustness test for the heterogeneity of the tax responsiveness with respect to tax-haven connection (Modifying the tax-haven classification by excluding Hong Kong and Singapore)

VARIABLES	(1) Without tax-haven connection	(2) With tax-haven connection
Bilateral EATR	-6.202***	-3.237***
	(0.659)	(1.061)
Distance (L)	-0.804***	-0.473***
	(0.046)	(0.071)
Colonial	-0.177	0.445***
	(0.109)	(0.082)
Real GDP (L)	0.472***	0.104**
	(0.036)	(0.049)
Governance	0.121***	0.232***
	(0.008)	(0.014)
Mobile Subscription	0.012***	0.005**
	(0.001)	(0.002)
Observations	21,740	11,340
Marginal effects of the tax variable		
Bilateral EATR	-0.992	-0.518

Notes: 'L' indicates log. Numbers in parentheses indicate standard errors which are heteroscedasticity robust and clustered at the firm level. ***, ** and * = Significantly different from zero at the 1%, 5% and 10% level, respectively. The marginal effects of the tax variables are evaluated at the means of all regressors.
Source: Author's analysis