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A study of profit shifting using the Hines and Rice approach

TTPI - Working Paper 12/2021
July 2021

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Abstract

Adopting and modifying the approach used by Hines and Rice (1994), we investigate the extent of cross-border profit shifting activities by foreign-owned Australian companies (FOACs) and evaluate the effectiveness of the measures implemented by the Australian government to combat base erosion and profit shifting (BEPS) by multinational enterprises (MNEs). Specifically, we measure the sensitivity of profit before tax reported in Australia by FOACs to the tax rate differentials between Australia and other countries where the related foreign-based MNE groups operate and examine whether such sensitivity decreases after the implementation of BEPS countermeasures. Overall, we find that profit shifting from Australia to low-tax countries took place throughout the 14-year study period, 2007 to 2020. The higher the Australian corporate tax rate relative to the tax rates of immediate parent entity, ultimate parent entity, and the higher the ranking of Australian tax rate relative to those of other countries where the foreign MNEs operate, the lower is the profit reported in Australia. In general, crossborder profit shifting from Australia to low-tax countries has not reduced in the post-BEPS period from 2013 to 2020 after the launch of the BEPS Project by the OECD and the implementation of BEPS countermeasures in Australia, although there is some evidence from breaking down the post-BEPS period by years which shows that profit shifting might have reduced in the year 2019. Such reduction, however, does not sustain in 2020.

Keywords: base erosion and profit shifting (BEPS), multinational enterprises, BEPS countermeasures, Australia, Hines and Rice Approach

∗ *The financial support of the Australian Research Council Discovery Projects Grant DP170104244 is gratefully acknowledged. The provision of annual reports for 2007 to 2018 by the Australian Securities and Investments Commission on a cost recovery basis is greatly appreciated.*

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1. Introduction

Multinational enterprises (MNEs) view corporate income tax as a cost to be minimised in order to maximise the returns to equity owners. MNEs are in a good position to avoid taxes because their global operations provide them with the opportunities to exploit the differences of tax rates and tax rules across various host countries and thus shift profits from high-tax jurisdictions to low-tax jurisdictions (including tax havens) to save corporate income taxes (see, for example, Bartelsman and Beetsma, 2003; Mills and Newberry, 2004; Huizinga and Laeven, 2008). This practice is referred to by the Organization for Economic Co-operation and Development (OECD) as base erosion and profit shifting (BEPS).[1]

Both the OECD (e.g. OECD, 2014; OECD 2015a; OECD, 2015b) and prior tax research (e.g. Vicard, 2015; Avi-Yonah and Xu, 2017; Davies et al, 2018) have provided arguments and/or evidence showing that cross-border profit shifting has generated undesirable economic consequences. First, BEPS has resulted in erosion of tax bases and losses of corporate income tax revenues across countries. According to the BEPS explanatory statement released by OECD (2015a), the losses of global corporate income tax revenue could be between 4% to 10% of global corporate income tax revenues (i.e. USD 100 to 240 billion annually). Taking a closer look at specific countries, Vicard (2015) finds that profit shifting through intra-group transfer pricing reduces French corporate tax base by USD 8 billion in 2008. Davies et al. (2018) find that French tax authority would have collected over EUR 333 million for 1999 without tax-induced intra-group transfer pricing by manufacturing French MNEs in ten tax havens. In the United States (the US), the US multinationals had more than USD 2 trillion offshore profits in low-tax countries, which translates to nearly USD 700 billion in US tax avoided as of the end of 2015 (Avi-Yonah and Xu, 2017). Second, cross-border profit shifting distorts competition and investment decisions. MNEs are likely to gain competitive advantages from BEPS opportunities that domestic companies do not have. They could also make investments in low-tax countries in activities that have lower pre-tax rates of return but higher after-tax returns, which results in inefficient

[1] We use the terms BEPS, cross-border profit shifting and international tax avoidance interchangeably.

allocations of resources (OECD, 2014).

As cross-border profit shifting has resulted in great losses of corporate income tax revenues and inefficient allocations of resources across countries, the issue of BEPS is at the forefront of the international tax policy agenda. To tackle cross-border profit shifting, the OECD at the request of the Group of Twenty (G20) launched the BEPS Project in full scale in 2013 (OECD, 2013a) and released a series of BEPS final reports in 2015. The OECD has since issued numerous guidance to help countries implement the measures recommended in the BEPS Action Plan (OECD, 2013b).[2] The Australian government has been making changes to Australian tax law to implement many recommendations of the OECD/G20 BEPS Project and has also adopted additional unilateral measures such as a new set of Multinational Anti-Avoidance Law (MAAL) and the Diverted Profits Tax (DPT) to tackle cross-border profit shifting (see Section 2).

Some studies have cast doubt on the effectiveness of the OECD/G20 BEPS Project. As this project still adheres to the dysfunctional tax principles such as the arm's length principle,[3] it is more like a patch-up of the loopholes of existing rules and principles instead of a fundamental reconstruction of the international tax regime (Devereux and Vella, 2014). The whole project is still designed based on the traditional source and residence principle,[4] which might be reasonable in 1920s in which companies usually operated only in one country and a clear conceptual distinction between active and passive income existed. However, the development of modern organizational structure of MNEs and global value chain (GVC) undermine the conceptual basis of the residence and source dichotomies for identifying where profit is earned and weaken

[2] The OECD/G20 BEPS Project contains 15 action items to address issues related to aggressive tax planning, harmful tax practices and information sharing. They are Action 1 *Addressing the Tax Challenges of the Digital Economy*, Action 2 *Neutralising the Effects of Hybrid Mismatch Arrangements*, Action 3 *Designing Effective Controlled Foreign Company Rules*, Action 4 *Limiting Base Erosion Involving Interest Deductions and Other Financial Payments*, Action 5 *Countering Harmful Tax Practices More Effectively, Taking into Account Transparency and Substance*, Action 6 *Preventing the Granting of Treaty Benefits in Inappropriate Circumstances*, Action 7 *Preventing the Artificial Avoidance of Permanent Establishment Status*, Action 8-10 *Aligning Transfer Pricing Outcomes with Value Creation*, Action 11 *Measuring and Monitoring BEPS*, Action 12 *Mandatory Disclosure Rules*, Action 13 *Transfer Pricing Documentation and Country-by-Country Reporting*, Action 14 *Making Dispute Resolution Mechanisms More Effective* and Action 15 *Developing a Multilateral Instrument to Modify Bilateral Tax Treaties*.

[3] Arm's length principle is defined in the article 9 of the *2010 OECD Model Tax Convention on Income and Capita*l. The principle states that the trade price between related parties should be adjusted to reflect price in comparable transactions between independent parties.

[4] The basic allocation of taxing rights between source and residence countries requires that the active income is taxed by the source countries and the passive income is taxed by the residence countries (Devereux and Vella, 2014).

some fundamental concepts and design features of the current international tax regime (Devereux and Vella, 2014). Also, the insistence of developed countries on preserving their tax breaks for business to obtain advantages in international tax competition blocks the approval of some innovative reform proposals (Avi-Yonah and Xu, 2016).

On the other hand, some studies have argued that the BEPS countermeasures help the tax authorities to tackle BEPS issues. For example, the Country-by-Country Reporting[5] introduced by the BEPS Project directly deals with the information asymmetry between taxpayers and tax administrations (Brauner, 2014). Relevant tax administrations can use the information about MNEs' global operations and tax positions disclosed in Country-by-Country Reports to assess transfer pricing risks and make better decisions on the efficient allocation of audit resources (Avi-Yonah and Xu, 2016). Using a mathematical model, Kayis-Kumar (2016) finds that both a unilateral and multilateral adoption of a fixed ratio rule[6] recommended in the BEPS Project to tackle thin capitalisation result in an increase in total tax payable by MNEs, most markedly for the most tax aggressive MNEs.

Although prior studies have discussed the strengths and the weaknesses of the BEPS countermeasures in the legal and regulatory dimensions, the actual effect of these countermeasures remains to be quantified by empirical studies (OECD, 2015a). Using publicly available financial and ownership data downloaded from the Orbis database and manually collected from the annual reports acquired from the Australian Securities and Investments Commission (ASIC), we conduct an empirical analysis to quantify the effect of BEPS countermeasures implemented by the Australian government on cross-border profit shifting and thus assess the effectiveness of these BEPS countermeasures.

To do so, first, we investigate the extent of cross-border profit shifting activities by foreign-owned Australian companies (FOACs)[7] in Australia in the 14-year study period from 2007 to 2020.[8] We adopt an identification strategy developed by a seminal

[5] Under the Country-by-Country reporting, MNEs with reporting obligations must report a detailed geographic breakdown of key operating, financial and tax metrics for all countries in which an MNE group operates, and such reports can be shared among tax authorities across countries where this MNE group operates (Joshi, 2020).
[6] In October 2015, the OECD recommended a ratio of net interest expense to earnings before interest, tax, depreciation and amortization (EBITDA) up to an allowable threshold within the corridor or 10 percent to 30 percent.
[7] In this study, FOACs refer to the Australian subsidiaries of foreign MNEs.
[8] 2020 refers to the income year ended 30 June 2020 (or the income year 2019-20). The majority of FOACs (about 67%) have a December financial reporting date following their foreign ultimate parent, so 2020 refers to their substituted accounting period ended 31 December 2019.

paper, Hines and Rice (1994) (hence the Hines and Rice approach), with some modifications to measure the extent of cross-border profit shifting conducted by FOACs. The basic premise of the Hines and Rice approach is that "the observed pre-tax profit of an affiliate (subsidiary) of an MNE in a host country represents the sum of 'true' profit and 'shifted' profit (either positive or negative)" (Dharmapala, 2014, p. 424). 'True' profit is generated by the affiliate from its capital and labour inputs. 'Shifted' profit is determined by the tax rate differentials, which are the tax incentives to move profit into or out of the affiliate. Hines and Rice (1994)'s pioneer study on cross-border profit shifting by MNEs 'established a conceptual framework that continues to be highly influential' (Dharmapala, 2014, p.424). Dowd et al. (2017) indicate that the Hines and Rice approach has become a standard in the literature.

Specifically, in this study, we estimate the sensitivity (i.e. semi-elasticity) of profits reported in the FOACs' income statements to the tax rate differentials across countries where the related foreign MNE groups operate. Given that Australian corporate income tax rate (30%) is relatively high compared to many other countries, and FOACs cannot enjoy the benefit of dividend imputation,[9] FOACs have both the incentives and opportunities to shift profits out of Australia to the group members located in low-tax jurisdictions. Therefore, a FOAC's profit reporting behaviour is expected to be affected by the international tax rate differentials between this FOAC and its parents (both immediate parent entity and ultimate parent entity) as well as the tax rate differentials between this FOAC and its affiliates in different host countries within the same MNE group.

Second, we investigate how the estimated tax rate semi-elasticity changes after the launch of the OECD/G20 BEPS Project in 2013 and the gradual implementation of BEPS countermeasures in Australia (i.e. in the post-BEPS period from 2013 to 2020), and thus empirically assess the effectiveness of the Australian BEPS countermeasures. BEPS countermeasures implemented by the Australian government are expected to impede foreign MNEs' ability to shift profit out of Australia by expanding the reach of Australian tax law and by tackling different types of tax planning arrangements used

[9] FOACs are mainly owned by foreign shareholders outside Australia, and their foreign shareholders cannot claim the franking credit tax offsets either in Australia or in their resident countries (Li and Tran, 2020). Therefore, foreign shareholders of FOACs treat Australian corporate tax as a real cost.

by foreign MNEs. At the same time, as the implementation of BEPS countermeasures increase profit shifting costs, managers may have less incentives to engage in costly corporate tax avoidance in the post-BEPS period. Therefore, profits reported in FOACs' income statements are expected to be less sensitive to international tax rate differentials in the post-BEPS period (2013-2020) compared to the pre-BEPS period (2007 – 2012).

Based on the empirical results, we find that profit shifting from Australia to low-tax countries took place throughout the 14-year study period: the higher the Australian corporate rate relative to the tax rates of a FOAC's immediate parent and ultimate parent, and the higher the ranking of Australian tax rate relative to those of other countries where the foreign MNEs operate, the lower is the profit reported in Australia.

Further, cross-border profit shifting from Australia to low-tax countries has not reduced generally in the post-BEPS period after the implementation of BEPS countermeasures, although there is some evidence from breaking down the post-BEPS period by years indicating that profit shifting might have reduced in the year 2019. Such finding is consistent with the findings of Joshi (2020). Using the Hines and Rice approach, Joshi (2020) cannot detect a significant effect of the Country-by-Country Reporting (proposed in Action 13 of the BEPS Project) in reducing tax-motivated profit shifting at affiliate level in the European Union (the EU). However, it is premature for us to conclude that the BEPS countermeasures adopted by Australia are not effective because it takes time (years) for the Australian Taxation Office (ATO) to audit FOACs, to raise amended assessments and to resolve tax disputes before higher profits can be reflected in the income statements of FOACs.

This study is significant in the following aspects. First, we use empirical method to quantify profit shifting by FOACs in Australia and evaluate the effectiveness of the measures adopted by the Australian government to tackle cross-border profit shifting after the launch of the OECD/G20 BEPS Project. Most of previous related studies have critically discussed the strengths and the weaknesses of the BEPS Project in the legal and regulatory dimensions (e.g. Brauner, 2014; Devereux and Vella, 2014; Avi-Yonah and Xu, 2016). The actual effect of these BEPS countermeasures remains to be quantified by empirical studies (OECD, 2015a). Applying empirical methods allows us to assess the effectiveness of BEPS countermeasures based on objective evidence instead of subjective judgements and opinions.

Second, we apply the Hines and Rice approach to investigate the extent of profit shifting activities of foreign MNEs in the Australian context. Most prior studies that use such approach mainly focus on the profit shifting activities of MNEs in the US and countries in the EU (e.g. Hines and Rice, 1994; Huizinga and Laeven, 2008; Markle, 2016 and Dowd et al., 2017). Little research has been done in Australia to quantify the scope or the effect of BEPS, especially using the Hines and Rice approach.

Last but not least, assessing whether the current Australian BEPS countermeasures are effective in reducing the extent of cross-border profit shifting may help policy-makers, such as the Australian government and the OECD, to fine-tune the measures to tackle international tax avoidance.

The remaining sections of this paper are structured as follows. Section 2 describes the adoption of measures recommended by the OECD/G20 BEPS Project and other unilateral BEPS countermeasures by the Australian government. Section 3 reviews the relevant literature. Section 4 develops the hypotheses. Section 5 discusses the research design of this study. Section 6 reports the empirical results of the main test and an additional test. Section 7 concludes the paper.

2. BEPS Countermeasures Adopted by the Australian Government

The integration of national economies and markets imposes challenges to the existing international tax framework. The weakness of the international tax regime creates opportunities for cross-border profit shifting by MNEs (OECD, 2015b). To offer possible solutions that are suitable for the contemporary economic environment to address cross-border profit shifting, OECD released its final reports of the BEPS Action Plan (OECD, 2013b) in 2015. The Action Plan contains 15 action items to address the issues related to aggressive tax planning, harmful tax practices and information sharing.

In Australia, the government has been in the process of implementing the recommendations from the OECD/G20 BEPS Project to tackle the BEPS issues. The rest of this section summaries the actions taken by the Australian government to address the BEPS issues.

First, the government has ensured that current Australian transfer pricing provisions under Division 815 of the *Income Tax Assessment Act (ITAA) 1997* reflect the arm's

length principle developed by OECD in its documents, including the final report on Action 8-10 *Aligning Transfer Pricing Outcomes and Value Creations* of the OECD/G20 BEPS Project, *Transfer Pricing Guidelines for Multinational Enterprises* and *Tax Administrations (2010)* (i.e. 2010 OECD Guidelines) and the 2016 OECD BEPS amendments to the guidelines. To implement Action 13 *Transfer pricing documentation and Country-by-Country Reporting* of the OECD BEPS Project, the Parliament inserted Subdivision 815-E in the *ITAA* 1997 that contains a requirement for preparing Country-by-Country Reporting into the current transfer pricing regime.[10] *Tax Laws Amendment (Combating Multinational Tax Avoidance) Act 2015* was enacted in 2015 and imposes Country-by-Country reporting obligations on significant global entities (SGE) with a global turnover of AUD 1 billion or more from 1 January 2016.

Second, effective from 1 July 2017, the Australian government introduced goods and services tax (GST) provisions to make an 'electronic distribution platform' (EDP) operator responsible for GST on supplies of digital products and digital services made through their platform. From 1 July 2018, GST was further extended to offshore supplies of low value goods (AUD1,000 or lower) brought to Australia. These measures partly address the issues in BEPS Action 1 *Addressing the Tax Challenges of the Digital Economy* and BEPS Action 7 *Preventing the Artificial Avoidance of Permanent Establishment Status*.

Third, the *Treasury Law Amendment (Tax Integrity and Other Measures No.2) Act 2018* introduced a set of hybrid mismatch rules in Australian tax law which came into effect on or after 1 January 2019. This amendment is to implement Action 2 *Neutralizing the effects of hybrid mismatch arrangements* of the BEPS Project to address BEPS issues related to hybrid mismatch arrangements (OECD, 2015a). The purpose of this new anti-hybrid rules is to deny double tax benefits or reduced income tax payable as a result of

[10] A Country-by-Country Report comprises three tables. Table 1 provides an overview of income, taxes, employees and assets of the MNE group allocated to each of the different tax jurisdictions in which the MNE group operates. Each line of the table reports the aggregated numbers relating to a particular tax jurisdiction. Table 2 provides an overview of each constituent entity (including permanent establishments) of the MNE group, grouped according to the tax jurisdictions in which the entities are tax resident. The main business activities of each entity also need to be stated. Table 3 allows the MNE group to provide any additional information that it believes would be necessary or useful in interpreting and understanding the data provided in the Country-by-Country report (ATO, 2019a). The exchange of Country-by-Country reports with partner jurisdictions is via the OECD Common Transmission System (CTS) (ATO, 2019b).

hybrid mismatch arrangements.[11]

Forth, in 2017 Australia signed the OECD's *Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting* (the MLI), which is recommended by Action 15 *Developing a multilateral instrument to modify bilateral tax treaties* of the BEPS Project. The MLI was given the force of law in Australia by the *Treasury Laws Amendment (OECD Multilateral Instrument) Act 2018* and entered into force on 1 January 2019. The main parts of the MLI are separated into provisions governing hybrid mismatches (BEPS Action 2), treaty abuse (BEPS Action 6), avoidance of permanent establishment status (BEPS Action 7), and improving dispute resolution and arbitration (BEPS Action 14).

Moreover, in October 2018, the Australian government updated the mutual agreement procedures (MAP) guidance to implement recommendations in Action 14 *Making Dispute Resolution Mechanisms More Effective* (ATO, 2019b).

In addition to implementing the recommendations of the OECD BEPS Project, the Australian government has implemented several unilateral measures.

First, a new set of Multinational Anti-Avoidance Law (MAAL) articulated in the *ITAA 1936* section 177DA came into effect on or after 1 January 2016 to tackle cross-border profit shifting schemes carried out by large MNEs to obtain tax benefits.[12]

Second, the diverted profits tax (DPT) provisions articulated in the *ITAA 1936* Sections 177H-177R came into effect on 1 July 2017 and imposes a 40% tax. The provisions only apply to SGEs that have cross-border related-party transactions. It attempts to ensure that the Australian tax payable by SGEs properly reflects the economic substance of activities that those entities carry on in Australia and to prevent those entities from reducing the amount of Australian tax they pay by diverting profits offshore through aggressive tax arrangements between related parties.

[11] The new rules apply to deny the deduction or income exemption and target six types of mismatch: (1) hybrid financial instrument mismatch; (2) hybrid payer mismatch; (3) reverse hybrid mismatch; (4) branch hybrid mismatch; (5) deducting hybrid mismatch and (6) imported hybrid mismatch. The new provisions include a targeted integrity rule which prevents offshore multinational companies from replicating a hybrid mismatch outcome by routing financing into Australia through an interposed entity in a low-tax jurisdiction (tax rate less than or equal to 10 per cent) (Commonwealth of Australia, 2015).

[12] The MAAL applies to significant global entities with global revenue exceeding AUD 1 billion.

Third, the *Tax and Superannuation Laws Amendment (2014 Measures No. 4) Act 2014* tightened the thin capitalization rules to restrict the deduction of interest expense in Division 820 of *ITAA 1997* effective from 1 July 2014. For instance, the safe harbour debt limit for general inbound and outbound investors is reduced from a debt to equity ratio of 3:1 to 1.5:1, or a debt to Australian assets ratio of 75% to 60%. For non-ADI financial investors, the safe harbour debt limit is 15:1 (down from 20:1). The thin capitalization rules were further tightened by the *Treasury Laws Amendment (Making Sure Multinationals Pay Their Fair Share of Tax in Australia and Other Measures) Act 2019* to require an entity to use the value of the assets, liabilities (including debt capital) and equity capital that are used in its financial statements, and to remove the ability for an entity to revalue its assets specifically for thin capitalization purposes effective from 8 May 2018. However, the Australian thin capitalisation rules after the amendments are not consistent with the best practice approaches recommended in Action 4 *Limiting base erosion involving interest deduction and other financial payments* of the BEPS Project.[13]

3. Literature Review

The issue of cross-border profit shifting within MNEs has attracted increasing attention from empirical researchers. The main idea of international tax avoidance is that MNEs typically exploit the differences in corporate tax rates across jurisdictions where they operate to conduct cross-border profit shifting and thus lower their total tax burdens. Mills and Newberry (2004) find that foreign MNEs with relatively low average foreign tax rates report less taxable income in the US tax return of their US subsidiaries than those with relatively high average foreign tax rates.

In line with the studies discussed above, a group of studies (e.g. Hines and Rice, 1994; Huizinga and Laeven, 2008; Markle, 2016 and Dowd et al., 2017) have estimated the semi-elasticity of reported profit by companies within an MNE group with respect to

[13] Distinct from Australian thin capitalisation rules, Action 4 of the BEPS Project contains a fixed ratio rule and a group ratio rule. According to the fixed ratio rule, a ratio of net interest to earnings before interest, taxes, depreciation and amortization (EBITDA) is used to limit an entity's net deductions for interest and payment within the range (OECD, 2015c). The approach includes a corridor of the possible ratio of between 10% and 30% for adoption by different countries depending on their own circumstances. The recommended approach also proposes a group ratio rule to reduce the effect of fixed ratio rule on highly leveraged groups (OECD, 2015c). The group ratio rule allows an entity with interest above a country's fixed ratio to deduct its interest expense to the level of the interest to EBITDA ratio of its worldwide group.

the tax rate differentials across countries where the MNE groups operate.

3.1 Overview of the Hines and Rice (1994) approach

Hines and Rice (1994) investigate the US MNEs' ability to shift their profits and even their real business activities to tax havens in order to minimize their US domestic corporate tax. They argue that MNEs have incentives to shift profits from high-tax countries where the main productive physical activities take place to low-tax countries where few economic activities take place. MNEs may also have incentives to shift their real business operations that would be unprofitable at normal corporate tax rate to low-tax countries in order to make these operations become profitable or to justify the profits they plan to report in the tax-preferred locations.

Hines and Rice (1994) assume that the reported profit of an affiliate within an MNE group represent the sum of 'true' profit and 'shifted' profit. They utilize the input-output relation of the Cobb-Douglas production function[14] to isolate the 'true' profit from the reported profit. The 'true' profit of an affiliate is determined by the labour input and the capital input of this affiliate and the level of productivity in the country where this affiliate operates. The 'shifted' profit is determined by the tax incentives to transfer profit into or out of this affiliate (i.e. 'shifted' profit can be either positive or negative). According to Hines and Rice (1994), the tax rate difference between the home country where the parent locates and the host country where this affiliate operates creates the incentive to shift profits. Hines and Rice (1994) use a regression model represented by equation (1) to measures how the deviation of reported accounting profits from profits actually generated from real business activities is affected by the tax rates of host countries where MNEs' subsidiaries operate.

$$log\pi_i = \beta_0 + \beta_1\tau_i + \beta_2 logL_i + \beta_3 logK_i + \beta_4 logA + \varepsilon_i \qquad (1)$$

Where:

[14] The Cobb-Douglas function can be represented by the following equation:

$$Y = A_i L_i^{\beta} K_i^{\alpha}$$

Y is total production output (the real value of all goods produced in a year; measured in dollars). *L* refers to labour input (the total number of person-hours worked in a year). *K* refers to capital input (a measure of all machinery, equipment and buildings). *A* refers to the level of productivity and technology. α and β are the output elasticities of capital and labour, respectively. Their values are determined by available technology. One point worth highlighting is that Hines and Rice (1994) does not test the relation between production inputs and outputs of this function. Instead, it makes use of such relation to isolate the 'true' profit from the reported profit.

π_i is measured by the logarithm of the pre-tax profit of all US MNEs' foreign affiliates in the host country i;

τ_i is measured by the average tax rate in the host country i;[15]

K_i is measured by capital input in the host country i;

L_i is measured by labour input in the host country i;

A_i is the level of productivity in the host country i;

ε_i is the regression error term.

Equation (1) measures the linear relation between the affiliate's pre-tax profit (π) and the tax rate difference (τ). An affiliate's labour input (L), its capital input (K) and the country-level productivity (A) are used to determine the 'true' profit of the affiliate without profit shifting. Employee compensation, or alternatively, the number of employees is used to measure labour input (L), and property, plant and equipment is used to measure capital input (K). A is measured by the natural logarithm of GDP per capita. Hines and Rice (1994) estimate equation (1) using country-level aggregate data on US non-bank majority-owned foreign affiliates in 1982. The results indicate that one percentage point higher tax rate in a host country reduces profit reported in that country by three percent.

After Hines and Rice (1994), a bulk of studies (e.g. Huizinga and Laeven, 2008; Markle, 2016; Dowd et al., 2017) have adopted and modified the Hines and Rice approach to measure how the reported accounting profits is affected by MNEs' cross-border profit shifting activities. These studies have shown that the Hines and Rice approach is a vigorous method for investigating how tax rate disparities affect MNEs' profit reporting behaviour in different countries.

3.2 International tax avoidance studies using the Hines and Rice approach

Hines and Rice (1994) use data from the Bureau of Economic Analysis (BEA) of the

[15] Hines and Rice (1994) calculate the average tax rate based on the effective tax rate (ETR) or the statutory tax rate (STR) whichever is lower.

US Department of Commerce, aggregated up to the country level to conduct their study. However, such aggregated data yields measurement problems. One of the problems is that the use of aggregated data is associated with a significant upward bias in the estimated tax semi-elasticity (Heckemeyer and Overesch, 2017).[16] One possible reason for this upward bias is that the aggregated data cannot isolate the profit-shifting effect on reported profits from real economic location and investment effects (Heckemeyer and Overesch, 2017). Also, aggregated country-level data ignores the variations among individual firms and does not control for other confounding tax or non-tax effects. Particularly, aggregated data might have problems to sufficiently control for the scale of real business activities.

More recently, the increasing availability of firm-level data from commercial databases has enabled the empirical studies to move from aggregate country-level analysis to firm-level analysis of individual MNEs and their affiliates. A shift from aggregate country-level data to firm-level micro data can greatly enhanced the creditability of more recent estimates of cross-border profit shifting (Dharmapala, 2014). Using firm-level micro data, several empirical studies have investigated the response of MNEs' profit reporting behaviour to the global tax rate differentials based on the Hines and Rice approach.

Huizinga and Laeven (2008) use publicly available firm-level data of the parent entities and subsidiaries of European MNEs in 1999 from the commercial database Amadeus to investigate the opportunity and incentives for intra-European profit shifting generated by tax rate differences.[17] They point out that cross-border profit shifting by an MNE relies on its overall international structure and the tax regime it faces in each of the countries where it operates. Distinct from Hines and Rice (1994), Huizinga and Laeven (2008) not only consider the tax rate differentials between parent entities and their subsidiaries, but also the tax rate differentials among subsidiaries operated in different host countries to measure the tax incentives for MNEs to conduct cross-border profit shifting. They further consider the opportunity of MNEs to conduct tax-motivated profit shifting, and such opportunity is determined by the scale of MNEs' operations

[16] The tax rate semi-elasticity estimated based on aggregated data provided by BEA and Internal Revenue Service (IRS) are generally higher than tax semi-elasticities estimated based on firm-level data from commercial databases such as Amadeus and Orbis.

[17] Hines and Rice (1994) only focus on the tax incentives to shift profit out of the US.

across countries. Taking both factors into consideration, they construct a tax composite variable,[18] which is a function of MNEs' international structure and tax rates of countries where MNEs operate, in the regression model.[19] A positive value of such composite tax variable implies that MNEs optimally shift profit out of a certain country. The empirical results show a significant and negative relation between this tax composite variable and reported profits ($\hat{\gamma} = -1.017$), suggesting that MNEs' profit shifting activities in a country depend on the weighted average of tax rate differences between all countries in which MNEs operate. Using estimated $\hat{\gamma}$, they estimate the average semi-elasticity of reported profits with respect to top statutory tax rates to be 1.31. Huizinga and Laeven (2008) further find that only the variable measuring tax difference of a subsidiary vis-à-vis its parent is statistically significant at the 0.01 level.[20]

Using 1995 to 2007 firm-level ownership structures and accounting data for European MNEs from Amadeus, Dischinger et al. (2014) also find the special role of MNEs' headquarters in corporate profit shifting strategies.[21] They find that profit shifting activities between parents and subsidiaries tend to be large if the parent firm has a lower corporate tax rate than its subsidiary, and profit is hence shifted towards the parent. Specifically, the semi-elasticity for profit shifting from parents located in high-tax countries to low-tax affiliates is 0.5, whereas the magnitude of semi-elasticity for shifting from high tax affiliates to parents with lower tax rates is significantly larger at an estimate of 1.7. The empirical results highlight the special role of low-tax parents in the cross-border profit shifting. This asymmetry might be attributable to several non-tax and tax reasons. For example, senior managers in the parent company value having funds and valuable assets under direct controls at the home country rather than the host

[18] To construct the tax composite variable, Huizinga and Laeven (2008) calculate the revenue-weighted statutory differential tax rate of all affiliates within an MNE group to measure tax rate incentives for profit shifting. The scale of MNEs' operations across countries determines profit shifting opportunity.

[19] Huizinga and Laeven (2008) modify equation (1) as follows:

$$log\pi_i = \beta_0 + \beta_1 logA + \beta_2 logL_i + \beta_3 logK_i + \hat{\gamma} C_i + \varepsilon_i$$

The dependent variable, π, is earnings before interest and tax (EBIT). The proxies for independent variables, *A*, *K* and *L*, are same as the proxies used by Hines and Rice (1994). The main coefficient of interest is $\hat{\gamma}$, which is the semi-elasticity of reported profit (π) with respect to the composite tax variable *C*.

[20] Huizinga and Laeven (2008) split a tax composite variable *C* into two variables: one variable represents the tax difference of a subsidiary vis-à-vis its parent, and the other is the (weighted) sum of the tax difference vis-à-vis subsidiaries in other (foreign) countries.

[21] Dischinger et al. (2014) revise equation (1) by adding an indicator variable taking value of "1" if the subsidiary is located in a host country with a higher corporate tax rate than in the parent country and "0" otherwise, an interaction term between this indicator and the tax rate variable as well as full sets of fixed effects.

countries. In addition, such asymmetry may reflect tax planning strategies to avoid taxes upon the repatriation of profits from the subsidiaries to the parent firm (Dischinger et al., 2014).

Markle (2016) uses 2004-2008 firm-level financial and ownership data from Orbis to conduct an international study,[22] and finds that the estimated tax rate semi-elasticity is -1.23 for countries with the territorial tax system and -0.62 for countries with the worldwide tax system.

Heckemeyer and Overesch (2017) synthesize the evidence from 27 empirical studies using the Hines and Rice approach and conduct a meta-regression analysis. They sample 203 estimates of MNE's profits response to tax rate differences, and they predict a tax rate semi-elasticity of pre-tax accounting profits of about 0.8 based on a hypothetical state-of-the-art research design.

Different from the studies discussed above, Dowd et al. (2017) point out the uniqueness of tax havens' role in international tax avoidance[23] and explore the non-linearity of profit shifting behaviours by MNEs, relying on a large US dataset over the period 2002-2012 provided by the Statistics of Income Division (SOI) of the Internal Revenue Service. They find that in a scatter plot of the net of average tax rates[24] on the natural logarithm of reported profit, the fitted line is approximately flat for high-tax countries, while it reflects a steep correlation for low-tax countries. This indicates that the elasticities of affiliates in low-tax countries are generally different from those in high-tax countries and thus a non-linear relation between reported profit and the corporate tax rates. According to their empirical results, for a linear specification, a semi-elasticity of reported profits with respect to the net of tax rates is 1.44 for all countries with

[22] Markle (2016) tests for the differences in the tax-motivated profit shifting behaviour of MNEs subject to different systems (i.e. territorial and worldwide system) of taxing foreign earnings. He argues that MNEs from territorial and worldwide countries are likely to have different responses to the tax incentive and opportunity to shift profit because of the differences in tax laws from these two types of countries. Territorial countries are those that generally exempt foreign income from home country tax, while worldwide countries are those that tax foreign income at the home country rate and allow credits for the foreign tax paid on the income (Markle, 2016). Given that a territorial MNE can save cash tax as long as they shift profit out of its home country, and conditions for a worldwide MNE to get a convergence under deferral and crediting provision are not always present, Markle (2016) predicts that a MNE subject to a territorial tax regime shifts more profit across jurisdictions for tax reasons than does a similar MNE subject to a worldwide tax regime.

[23] According to the OECD's *Action Plan on Base Erosion and Profit Shifting* (OECD, 2013b), a tax haven is not simply a low-tax country but one that facilitates tax avoidance for firms by artificially segregating taxable income from the activities that generate it. Besides low tax rate, non-tax characteristics of tax havens such as bank secrecy laws and low auditing and reporting requirements also attract MNEs to shift their profit to these countries (Hines and Rice, 1994).

[24] The net of average tax rate is defined as one minus the average tax rate for a country in Dowd et al. (2017).

different levels of tax rate, regardless of whether the original tax rate is 30% or 5%. However, for a non-linear specification, they find a one percentage point reduction in a country's statutory tax rate (STR) from 30% to 29% would result in a 0.7% change in reported income, whereas the same one percentage point reduction in the STR from 5% to 4% would increase reported income by 4.7%.[25] Dowd et al. (2017) also adopt a discontinuous nonlinear function by including an indicator variable for tax havens. Using simulation, this discontinuous specification displays a 0.5% change in profit when a country's STR reduces from 30% to 29% and a 4.9% change in reported profit if the STR decreases from 5% to 4%.

Prior empirical studies have applied and modified the Hines and Rice approach to measure the extent of cross border profit shifting activities mainly in the US (e.g. Hines and Rice, 1994; Dowd et al., 2017) and countries in the EU (e.g. Huizinga and Laeven, 2008; Dischinger et al., 2014; Markle, 2016). Using publicly available 14-year firm-level financial and ownership data of FOACs, we apply the Hines and Rice approach in this study to measure profit shifting activities by foreign MNEs in the Australian context.

3.3 The effectiveness of BEPS countermeasures

To address the issues related to cross-border profit shifting, the OECD released a series of BEPS final reports for the BEPS Action Plan in 2015 and has since been issuing many guidance to help countries implement its recommendations. Some countries also have introduced unilateral measures to tackle the BEPS. Previous studies (e.g. Brauner, 2014; Devereux and Vella, 2014; Avi-Yonah and Xu, 2016) critically evaluate the effectiveness of these countermeasures theoretically.

Avi-Yonah and Xu (2016) summarise the 15 action items in the BEPS Project and critically analysed the strengths and the weaknesses of this project. The BEPS Project sends a clear message to global MNEs that cross-border profit shifting will not be tolerated in the future. Also, it is an achievement for OECD to involve many non-member countries, developing countries and non-governmental organisations (NGOs) into the process of designing and negotiating the action items within the project. This

[25] This non-linear result is based on a second order Taylor approximation of the net of tax rate.

represents the first step for international tax law to move forward towards the direction of inclusiveness and multilateralism. That is why OECD proudly declared that 'the fact that so many countries have participated in the work and cooperated in the development of changes to the international tax environment is in itself a significant achievement of the Project' (OECD, 2015a, p.5).

Looking into specific action items, the BEPS Monitoring Group (2015) argued that some proposals in the BEPS Project, such as the Country-by-Country Reporting, do mark a significant step forward. The Country-by-Country Reporting is informative to the tax authorities as such report contains new information like a detailed geographic breakdown of key operating, financial and tax metric across jurisdictions where an MNE group operates (Joshi, 2020). Relevant tax authorities can use this information to assess BEPS risks (e.g. transfer-pricing risks) and check whether an MNE is indeed taxed where its economic activities take place and value is generated based on a fuller picture of the MNE's operation (BEPS Monitoring Group, 2015).

Two recent tax studies (De Simone and Olbert, 2020; Joshi, 2020) have empirically examined the effect of the Country-by-Country Reporting in the EU context. Specifically, using 2010-2018 financial and ownership data of EU MNEs and their subsidiaries, Joshi (2020) treats the implementation of private Country-by-Country Reporting in the EU as a shock to private disclosure requirements and examines its effect on corporate tax outcomes (i.e. tax avoidance and profit shifting).[26] Graphical evidence of the post-implementation period[27] graph reflects a positive discontinuity in the effective tax rates (ETRs) at the €750 million cut-off point, which implies a decline in tax avoidance by firms within the reporting regime in the post-implementation period. Regression results indicate that the ETRs of firms within the reporting regime are 1 to 2 percentage point higher than those of firms outside the regime, which further signals a decline in tax avoidance in the post-implementation period. Using 2015-2018 financial and ownership data of multinational groups operated in the EU and their

[26] The Country-by-Country Reporting requirement only applies to MNEs with at least €750 million in annual revenue. This €750 million threshold provides a natural ground for a regression discontinuity design. In the sharp regression discontinuity design, the rating variable is the consolidated revenue of EU MNEs in the preceding year, and the cut-off is €750 million. The outcome variable is tax avoidance, which is measured by effective tax rates (ETRs), the difference between ETR and statutory tax rates (STRs) and cash effective tax rates (CETRs).

[27] Joshi (2020) divides the nine years into two time periods: six years from 2010 to 2015 is the pre-implementation period and three years from 2016 to 2018 is the post-implementation period.

subsidiaries, De Simone and Olbert (2020) investigates how the Country-by-Country Reporting affects MNEs' organizational structure. Both graphic and empirical results suggest that MNEs above the reporting threshold have fewer tax haven subsidiaries, fewer total subsidiaries as well as fewer hierarchical tiers compared to MNEs below the threshold after the implementation. This indicates that in response to the Country-by-Country Reporting, affected MNEs not only shut down their tax haven operations, but also unwind obsolete entities in order to reduce organizational complexity and achieve a simplification of legal entity chart (De Simone and Olbert, 2020).

On the other hand, the BEPS Project has been criticized for its limited inclusiveness and multilateralism. It is an undisputed fact that major OECD countries, which are all developed countries, have dominating power over the process of discussing, negotiating and formulating the BEPS Project. For example, the €750 million under the Country-by-Country Reporting might be an appropriate reporting threshold for the large OECD and G20 economies, but it would leave smaller countries (especially developing countries) with limited or even no access to information about many global and the newly emerging MNEs (BEPS Monitoring Group, 2015).

In addition, Avi-Yonah and Xu (2016) criticise that the entire project is still design based on traditional benefit principle, which determines the basic allocation of tax rights between source and residence countries. This principle may be reasonable in 1920s in which companies usually operated only in one country, but the development of modern organizational structure of MNEs and global value chain (GVC) undermine the conceptual basis of source and residence principle for identifying where profit is earned. Tax competition started in 1980s has also led many source countries to offer "tax holidays" to MNEs, and residence countries are reluctant to tax MNEs' global profit as these countries do not want to put themselves at a competitive disadvantage (Avi-Yonah and Xu, 2017). In addition, they questioned the arm's length principle, arguing that it fails to provide a solution to the division of profits arising from synergies. This principle also struggles with transactions that are undertaken by related parties but not by independent parties. Each MNE group is unique, and the related party transactions within different MNE group are different. It is therefore difficult to find a comparable used to determine the price within the arm's length principle, especially for highly differentiated products or unique transactions.

In the Australian context, instead of making legal arguments, Kayis-Kumar (2016) uses simulation to compare the effectiveness of the tightened Australian thin capitalisation rules and the fix ratio rule recommended in Action 4 *Limiting base erosion involving interest deduction and other financial payment*s of the BEPS Project. She finds that the hypothetical MNE is indifferent to the existence and the variation in the current form of Australian thin capitalisation rules. The average effective tax rate (AETR) remains steady for the hypothetical MNE regardless of whether the thin capitalisation rules are tightened and is less than the AETR for a hypothetical MNE without any tax planning. Besides AETR, the measurement model also indicates no change in the total tax payable from tightening the thin capitalisation rules from a debt-to-equity ratio of 3:1 to 1.5:1. For the effect of the thin capitalisation rules on MNEs' funding behaviour, Kayis-Kumar (2016) finds that capital structure and both quantum and directions of funds flow remain the same. Both Australian subsidiaries and their parent companies experience no change in the funding mix regarding tightened inbound and outbound rules. This indicates that the current form of Australian thin capitalisation rules is unable to affect MNE's international funding decisions, casting doubt on the policymakers' perception that the Australian thin capitalisation rules become more effective at restricting intra-group debt financing and base erosion by simply reducing the debt-to-equity ratio. On the contrary, both a unilateral and multilateral adoption of a fixed ratio rule recommended in the BEPS Project result in an increase in total tax payable by MNEs, most markedly for the most tax aggressive MNEs. However, the behaviour of the hypothetical MNE is still indifferent. The indifferent reaction of the hypothetical MNE is not a surprising result. As MNEs can change their funding mix flexibly within the group, they can switch to finance lease from other types of intercompany funding such as intercompany financing and licensing easily if other types of intercompany funding are subject to strict legislations. The alternative reform configurations between different intercompany funding allow the MNE to obtain the same total tax payable regardless of the implementation of related rules.

Although OECD released its final reports of the BEPS Project in 2015, and countries are in the process of implementing the measures recommended in this project, there are limited empirical tax studies quantifying the effectiveness of the BEPS countermeasures, especially in the Australian context. We attempt to extend the

literature by empirically assessing the effectiveness of Australian BEPS countermeasures using archival data.

4. Hypotheses Development

4.1 Cross-border profit shifting by MNEs

In this study, we first investigate the extent of cross-border profit shifting from Australia based on an identification strategy developed by Hines and Rice (1994). Specifically, we investigate how a FOAC reports its profit in response to international tax rate differentials across countries in which its MNE group operates.

Shareholder theory developed by Friedman (2007) emphasises the importance of profitability and companies' duties to their shareholders. It believes that in a free-enterprise system, managers and executives in the companies have a responsibility to maximise the shareholders' interests because managers and executives are employed by the business owners, who are shareholders. The responsibility of business is to make profit as much as possible while conforming to the basic rules of the society, both law and ethical custom (Friedman, 2007).

One way for an MNE to maximize its profit and returns to shareholders is to pay less corporate income taxes. Previous studies (e.g. Desai and Dharmapala, 2006 and Robinson et al., 2010) suggest that tax departments within firms are operated as profit centres because firms uses tax planning schemes with a goal of improving accounting outcomes. Given that the corporate tax rate faced by FOACs in Australia (30%) is relatively high compared to the tax rates of many countries, FOACs have incentives to shift profits out of Australia and thus report less profit in Australia in order to minimise the global corporate income taxes borne by the foreign MNE groups and maximize the groups' global profits after taxes.

Amiram et al. (2019) suggest that the existence of dividend imputation system depresses managers' incentives to engage in costly tax planning because corporate tax avoidance in an imputation system shifts tax payments from the corporation to its shareholders. Firms in countries that eliminated their imputation systems increase corporate tax avoidance by 5.5 percent of pre-tax corporate profit compared to the extent of profit shifting before the elimination (Amiram et al., 2019). Australia has a

dividend imputation system under which Australian shareholders are entitled to a tax credit for the share of Australian corporate income tax paid by an Australian company and imputed or attached to the dividend payouts. Dividends that carry such a tax credit are called franked dividends. Based on a sample of profitable Australian listed companies across the period from 2009 to 2012, Li and Tran (2019) find that companies distributing a higher proportion of their after-tax profits as franked dividends and companies with less foreign ownership engage in less corporate tax avoidance. As FOACs are Australian subsidiaries of foreign MNEs and are mainly owned by foreign shareholders outside Australia, FOACs and their foreign shareholders cannot enjoy the benefits of the Australian dividend imputation system. Therefore, unlike Australian companies that are owned by Australian shareholders, FOACs have incentives to shift profit out of the country to avoid Australian corporate tax.

Global operations in a wide range of countries provide foreign MNEs with the opportunities to shift profit from their Australian subsidiaries (i.e. FOACs) to the parent company or other subsidiaries located in low-tax countries within the MNE group using different profit shifting channels, such as tax-induced intra-group transfer pricing and intra-group debt financing and interest loading. The development of global operations and GVC also make it easy for foreign MNEs to find justifications for their tax-motivated profit shifting.

In order to maximise group profit after taxes, a FOAC is likely to shift profit to other group members with corporate tax rates lower than the Australian tax rate. The larger the tax rate differentials between a FOAC and other members in the same MNE group, the smaller will be the profit reported by this FOAC in Australia. This leads to the following hypothesis:

> ***H1:*** *The profit before tax reported by a FOAC is negatively associated with the tax rate differentials between Australia and other countries where its MNE group operates.*

4.2 The effectiveness of Australian BEPS countermeasures

As discussed before, FOACs have incentives to shift profits to group members located

in low-tax jurisdictions in order to minimise total tax expenses and maximize group profits after taxes. However, the implementation of Australian BEPS countermeasures since the launch of the OECD/G20 BEPS Project in 2013 increases both the costs and risks of foreign MNEs when they shift profit out of their Australian subsidiaries. If foreign MNEs continue conducting aggressive tax avoidance in the post-BEPS period, the tax benefits they used to obtain are likely to be denied, and they also face potential penalties and reputational losses resulted from the violation of Australian tax law.

From the legal perspective, these countermeasures tackle many types of tax planning schemes by foreign MNEs and expand the reach of Australian tax law. For example, the MAAL impedes MNEs' ability to avoid tax through trusts or partnerships, in addition to companies, within the groups using artificial or contrived arrangements to avoid the attribution of business profits to Australia. The DPT has been introduced to catch a much wider set of businesses, including those transacted through the internet (e.g. Google, Netflix and Amazon) and others that have operations in a lower tax jurisdiction. Under the DPT, the ATO may issue a DPT assessment, imposing DPT liability and penalties if a profit shifting scheme in which a company obtains a "DPT tax benefit"[28] exists.[29] This DPT liability and penalties include a 40% DPT tax on the diverted profit and interest charge.[30] The Australian government has also imposed goods and services tax (GST) on digital and low value goods to tackle the severe international tax avoidance conducted by the digital economy.[31] These provisions ensure that an entity could be liable for this additional tax even if it has no permanent establishment in the Australia and/or if any of its employees ever work remotely from Australia, as long as the entity has any operations (i.e. selling goods or services) in Australia.

The expansions of current Australian tax regime are expected to interdict some of foreign MNEs' profit shifting channels, force them to change their tax planning strategies and pay more corporate income tax in Australia. For example, the MAAL has

[28] According to *Income Tax Assessment Act 1936* Section 177, to determine whether the taxpayer has obtained a "DPT tax benefit", the principal purposes of a scheme is considered. Also, "sufficient foreign tax test" and "sufficient economic substance test" are applied to the foreign associates of the taxpayer in a low-tax jurisdiction or a jurisdiction in which the foreign associates can receive tax concessions.
[29] *Income Tax Assessment Act 1936* Section 177J.
[30] *Income Tax Assessment Act 1936* Section 177P.
[31] Some features of digital economy such as mobility, the spread of multi-sided business model and volatility have seriously exacerbated BEPS risks from the aspect of international tax system (Avi-Yonah and Xu, 2016).

led to global restructure of some MNE groups. According to the ATO, following the introduction of the MAAL, 44 corporate taxpayers have restructured their tax affairs and businesses to recognise sales in Australia (Khadem, 2020). MNEs have restructured their business, devolving responsibility for entering into contracts with customers into the Australian entity. In some specific cases, companies in the technology industry like Google and Facebook have publicly stated that they would return Australian-sourced sales to Australia as a result of the MAAL (ATO, 2017). At the end of 2019, the ATO claims that the operation of the MAAL has already seen AUD 7 billion in taxable sales being returned to Australia (ATO, 2019c). The MAAL is also expected to have positive impacts on a number of significant cases by encouraging settlement discussions to be brought forward (Khadem, 2019). Recently, Google has settled its tax dispute with the ATO with a payment of an extra AUD 481.5 million on top of its previous tax payments at the end of December 2019 (ATO, 2019c). Such payment covers the period from 2008 to 2018 (Khadem, 2019).

Following the adoption of BEPS countermeasures in Australian tax law, the costs for FOACs and their foreign MNEs to engage in international tax avoidance also increase. In addition to higher audit risks by tax administrations and monetary penalties required to be paid if tax planning arrangements are caught by tax authorities, the costs of cross-border profit shifting also include reputation damage, undesired political attention, lower income for financial reporting purposes and stock crash risks.

From the capital market perspective, foreign MNEs may reduce the extent of profit shifting activities due to the potential downward risk of stock prices and potential losses of reputation. Hanlon and Slemrod (2009) find that a company's stock price declines when there is news about its involvement in corporate tax avoidance. Aggressive tax planning increases the crash risk of firm-specific stock price (Kim et al., 2011). Besides these two studies, Blaylock et al. (2012) provides an indirect evidence that investors will link tax avoidance, reflected by large positive book-tax differences, to earnings management as well as lower earnings and accruals persistence. Therefore, if a company’s tax planning schemes trigger actions taken by the tax authorities under the BEPS countermeasures, investors will perceive this as a bad signal and reduce their investments, causing stock price decreases. To avoid this situation, managers of foreign MNEs may have to reduce their tax planning activities.

MNEs are also likely to be forced to reduce the extent of profit shifting due to the potential losses of reputation and consumers. Graham et al. (2014) find that concerns of "potential harm to firm reputation" and "risk of adverse media attention" discourage managers to engage in tax planning. About 69 percent of tax executives rate reputation as important, and such factor ranks second in order of importance among factors that explain why firms do not adopt aggressive tax planning schemes (Graham et al., 2014).[32]

According to the stakeholder theory, companies have social responsibilities beyond making profits, and companies should care about public interest and social welfare besides their shareholders' interest. MNEs depend on the existence of a local economy in different countries to operate businesses. It is their responsibilities to contribute to the economies in which they operate. Aggressive tax planning is an indicator for corporate social irresponsibility (poor corporate citizen) as aggressive tax avoidance violates a corporation's social and ethical obligations. More socially responsible corporations are likely to be less tax aggressive in nature (Lanis and Richardson, 2012). In other words, aggressive profit shifting and tax avoiding activities signal the lack of corporate social responsibility (CSR) (Hoi et al., 2013). Therefore, if tax avoidance by MNEs results in penalties or other actions from the tax authorities under the BEPS countermeasures, the public may perceive that the MNEs conduct immoral activities and are in lack of social responsibility. This perception could lead to negative consumer reactions including negative word of mouth, protest activities and consumer boycotts and thus negatively affect the relation between the company and its consumers (Grappi et al., 2013). For instance, an article in *New York Times* profiled General Electric Company (GE) and its tax avoidance activities (Kocieniewski, 2011). GE responded to this article on its official website, claiming that it does not avoid taxes and has paid the legally owed amount of tax. However, several people still made negative comments like "I will never buy GE products again" toward the statement of GE (Graham et al., 2014). In the long run, the negative consumer reactions will harm companies' reputations, brand images and overall operations (Brunk, 2010). In order to maintain good public images and current consumers, FOACs and their MNEs have to reduce the

[32] The factor that ranks first is the concern that a tax strategy might not pass the judicial standard of business purpose/economic substance (Graham et al., 2014).

extent of profit shifting conducted in the Australian context. For example, Starbucks reported sales growth in the UK every year but always made losses and paid no tax in the UK. When reporters reported that Starbucks shifted profits out of the UK by transfer pricing, UK consumers boycotted Starbucks in December 2012, and Starbucks subsequently made voluntary tax payment of GBP 20 million to the UK tax authorities to pacify consumers.

Admittedly, the flexible changes between different tax planning strategies and schemes undermine the effectiveness of the BEPS countermeasures. Foreign MNEs can switch to other tax planning schemes from the ones that become subject to BEPS countermeasures.[33] However, seeking more complicated and sophisticated profit shifting schemes leads to extra profit shifting costs as the BEPS countermeasures have already tackled the most commonly used profit shifting channels by MNEs such as intra-group transfer pricing and intra-group debt financing. Also, these countermeasures are still expected to put extra pressures on foreign MNEs by affecting groups' profitability and reputations. Therefore, FOACs are likely to have less incentives of profit shifting out of Australia after the implementation of the BEPS countermeasures due to increasing costs. If FOACs shift less profits out of Australia, the profit reported by them will increase. Hence, the reported profits by FOACs will be less sensitive to the tax rate differentials across countries where the MNE groups operate in the post-BEPS period compared to the pre-BEPS period. This leads to the second hypothesis:

> ***H2:*** *The profits reported by FOACs are less sensitive to the tax rate differentials between Australia and other countries where the MNE groups operated in the post-BEPS period, compared to the pre-BEPS period.*

5 Research Design

5.1 Sample and data

The study period is the 14 years from 2007 to 2020. We divide the 14 years into two

[33] For example, the indifferent reaction of the hypothetical MNE under tightened thin capitalisation rules in Kayis-Kumar's (2016) simulation indicates that the alternative configurations between different intercompany funding allow MNEs to obtain the same total tax payable regardless of the implementation of new thin capitalisation rules.

time periods: the six years from 2007 to 2012 is the pre-BEPS period, and the eight years from 2013 to 2020 is the post-BEPS period. The divide line is 2013 because the OECD started the BEPS Project in 2013, and the BEPS issues drew the attention of the media and the public at large since then. Also, the Australian government has made changes to the tax law to implement the recommendations of the BEPS Project and introduced unilateral BEPS countermeasures since 2013.

The population of interest in this study is FOACs, which are the Australian subsidiaries of foreign MNEs. FOACs have both incentives and opportunities to shift profits to other members of the MNE groups located in low-tax countries. The initial sample is drawn from the lists of the top 2,000 Australian companies on the IBISWorld website in 2012 and 2016.[34] Additional efforts are made to check whether a certain company is a FOAC and whether a FOAC has real operations across the entire 14-year sample period based on the financial reports acquired from the ASIC. If a company is determined to be not foreign-owned or be a dormant company in a certain year, corresponding firm-year observations are excluded from the sample.[35]

All banks and insurance companies are excluded from the study because they are subject to different tax rules, different regulatory and financial reporting requirements. Companies in the public utility industry (i.e. electricity, gas and water) are regulated by the government and are also excluded.

Ownership data of FOACs are directly downloaded from the Orbis database. This ownership data is used to identify the immediate parent, the global ultimate owner (GUO) (i.e. the ultimate parent entity)[36] and all other affiliates of a FOAC. The collection process of ownership data for each FOAC follows four steps.

First, we search a FOAC in the Orbis database and identifies its GUO. Second, we collect the ownership data of this GUO and its group structure from Orbis. All

[34] The initial sample of FOACs we use is based on the sample used by Li and Tran (2020). Li and Tran (2020) identified FOACs based on the list of Australia's top 2,000 companies in the year 2012 obtained from the IBIS World website. The IBIS World top 2,000 Australian companies include listed Australian companies, Australian-owned non-listed companies, foreign-owned and government-owned companies, universities and other non-government organisations. As we extend the study period to a 14-year period, from 2007 to 2020, further efforts were made in 2016 to identify additional FOACs based on the list of Australia's top 2,000 companies in the year 2016 from the IBIS World website.

[35] For instance, based on the information provided by 2007-2020 financial reports, Clemenger Group Limited was not a FOAC until 2012. Therefore, its 2007 to 2011 firm-year observations are excluded from the sample.

[36] The ultimate parent must be a company, not a country, an individual or a trust.

subsidiaries of the GUO are treated as the affiliates of this FOAC.[37] Third, a company is excluded from the list of affiliates if the GUO has 50% or less total ownership of this company,[38] or the ownership percentage is not available in the Orbis database. Forth, given that a list of countries where all affiliates of a FOAC operate is required to compute variables capturing tax rate differentials within a group, a company is excluded from the list of affiliates if its location or country is not available in the Orbis database. The list of affiliates of a FOAC, which includes countries where the affiliates operate, is used to calculate the tax rate difference variables for each FOAC. Detailed calculation of these variables will be explained later.

Given that the immediate parent entity and the ultimate parent entity of a FOAC could change over the 14-year study period, we rely on the financial reports of FOACs provided by ASIC to determine the immediate parent entity and ultimate parent entity of a FOAC year by year. However, the list of affiliates of a FOAC is static at around the end of 2018 because ownership data were downloaded from the Orbis database in March 2019. The Orbis database only provides the latest ownership data and group structure at the time of access.

Global corporate tax rates (i.e. statutory tax rates) data is collected from KPMG Global Tax Rate Table and Deloitte Corporate Tax Rate.[39] A separate spreadsheet is prepared to record the corporate tax rates faced by a FOAC's immediate parent entity and ultimate parent entity as well as the computation of average tax rate of all affiliates (i.e. all group members other than the FOAC, its affiliates located in Australia and the ultimate parent) and the ranking of Australian tax rate among countries where the group operates in percentile for each FOAC.

Financial and firm characteristics (e.g. industry code) data of FOACs are collected from the Orbis database as well as the IBISWorld website, and these data are cross-checked against financial reports acquired from ASIC.

The tax rates dataset and the financial dataset are merged together into the final dataset

[37] Data up to ten levels of the subsidiaries of a GUO are downloaded from the Orbis database.
[38] If the GUO has 50% or less ownership of a company, then the GUO does not control this company.
[39] The main source in this study is KPMG Global Tax Rate Table available at https://home.kpmg/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html. The tax rates of additional countries are collected from Deloitte Corporate Tax Rate available at https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-corporate-tax-rates.pdf.

used for the regression analyses. Table 1 summarises the sample selection process.

[Insert Table 1 here]

Overall, there are 4,726 firm-year observations, including 1,944 observations in the 6-year pre-BEPS period, 2007 to 2012, and 2,782 observations in the 8-year post-BEPS period, 2013 to 2020, representing 374 FOACs in the final sample.

5.2 Statistical model and variables of interest

In this study, we adopt and modify the Hines and Rice approach to investigate the extent of cross-border profit shifting activities conducted by FOACs in Australia and their foreign MNEs. This economic approach measures how the deviation of reported accounting profits from profits actually generated from real business activities is affected by MNEs' cross-border profit shifting activities.

The following regression model (for firm *i* and year *t*) as represented by equation (2) is the general model for this study. This regression model estimates how the reported profits of FOACs respond to the tax rate differentials between two countries or across countries where the whole MNE groups operate. The model also includes a *PostBEPS* indicator and the interaction term *PostBEPS* × *TaxRateDiff* to measures the effectiveness of Australian BEPS countermeasures.

$$\begin{aligned} logProfBTax_{i,t} \quad = \quad & \beta_0 + \beta_1\, logCapital_{i,t} + \beta_2\, logLabour_{i,t} + \beta_3\, TaxRateDiff_{i,t} + \\ & \beta_4\, PostBEPS_t + \beta_5\, PostBEPS_t \times TaxRateDiff_{i,t} + \beta_{6\text{-}23}\, IND_{i,t} \\ & + \varepsilon_{i,t} \end{aligned} \tag{2}$$

Where:

$logProfBTax_{i,t}$	is measured by the natural logarithm of accounting profit before tax;
$logCaptial_{i,t}$	is measured by the natural logarithm of the sum of tangible fixed assets and intangible fixed assets (excluding goodwill and deferred tax assets);
$logLabour_{i,t}$	is measured by the natural logarithm of employee compensation, or by the natural logarithm of the number of employees;

$TaxRateDiff_{i,t}$	a generic variable to capture tax rate differentials within an MNE group;
$PostBEPS_t$	is post-BEPS period indicator, taking value of "1" if the year falls in the post-BEPS period (i.e. the period from 2013 to 2020) and "0" otherwise (i.e. the period from 2007 to 2012);
$Ind_{i,t}$	industry indicators based on the Australian and New Zealand Standard Industrial Classification (ANZSIC), taking the value of "1" for the correct industry, and "0" otherwise;
$\varepsilon_{i,t}$	is the regression error term.

Table 2 summarizes variable definitions.

[Insert Table 2 here]

Although the problem of heteroscedasticity may exist,[40] we do not employ panel data analysis (i.e. firm fixed effects models) for the following reasons. First, the corporate tax rates of many countries and the group structures of MNEs[41] do not vary significantly over the study period. This means that the within-firm variation in *TaxRateDiff* (especially the average tax rate variable *ATRD_A* which is static) is likely to be very small or even zero.[42] As the fixed-effects estimator requires a within-firm variation of the independent variable, which is absent in this study, fixed-effects models are not appropriate. Second, the panel data are unbalanced, as reported in Appendix 1. There are 374 firms with 4,726 firm-year observations. On average, a firm has only about 12.6 yearly observations. Only 231 firms out of 374 (about 62 percent) have data for all 14 years. Given that the omitted yearly observations may be systematic due to the exclusion of firm-year observations that are not foreign-owned or are dormant or report a loss before tax (hence the logarithm of profit before tax is missing), the estimated coefficients from fixed effects models might be biased.

Instead of firm fixed effects model, we use the cluster robust-variance option for the regression model to relax the independent errors assumption in a limited way when

[40] The presence of heteroscedasticity is due to the fact that a firm may have up to 14 years of data in the dataset so the errors are auto-correlated between yearly observations of the same firm.
[41] The group structures of MNEs are static at around the end of 2018 due to data limitation.
[42] The standard deviations of *TRD_IP, TRD_UP* and *RTR_C* are about 0.09, and the standard deviations of *ATRD_A* are less than 0.02.

errors are correlated within subgroups or clusters of data. Standard errors across all models are clustered by firms.

5.2.1 Dependent variable

As discussed before, the basic premise of Hines and Rice (1994) is that the observed pre-tax profit of an affiliate (subsidiary) of an MNE in a host country represents the sum of 'true' profit and 'shifted' profit (either positive or negative) (Dharmapala, 2014, p. 424).

Estimating the reported profit

In equation (2), we use *logProfBTax*, which is measured by the natural logarithm of accounting profit before tax to measure the observed reported profit following Hines and Rice (1994) and the Cobb-Douglas production function form. Logarithm transformation is also necessary to ensure that the data are close to normal distribution. As the natural logarithm of a negative number is undefined, FOACs reporting losses (i.e. negative profits) will have their *logProfBTax* become missing values upon taking logarithm. Therefore, the data analyses only apply to profitable FOACs.

5.2.2 Independent variables and control variables

Estimating the 'true' profit

The 'true' profit from the production output of a FOAC is estimated from the relation with its labour and capital inputs. According to the Cobb-Douglas production function, the production output and hence the 'true' profit of a FOAC is a function of its labour input and capital input, as well as the level of productivity in the country where the subsidiary operates (i.e. a productivity parameter that reflects cross-country differences in technology level and factor qualities). Given that all FOACs in the sample operate in Australia, there is no cross-country differences in technology and factor productivity among them, so this variable needs not be included in the regression model. In other words, the 'true' profit of a FOAC should only be a function of a FOAC's labour input and capital input.

The capital input (*logCapital*) is measured by the natural logarithm of the sum of

tangible fixed (or non-current) assets and intangible fixed assets. Previous studies (e.g. Hines and Rice, 1994; Huizinga and Laeven, 2008) use total physical fixed assets as a proxy for capital input. We argue that as intangible fixed assets have become more important nowadays, they should also be included. Other fixed assets, such as goodwill on consolidation and deferred tax assets, may not relate to the production of output and profits and are excluded. The labour input (*logLabour*) is measured by the natural logarithm of the number of employees (*logNumEmp*). Alternatively, labour input can be measured by the natural logarithm of the costs of employees (*logCostEmp*). We choose to use two alternative proxies for labour input because some companies disclose cost of employees[43] but not number of employees,[44] and vice versa. Therefore, we use two alternative proxies for labour input to include as many observations in the regression models as possible.

Estimating the 'shifted' profit

In equation (2), we use a generic variable, *TaxRateDiff*, to captures the tax rate difference incentives to shift profits into or out of Australia. This generic variable can be proxied by (1) the international tax rate differential between a FOAC and its parent, either the immediate parent or the ultimate parent, and (2) the average tax rate differential between a FOAC and other group members in different host countries within the same MNE group.

Foreign subsidiaries of MNEs may shift profit to low-tax immediate parent entity (Ting 2014; Purba and Tran, 2020). Specifically, Ting (2014) explains how the distribution companies of Apple products located in various countries, such as Apple Australia Pty Ltd, shift profits to Apple Operations International, a holding company (i.e. the immediate parent of those distribution companies) located in Ireland (a low-tax country), in order to save the global income taxes of the group headed by Apple Inc. in the United States. Purba and Tran (2020) conduct empirical analyses of confidential Indonesian tax return data and find that on average a one-percentage-point lower tax

[43] Australian Accounting Standards allow companies to classify and disclose their expenses by the nature of expense (e.g. raw materials and consumables, employee costs, depreciation and amortization expenses) or by the function of expense (e.g. cost of goods sold or costs of sales, distribution costs, administrative expenses). Costs of employees are disclosed only when the companies classify expenses by nature.

[44] The number of employees is not a mandatory disclosure item in the financial reports, so only some companies disclose their numbers of employees.

rate in the residence country of a foreign-owned Indonesian company's immediate parent is associated with a reduction of 2.6 percent and 2.9 percent, respectively, in the pre-tax accounting profit and taxable income reported by those Indonesian companies. Following these studies, we first use the international tax rate differential between a FOAC and its immediate parent entity (*TRD_IP*) to capture the incentive of tax rate differences. *TRD_IP* is measured by Australian corporate tax rate (i.e. 30%) minus the corporate tax rate of the country in which the immediate parent entity is located.

Previous studies (e.g. Huizinga and Laeven, 2008; Dischinger et al., 2014) also have suggested that an MNE affiliate may shift profit to any low-tax affiliate, especially to the ultimate parent if the headquarters is located in a low-tax country. Therefore, we disaggregate the tax rate differentials between a FOAC and its group members into two parts: the tax rate differential between a FOAC and its ultimate parent (*TRD_UP*) and the average tax rate differential between a FOAC and other affiliates in different host countries within the same MNE group (*ATRD_A*). *TRD_UP* is measured by Australian corporate tax rate (i.e. 30%) minus the corporate tax rate of the country in which the ultimate parent entity is located. *ATRD_A* is measured by Australian corporate tax rate (30%) minus the unweighted average tax rate of countries where other affiliates operate. Previous studies (e.g. Huizinga and Laeven, 2008; Markle, 2016) have used *TRD_UP* and the average tax rate of affiliates weighted by the revenues of affiliates in different countries, which represent the opportunities to shift profits. We do not adopt such weighted measurements for two reasons: (1) revenues of affiliates in different countries are not available on the Orbis database; (2) De Simone (2016) argues that the weighted tax rate difference variable weights affiliates' tax rates by sales revenue, but sales revenue is likely distorted as a result of cross-border profit shifting, resulting in the endogeneity problem. Therefore, we use *TRD_UP* and the simple (i.e. without weighting) average tax rate difference, *ATRD_A*, as the proxies to cover all members of the MNE group operating in other countries.

To compute *TRD_IP* and *TRD_UP*, we determine a FOAC's immediate and ultimate parent entity and their locations (i.e. countries) based on the Orbis database as well as the financial reports acquired from ASIC for every FOAC year by year. Both *TRD_IP* and *TRD_UP* may vary from year to year because the parent entities of a FOAC and the corporate tax rates faced by them could change during the 14-year sample period.

To compute *ATRD_A*, the unweighted average tax rate of countries where other affiliates operate is calculated based on the list of affiliates for every FOAC. It is worthy to notice that all companies located in Australia are excluded when *ATRD_A* is computed. Also, *ATRD_A* is fixed for the whole study period because it is based on the group structure of an MNE at the time when the Orbis database is accessed.

The average tax rate difference of affiliates overseas (*ATRD_A*) is found to have little variation across FOACs because of the averaging process, so we further use the ranking of Australian tax rate among the tax rates of other countries where the MNE group operates as another proxy for tax rate difference incentive. De Simone (2016) employs the rank of an affiliate's statutory tax rate relative to all other affiliates in the same group-year[45] and finds a negative relation between this rank and reported profits. We convert the absolute value of tax rates into relative rankings and constructs one tax rate ranking variable. *RTR_C* is measured by the ranking of Australian corporate tax rate relative to tax rates of all other countries in which the MNE group operates in percentile. *RTR_C i*s also fixed for the whole study period because it is based on the group structure of an MNE at the time when the Orbis database is accessed.

Higher values of *TRD_IP*, *TRD_UP*, *ATRD_A* and *RTR_C* indicate that Australian corporate tax rate is relatively high compared to the tax rates of other countries where an MNE operate, so the FOAC has more tax incentives to shift profit out of Australia. The coefficient (β_3) of this generic tax rate difference variable, *TaxRateDiff*, in equation (2) is the semi-elasticity of reported profit with respect to tax rate differentials in the study period, especially the pre-BEPS period. It captures how international tax rate differentials, average tax rate differentials and Australian tax rate ranking affect the 'shifted' profits (hence the observed reported profits) in the study period. As discussed in the hypotheses development, an MNE has more incentives to shift more profit out of its Australian subsidiary (i.e. FOAC) to its lower tax group members, when tax rate differentials are larger between Australia and other countries where it operates. In other words, the higher the Australia tax rate relative to tax rates of other countries, the more profits are expected to be shifted out of Australia, and thus the less the profit will be reported by FOAC in Australia. Therefore, the regression coefficient (β_3) of this generic

[45] De Simone (2016) adopts two ways to calculate this variable: by ranking statutory tax rates of an affiliate group-year into quintiles and into deciles.

variable, *TaxRateDiff*, is expected to be negative.

Assessing the effectiveness of the BEPS countermeasures

After detecting the extent of cross-border profit shifting activities by FOACs in the study period based on Hines and Rice approach, we further evaluate the effectiveness of Australian BEPS countermeasures in this study. To do so, we include an indicator variable, *PostBEPS*, to compare the differences in FOACs' reported profits between the pre-BEPS period and the post-BEPS period. This indicator variable takes value of "1" if the year falls in the post-BEPS period (2013 to 2020) and "0" otherwise (2007 to 2012). The regression coefficient of *PostBEPS* (β_4) in equation (2) captures the change in 'true' profit between the pre-BEPS period and the post-BEPS period as a result of changes in productivity over time.

In equation (2), an interaction term, $TaxRateDiff \times PostBEPS$, is also included. The coefficient of this interaction term is β_5 which is the main coefficient of interest. This coefficient captures the incremental effect of the implementation of BEPS countermeasures on cross-border profit shifting measured by the semi-elasticity of reported profit with respect to tax rate differential. When *PostBEPS* equals to "0", that is the pre-BEPS period, the semi-elasticity of reported profit with respect to global tax rate differential is captured by β_3. When *PostBEPS* equals to "1", that is the post-BEPS period, such tax rate semi-elasticity is captured by β_3 plus β_5, where β_5 captures the difference between the post-BEPS period and the pre-BEPS period and thus the effect of BEPS countermeasures on the estimated tax rate semi-elasticity. If BEPS countermeasures are effective, FOACs are likely to reduce the extent of profit shifting out of Australia after the implementation of the BEPS countermeasures. If FOACs shift less profits out of Australia, the profit reported by them are expected to be less sensitive to the tax rate differentials across the MNE groups in the post-BEPS period compared to the pre-BEPS period. Therefore, β_5 is expected to be positive if Australian BEPS countermeasures are effective.

Control variables

In equation (2), we also include a set of industry indictors to control for the industry affiliations because firms in different industry group may have different efficiency in

utilizing capital and labour inputs as well as different level of technology. Firms in the final sample are divided into 19 industry groups based on the Australian and New Zealand Standard Industrial Classification (ANZSIC) code. Eighteen industry dummy variables (*Ind*) are used to control for industry differences in efficiency and technology level in comparison with the base industry, namely, Agriculture, Forestry and Fishing (industry group 1).

Six specific models (for firm *i* and year *t*) for the two alternative labour input proxies and the three sets of international tax rate difference proxies as represented by equation (3) to (8) are analysed in the main test.

$$logProfBTax_{i,t} = \beta_0 + \beta_1 logCapital_{i,t} + \beta_2 logNumEmp_{i,t} + \beta_3 TRD\_IP_{i,t} + \beta_4 PostBEPS_t + \beta_5 PostBEPS_t \times TRD\_IP_{i,t} + \beta_{6\text{-}23} IND_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$logProfBTax_{i,t} = \beta_0 + \beta_1 logCapital_{i,t} + \beta_2 logCostEmp_{i,t} + \beta_3 TRD\_IP_{i,t} + \beta_4 PostBEPS_t + \beta_5 PostBEPS_t \times TRD\_IP_{i,t} + \beta_{6\text{-}23} IND_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$logProfBTax_{i,t} = \beta_0 + \beta_1 logCapital_{i,t} + \beta_2 logNumEmp_{i,t} + \beta_3 TRD\_UP_{i,t} + \beta_4 PostBEPS_t + \beta_5 PostBEPS_t \times TRD\_UP_{i,t} + \beta_6 ATRD\_A_{i,t} + \beta_7 PostBEPS_t \times ATRD\_A_{i,t} + \beta_{8\text{-}25} IND_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$logProfBTax_{i,t} = \beta_0 + \beta_1 logCapital_{i,t} + \beta_2 logCostEmp_{i,t} + \beta_3 TRD\_UP_{i,t} + \beta_4 PostBEPS_t + \beta_5 PostBEPS_t \times TRD\_UP_{i,t} + \beta_6 ATRD\_A_{i,t} + \beta_7 PostBEPS_t \times ATRD\_A_{i,t} + \beta_{8\text{-}25} IND_{i,t} + \varepsilon_{i,t} \quad (6)$$

$$logProfBTax_{i,t} = \beta_0 + \beta_1 logCapital_{i,t} + \beta_2 logNumEmp_{i,t} + \beta_3 RTR\_C_{i,t} + \beta_4 PostBEPS_t + \beta_5 PostBEPS_t \times RTR\_C_{i,t} + \beta_{6\text{-}23} IND_{i,t} + \varepsilon_{i,t} \quad (7)$$

$$logProfBTax_{i,t} = \beta_0 + \beta_1 logCapital_{i,t} + \beta_2 logCostEmp_{i,t} + \beta_3 RTR\_C_{i,t} + \beta_4 PostBEPS_t + \beta_5 PostBEPS_t \times RTR\_C_{i,t} + \beta_{6\text{-}23} IND_{i,t} + \varepsilon_{i,t} \quad (8)$$

Where:

$logProfBTax_{i,t}$	is measured by the natural logarithm of accounting profit before tax;
$logCaptial_{i,t}$	is measured by the natural logarithm of the sum of tangible fixed assets and intangible fixed assets (excluding goodwill and deferred tax assets);
$logNumEmp_{i,t}$	is measured by the natural logarithm of the number of employees;
$logCostEmp_{i,t}$	is measured by the natural logarithm of employee compensations;
$TRD\_IP_{i,t}$	is measured by Australian corporate tax rate (30%) minus the corporate tax rate of the country in which the immediate parent entity is located;
$TRD\_UP_{i,t}$	is measured by Australian corporate tax rate (30%) minus the corporate tax rate of the country in which the ultimate parent entity is located;
$ATRD\_A_{i,t}$	is measured by Australian corporate tax rate (30%) minus the unweighted average tax rate in the countries where other affiliates operate;
$RTR\_C_{i,t}$	is measured by the ranking of Australian corporate tax rate relative to tax rates of all other countries in which the MNE group operates in percentile;
$PostBEPS_t$	is post-BEPS period indicator, taking value of "1" if the year falls in the post-BEPS period (i.e. period from 2013 to 2020) and "0" otherwise (i.e. period from 2007 to 2012);
$Ind_{i,t}$	industry indicator, taking the value of "1" for the correct year, and "0" otherwise;
$\varepsilon_{i,t}$	is the regression error term.

Model 1 includes *TRD_IP* to capture the effect of the international tax rate differential between a FOAC and its immediate parent entity on reported profits and is represented by equation (3) and equation (4) depending on whether the number of employees (Model 1a) or the costs of employees (Model 1b) is used as the proxy for labour input.

Model 2 includes *TRD_UP* and *ATRD_A* to separate the effect of international tax rate differential between a FOAC and its ultimate parent entity from the average tax rate differential between a FOAC and other affiliates on profit reporting behaviours and is

represented by equation (5) and equation (6) depending on the proxy used for labour input.[46] Huizinga and Laeven (2008) suggest that only the variable measuring tax difference of a subsidiary vis-à-vis its ultimate parent is statistically significant at the 1% level, which implies a special role of MNEs' headquarters in corporate profit shifting strategies (Dischinger et al., 2014).

Finally, Model 3 includes *RTR_C* to capture the effect of the ranking of Australian tax rate among the tax rates of other countries where the MNE group members operate on reported profits and is represented by equation (7) and equation (8) depending on the proxy for labour input.[47]

6 Empirical Results

6.1 Descriptive statistics

Table 3 reports descriptive statistics of variables used in the main test.

[Insert Table 3 here]

Panels A and B of Table 3 show the description statistics for Model 1 where *TRD_IP* is used as the proxy for *TaxRateDiff*. In Panel A, the mean (median) value of *logProfBTax* in Model 1a is 16.87 (16.78). In terms of the proxies for capital and labour inputs, the mean (median) value of *logCapital* is 17.20 (17.15); the mean (median) of *logNumEmp* is 6.17 (6.21). In Panel B, the mean (median) value of *logProfBTax* in Model 1b is 16.85 (16.76). The mean (median) value of *logCapital* is 17.19 (17.15), and the mean (median) of *logCostEmp* is 17.70 (17.75). There are two main reasons why the numbers of observations in Panels A and B of Table 3 are different from each other and are smaller than the number of observations of the final sample in Table 1. First, some firms disclose their number of employees but not costs of employees, and vice versa, so the numbers of observations are different when *logNumEmp* and *logCostEmp* are used as alternative proxies for labour input. Second, observations reporting negative and zero profit before tax have *logProfBTax* become missing when natural logarithm is taken.

[46] The number of employees is used as the proxy for labour input in Model (2a), and the costs of employees is used as the proxy for labour input in Model (2b).
[47] The number of employees is used as the proxy for labour input in Model (3a), and the costs of employees is used as the proxy for labour input in Model (3b).

Further, a small number of observations have missing *TaxRateDiff* or *logCapital*.

The mean value of *TRD_IP* is 0.015 in Panel A and 0.014 in Panel B, and the median value of *TRD_IP* is 0.02 in both Panel A and Panel B. This indicates that on average, countries in which immediate parent entities of FOACs locate have corporate income tax rates about 1.5 percentage points lower than the Australian tax rate in Panel A and Panel B, but the standard deviation is higher than 0.09 and the range is between -0.11 and 0.3.

Panels C and D of Table 3 show the description statistics for Model 2 where *TRD_UP* and *ATRD_A* are used as the proxies for *TaxRateDiff*. In Panel C, the mean (median) value of *logProfBTax* in Model 2a is 16.90 (16.81). In terms of the proxies for capital and labour inputs, the mean (median) value of *logCapital* is 17.26 (17.19), and the mean (median) of *logNumEmp* is 6.20 (6.23). In Panel D, the mean (median) value of *logProfBTax* in Model 2b is 16.88 (16.78). The mean (median) value of *logCapital* is 17.23 (17.17), and the mean (median) of *logCostEmp* is 17.73 (17.77).

The mean (median) value of *TRD_UP* is around -0.0035 (-0.006) in both Panel C and Panel D, suggesting that on average, corporate income tax rates of countries where FOACs' ultimate parent entities locate are about 0.35 percentage point higher than the Australian corporate tax rate, but the standard deviation is about 0.09 and the range is between -0.11 and 0.3. The average (median) value of *ATRD_A* is 0.063 (0.065) in both Panel C and Panel D, which indicates that on average, Australian corporate tax rate faced by FOACs is around 6 percentage points higher than the average tax rates faced by its affiliates in different host countries within the same MNE group, but the standard deviation is lower than 0.02.

Panels E and F of Table 3 show the description statistics for Model 3 where *RTR_C* is used as the proxy for *TaxRateDiff*. In Panel E, the mean (median) value of *logProfBTax* in Model 3a is 16.90 (16.81). In terms of the proxies for capital and labour inputs, the mean (median) value of *logCapital* is 17.26 (17.19) and the mean (median) value of *logNumEmp* is 6.20 (6.23). In Panel F, the mean (median) value of *logProfBTax* in Model 3b is 16.87 (16.78). The mean (median) value of *logCapital* is 17.23 (17.18), and the mean (median) of *logCostEmp* is 17.73 (17.77).

The mean (median) value of *RTR_C* is about 0.77 (0.77) in both Panel E and Panel F of Table 3, indicating that on average, the ranking of Australian corporate tax rate relative to tax rates of all other countries in which the MNE group operates in percentile is 0.77, which is relatively high, but the standard deviation is 0.09 in Panel E and 0.08 in Panel F.

Table 4 further reports the distribution of observations by industry in the six subsamples for the three regression models represented by equations (3) to (8).

[Insert Table 4 here]

Across six subsamples, the largest proportion of observations comes from Manufacturing (industry group 3), while the smallest all comes from Education and Training (industry group 16).

6.2 Correlation matrix

Table 5 reports a correlation matrix of all continuous variables included in the regression models in the main test.

[Insert Table 5 here]

According to the correlation matrix, the proxy for capital input, *logCapital*, and two proxies for labour input, *logCostEmp* and *logNumEmp*, are positively correlated with reported profits, *logProfBTax*, at the 0.01 significance level in Panel A to F of Table 5. Specifically, the correlation coefficients between *logCapital* and *logProfBTax* are about 0.66 to 0.69 in Panels A to F. The correlation coefficients between *logNumEmp* and *logProfBTax* are about 0.37 in Panel A and 0.36 in Panel C and E. The correlation coefficients between *logCostEmp* and *logProfBTax* are 0.44 in Panel B and 0.043 in Panel D and E. This implies that the proxies for capital and labour inputs are closely related to the 'true' profit which is a component of the reported profit. *LogCaptial* and *logCostEmp/ logNumEmp* are also positively correlated with each other at the 0.01 significance level. The correlation coefficients between *logCapital* and *logNumEmp* are about 0.45 in Panel A and 0.44 in Panel C and E. The correlation coefficients between *logCapital* and *logCostEmp* are about 0.46 in Panel B and 0.45 in Panel D and F.

Three tax rate difference variables (i.e. *TRD_IP*, *TRD_UP* and *ATRD_A*) are not

significantly correlated with *logProfBTax*. *RTR_C* is negatively related to *logProfBTax* at 0.01 significance level with a correlation coefficient of -0.07 in Panel E and -0.12 in Panel F. However, this table only reports the pair-wise correlations. The associations between the tax rate difference variables and the 'shifted' profit component of *logProfBTax* will be isolated in the multivariate analyses reported in the later section.

6.3 Regression Results of the Main Test

Table 6 reports the regression results of main test. Panel A shows the regression results of Models 1a and 1b using *TRD_IP* as the tax rate difference variable. Panel B reports the regression results of Models 2a and 2b using *TRD_UP* and *ATRD_A* as the tax rate difference variables. Panel C shows the regression results of models 3a and 3b using *RTR_C* as the tax rate difference variable. Appendix 2 reports the regression coefficients of the industry indicators in the main test.

[Insert Table 6 here]

6.3.1 When *TRD_IP* is the proxy for tax rate difference incentives

The tax rate difference variable included in Model 1 is *TRD_IP*, the tax rate differential between the FOAC and its immediate parent. Model 1a uses number of employees as a proxy for labour and is represented by equation (3). Model 1b uses costs of employees as a proxy for labour and is represented by equation (4).

The regression coefficient of *TRD_IP* is around -1.58 ($p<0.01$) in Model 1a, which suggests that the estimated semi-elasticity of profit before tax with respect to the international tax rate differential between a FOAC and its immediate parent entity in the pre-BEPS period is -1.58. Such negative tax rate semi-elasticity supports H1 and indicates that when the international tax rate differentials between Australia and countries where FOACs' immediate parent entities increase by one percentage point, profits before tax reported by FOACs in their income statements decrease by nearly 1.58% in the pre-BEPS period.

The coefficient of the interaction term, *PostBEPS*×*TRD_IP*, which shows the change in tax rate semi-elasticity between the pre-BEPS period and post-BEPS period, is not significantly different from zero in Model 1a. Therefore, the tax rate semi-elasticity of

profit before tax in the post-BEPS period is not significantly different from the pre-BEPS period and remains at -1.58 in the post-BEPS period.[48] In other words, the BEPS countermeasures do not appear to have significant effect in reducing profit shifting between a FOAC and its immediate parent in the post-BEPS period.

The regression coefficient of *TRD_IP* is approximately -1.04 ($p<0.05$) in Model 1b. The estimated tax rate semi-elasticity is -1.04, which implies that when the international tax rate differentials between Australia and countries where FOACs' immediate parent entities increase by one percentage point, profit before tax reported by FOACs in their income statements decreases by 1.04% in the pre-BEPS period. The coefficient of the interaction term *PostBEPS*×*TRD_IP* is also not significantly different from zero in Model 1b, which also suggests the BEPS countermeasures do not appear to have significant effect in reducing profit shifting between a FOAC and its immediate parent.[49]

In both Model 1a and Model 1b, *logCapital* is positively related to *logProfBTax* at the 0.01 significance level. Both proxies for labour input (i.e. *logNumtEmp* and *logCostEmp*) are also positively associated with *logProfBTax* at the 0.01 significance level.

6.3.2 When *TRD_UP* and *ATRD_A* are the proxies for tax rate difference incentives

Two tax rate difference variables included in Model 2 are *TRD_UP*, the tax rate differential between the FOAC and its ultimate parent, and *ATRD_A*, the average tax rate differential between the FOAC and its affiliates overseas. Labour input is measured by *logNumExp* in Model 2a as represented by equation (5) and *logCostExp* in Model

[48] The regression coefficient of *TRD_IP* is -1.576, which means that for every one percentage point that Australian tax rate is higher than the tax rate of the immediate parent of a FOAC, the profit reported by the FOAC in Australia is reduced by 1.576%. The mean *TRD_IP* is 0.015, which means that on average Australian tax rate is 1.5 percentage points higher than the tax rate of the immediate parent of FOAC. According to Appendix 3, mean value of profit before tax (*ProfBTax*) is about $91,900,000. Therefore, based on 2,876 firm-year observations (about 205 FOACs per year), the total amount of profit shifted by FOACs to immediate parents is estimated to be $6.25 billion ($91,900,000 x 1.576 x 0.015 x 2,876) over the 14 years to 2020.

[49] The regression coefficient of *TRD_IP* is -1.035, which means that for every one percentage point that Australian tax rate is higher than the tax rate of the immediate parent of a FOAC, the profit reported by the FOAC in Australia is reduced by about 1.035%. The mean *TRD_IP* is 0.014, which means that on average Australian tax rate is 1.4 percentage points higher than the tax rate of the immediate parent of FOAC. According to Appendix 3, mean value of profit before tax (*ProfBTax*) is about $91,800,000. Therefore, based on 3,428 firm-year observations (about 245 FOACs per year), the total amount of profit shifted by FOACs to immediate parents is estimated to be $4.56 billion ($91,800,000 x 1.035 x 0.014 x 3,428) over the 14 years to 2020.

2b as represented by equation (6).

In Model 2a, the regression coefficient of *TRD_UP* is around -2.14 ($p<0.01$), which indicates that the estimated semi-elasticity of profit before tax with respect to the international tax rate differential between a FOAC and its ultimate parent entity is -2.14 in the pre-BEPS period. This tax rate semi-elasticity also supports H1 and suggests that when the international tax rate differential between a FOAC and its ultimate parent entity increases by one percentage point, accounting profit before tax reported by FOACs in the income statements decreases by around 2.14% in the pre-BEPS period. The regression coefficient of *ATRD_A* is not statistically significant. This result is consistent with the findings of Huizinga and Laeven (2008). They find that only the variable measuring tax rate difference of a subsidiary vis-à-vis its parent is statistically significant at the 1% level, but the variable capturing the tax rate difference vis-à-vis subsidiaries in other (foreign) countries is not statistically significant. One possible reason for the insignificant regression coefficient of *ATRD_A* is that the averaging process results in little variation of *ATRD_A* across FOACs. The standard deviation of *ATRD_A* is lower than 0.02 in the sample used for the regression analyses.

The coefficient of the interaction term, *PostBEPS×TRD_UP*, which shows the difference in estimated tax rate semi-elasticity between the pre-BEPS period and post-BEPS period, is not significantly different from zero in Model 2a. Therefore, the tax rate semi-elasticity of profit before tax does not change significantly in the post-BEPS period, compared to the pre-BEPS period. It remains at -2.14 in the post-BEPS period. Hence, the BEPS countermeasures do not appear to have significant effect in reducing profit shifting between a FOAC and its ultimate parent. The coefficient of the interaction term, *PostBEPS×ATRD_A* is also not statistically significant.

When *logCostEmp* is used as an alternative measurement for labour input, *TRD_UP* is negatively associated with *logProfBTax* at the 0.01 significance level with a regression coefficient of -1.54 in Model 2b. This indicates that the estimated semi-elasticity of profit before tax with respect to the international tax rate differential between a FOAC and its ultimate parent entity is -1.54 in the pre-BEPS period. This further supports H1 and suggests that when the international tax rate differential between FOACs and its ultimate parent entity increases by one percentage point, accounting profit before tax

reported by FOACs in the income statements decreases by around 1.54% in the pre-BEPS period. The regression coefficient of *ATRD_A* is also not statistically significant in Model 2b for the same reasons discussed before.

The coefficient of the interaction term, *PostBEPS×TRD_UP* is not significantly different from zero in Model 2b. This insignificant coefficient also indicates that the tax rate semi-elasticity of profit before tax remains at -1.54 in the post-BEPS period, and thus the BEPS countermeasures do not appear to have significant effect in reducing profit shifting between a FOAC and its ultimate parent. The coefficient of the interaction term, *PostBEPS×ATRD_A* is also not statistically significant in Model (2b).

In both Model 2a and 2b, *logCapital*, *logNumEmp* and *logCostEmp* are positively associated with *logProfBTax* at the 0.01 significance level.

6.3.3 When *RTR_C* is the proxy for tax rate difference incentives

The tax rate difference variable included in Model 3 is *RTR_C*, the ranking of Australian corporate tax rate relative to the tax rates of all other countries where the MNE group operates in percentile. Model 3a uses number of employees as a proxy for labour and is represented by equation (7). Model 3b uses costs of employees as a proxy for labour and is represented by equation (8).

RTR_C is negatively related to *logProfBTax* at the 0.05 significance level with a regression coefficient of -1.79 in Model 3a. This implies that the higher the ranking of Australian corporate tax rate relative to tax rates of other countries where the MNE groups operate, the lower is the profit before tax reported by FOACs in their income statement in the pre-BEPS period. The regression coefficient of *PostBEPS* × *RTR_C* is not statistically significant in Model 3a.

In Model 3b, the regression coefficient of *RTR_C* is -1.78 ($p < 0.01$). This significant coefficient also suggests that the higher the ranking of Australian corporate tax rate relative to tax rates of other countries where the MNE groups operate, the lower is the profit before tax in FOACs' income statement in the pre-BEPS period. The regression coefficient of *PostBEPS* × *RTR_C* is not statistically significant in Model 3b. Therefore, the BEPS countermeasures do not appear to have significant effect in reducing profit shifting between a FOAC and its group members in different countries within an MNE

group.

In both Model 3a and Model 3b, *logCapital* is positively related to *logProfBTax* at the 0.01 significance level. Both proxies for labour input (i.e. *logNumtEmp* and *logCostEmp*) are also positively associated with *logProfBTax* at the 0.01 significance level.

Overall, the regression results of the main test indicate that profit shifting from Australia to low-tax countries took place throughout the study period. Specifically, the higher the Australian corporate tax rate relative to the tax rates of immediate parent entities and ultimate parent entities, and the higher the ranking of Australian corporate tax rate among countries where the MNEs operate, the lower is profit before tax reported by FOACs in Australia in the study period. The coefficients of interaction terms between *PostBEPS* and various tax rate difference variables are not statistically significant, indicating that profit shifting has not changed significantly in the post-BEPS period. In other words, profit shifting activities remain in the post-BEPS period and, in general, the Australian BEPS countermeasures do not appear to be effective. Such finding is consistent with the results reported in Joshi (2020). Joshi (2020) cannot find a significant effect of the implementation of private Country-by-Country Reporting (proposed in Action 13 of the BEPS Project) on tax-motivated cross-border profit shifting at affiliate level in the EU context.

6.4 Additional test

As discussed in section 2, the Australian government has implemented its BEPS countermeasures progressively since 2013, and these countermeasures have come into effect in different years. Therefore, a single *PostBEPS* indicator for the whole post-BEPS period, 2013 to 2020, may not be able to capture the effectiveness of the progressively implemented BEPS countermeasures. As an additional test, the *PostBEPS* indicator is broken down into a set of year indicators for the post-BEPS period (*Year2013*, *Year2014*, *Year2015*, *Year2016*, *Year2017, Year2018*, *Year2019* and *Year2020*) to compare with the pre-BEPS period as the base period.

Table 7 reports the regression results of this additional test. Panel A shows the regression results of Models 1a and 1b using *TRD_IP* as the tax rate difference variable.

Panel B reports the regression results of Models 2a and 2b using *TRD_UP* and *ATRD_A* as the tax rate difference variables. Panel C shows the regression results of Models 3a and 3b using *RTR_C* as the tax rate difference variable. Appendix 4 reports the regression coefficients of industry indicators in this additional test.

[Insert Table 7 here]

In Panel A of Table 7, the sign, magnitude and significance level of the regression coefficients of *TRD_IP* are similar to those reported in the main test for Models 1a and 1b. Among the interaction terms between *TRD_IP* and the set of year indicators for the post-BEPS period, only the regression coefficients of the interaction term between *TRD_IP* and the year 2019, *TRD_IP* × *Year2019*, are positive and significant at the 0.05 level in Model 1a and 1b. This provides some evidence that profit shifting between FOACs and their immediate parents might have reduced in the year 2019. However, such decrease in cross-border profit shifting does not sustain in the year 2020, as the regression coefficients of *TRD_IP* × *Year2020* are not significantly different from zero in Models 1a and 1b.

In Panel B of Table 7, the sign, magnitude and significance level of the regression coefficients of *TRD_UP* and *ATRD_A* are similar to those reported in the main test for Models 2a and 2b. The regression coefficients of the interaction terms between *TRD_UP* and the set of year indicators for the post-BEPS period are not statistically significant in both Model 2a and 2b, indicating that profit shifting between FOACs and ultimate parents has not changed significantly throughout the post-BEPS period. Also, the regression coefficients of the interaction terms between *ATRD_A* and the set of year indicators are not statistically significant in both Model 2a and 2b.

In Panel C of Table 7, the sign, magnitude and significance level of the regression coefficients of *RTR_C* are similar to those reported in the main test for Models 3a and 3b. Among the interaction terms between *RTR_C* and the set of year indicators, only the regression coefficient of *RTR_C* × *Year2019* in Model 3a is positive and significant: the coefficient is 2.11 with the p-value of 0.01. This provides some evidence that cross-border profit shifting between FOACs and their other group members might have reduced in 2019. However, such reduction in profit shifting does not sustain in the year 2020, given that the regression coefficients of *RTR_C* × *Year2020* are not significantly

different from zero in both Model 3a and Model 3b.

Overall, the results of this additional test indicate the presence of cross-border profit shifting in response to international tax rate differentials in both the pre-BEPS period and the post-BEPS period. In other words, cross-border profit shifting might not have reduced significantly in the post-BEPS period in general, although some evidence might suggest a reduction in profit shifting in 2019 in the additional test.

However, we cannot categorically conclude that the BEPS countermeasures adopted by Australia are not effective for the following reasons. First, even though BEPS countermeasures were legislated in the post-BEPS period, it takes time (years) for the ATO to audit FOACs, to raise amended assessments, and to resolve disputes with FOACs through the objection, review and appeal process (i.e. there are law enforcement or administrative time lags). Therefore, even if a BEPS countermeasure has come into effect within the post-BEPS period, its effectiveness might not be reflected in the income statements of FOACs immediately.

Second, about two-thirds of FOACs in the sample adopt 31 December as the accounting date, so the 2019-20 income year refers the accounting period to 31 December 2019 for these FOACs, because the ATO treats the accounting period to 31 December 2019 as the substituted accounting period for the income year ended 30 June 2020. In other words, for the majority of FOACs, the study period ends on 31 December 2019. According to the ATO (2019c), by December 2019 many tax audits and disputes involving BEPS countermeasures are still in progress or unresolved, so the Tax Avoidance Task Force has been extended to 2023 to ensure that the ATO is able to continue to pursue these issues to protect Australia's tax base. Thus, it is possible that the effectiveness of those BEPS countermeasures might not have been reflected in the financial reports of the years covered by this study.

7. Conclusion

Adopting and modifying the Hines and Rice approach, we have attempted to measure the extent of cross-border profit shifting activities conducted by FOACs in Australia and then assess the effectiveness of the BEPS countermeasures implemented by the Australian government. These countermeasures include changes to Australian tax law

based on the recommendations of the OECD/G20 BEPS Project and additional unilateral measures.

We find a significant level of cross-border profit shifting activities by FOACs across the entire study period (i.e. both the pre-BEPS and post-BEPS periods). Throughout the 14-year period, the higher the Australian corporate rate relative to the tax rates of immediate parent, ultimate parent, and the higher the ranking of Australian tax rate relative to those of other countries where the foreign multinationals operate, the lower is the profit reported in Australia. Specifically, the estimated semi-elasticity of accounting profit before tax with respect to the international tax rate differential between a FOAC and its immediate parent entity is -1.58 in the pre-BEPS period in Model 1a where labour input is measured by the number of employee, and is -1.04 in the pre-BEPS period in Model 1b where labour input is measured by employee compensations. The estimated semi-elasticity of profit before tax with respect to the international tax rate differential between a FOAC and its ultimate parent entity is -2.14 in Model 2a where labour input is measured by the number of employee, and is -1.54 in Model 2b where labour input is measured by employee compensations in the pre-BEPS period. The tax rate ranking variable, *RTR_C*, also has significant and negative relations with profit reported by FOACs in Models 3a and 3b. The coefficients of *ATRD_A* is, however, not statistically significant in Models 2a and 2b. This result is consistent with the findings of Huizinga and Laeven (2008) which also indicate that only the variable measuring tax rate difference of a subsidiary vis-à-vis its parent is statistically significant at the 1% level.

Cross-border profit shifting from Australia to lower tax countries has not shown any general sign of reduction in the post-BEPS period, although there is some evidence from breaking down the post-BEPS period by years that indicates profit shifting might have reduced in 2019 in the additional test. However, such reduction does not sustain in 2020. This finding is consistent with the results documented in Joshi (2020), which find an insignificant effect of the Country-by-Country Reporting (proposed in Action 13 of the BEPS Project) in reducing tax-motivated profit shifting at affiliate level in the EU. However, we cannot categorically conclude that the BEPS countermeasures adopted by Australia are not effective because, even though these countermeasures were legislated in the post-BEPS period, it takes time (years) for the ATO to audit

FOACs, to raise amended assessments, and to resolve disputes with FOACs through the objection, review and appeal process (i.e. administrative time lags) before any reduction in outwards profit shifting can be reflected in the income statements of FOACs.

This study is significant because it quantifies the extent of tax-induced profit shifting in Australia and empirically assesses the effectiveness of Australian BEPS countermeasures. Previous related studies only discuss the strengths and weaknesses of the BEPS Project. Applying empirical methods allows us to assess the effectiveness of BEPS countermeasures based on objective evidence instead of subjective judgements and opinions.

This study suffers from several limitations. First, we acknowledge the fact that the group structure of an MNE group could vary over times. Unfortunately, we cannot track the changes in group structure due to the static nature of the ownership data downloaded from the Orbis database. This could be one of the reasons why the coefficient to *ATRD_A* is not statistically significant. However, we do track the changes in the immediate and ultimate parent entities of a FOAC based on annual reports and hence the changes in the corporate tax rates that the parent entities faced across the 14-year period.

Second, we only consider the statutory tax rates of different countries when constructing variables to measure the incentives for international profit shifting and tax avoidance. We do not consider the numerous tax concessions and reductions in corporate tax rates offered to specific companies or industries by many countries to gain competitive advantages to attract foreign investments in the analyses.

Third, for technology MNEs (e.g. Google, Microsoft, Netflix) that make profit mainly from selling services on the internet (e.g. advertising services provided by Google), their revenues from Australian customers may not be correctly booked in Australia, and as a result their profits may not be correctly taxed in Australia, because 'you cannot tax what you cannot see'.[50] Despite BEPS countermeasures such as DPT, there may be difficulties in determining which part of the profit from digital services is attributable

[50] 'You cannot tax what you cannot see' is the title of part 1 of the report on corporate tax avoidance published by the Senate Economics References Committee (2015).

to activities in Australia. We cannot detect this type of international tax avoidance in this study.

With the regression results and limitations of this study in mind, some future research directions are suggested. First, as discussed before, we cannot find consistent evidence supporting the proposition that the current BEPS countermeasures are effective in reducing profit shifting in the post-BEPS period possibly because of administrative time lags. Therefore, the study period, especially the period after the implementation of BEPS countermeasures, should be extended in future studies.

Second, we conduct an empirical analysis to evaluate the effectiveness of those BEPS countermeasures implemented by the Australian government in reducing MNEs' international tax avoidance in the form of profit shifting out of Australia. Future studies can cover countries other than Australia using similar and improved research design to evaluate the effectiveness of the BEPS countermeasures implemented by different countries in tackling cross-border profit shifting.

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Table 1
Sample Selection

Selection process	**Number of observations**
Initial FOAC firm-year observations	5,819
Less: observations that are not matched in the merging process[51]	(654)
Less: observations in financial and insurance industry	(102)
Less: observations in utility industry	(48)
Less: observations determined to be not foreign-owned or to be dormant	(289)
Observations in the final sample	**4,726**
Number of firms	**374**

[51] We merge the data file that contains financial variables (e.g. *logProfBTax*, *logCapital* and *logLabour*) and the data file that contains tax rate variables (e.g. *TR_IP*, *TR_UP* and *ATR_A*).

Table 2
Variable Definitions

Variable	Definition
Dependent variables	
logProfBTax	The "reported" profit, measured by the natural logarithm of accounting profit before tax;
Independent variables	
logCapital	Capital input, measured by the natural logarithm of the sum of tangible fixed assets and intangible fixed assets;
logLabour	Labour input, measured by the natural logarithm of the number of employees (*logNumEmp*), or by the natural logarithm of costs of employees (*logCostEmp*);
PostBEPS	Post-BEPS period indicator taking value of "1" if the year falls in the post-BEPS period (i.e. the period from 2013 to 2020) and "0" otherwise (i.e. the period from 2007 to 2012);
Ind	Industry indicator, taking the value of "1" for the correct industry, and "0" otherwise;
TaxRateDiff	
TRD_IP	The international tax rate differentials between a FOAC and its immediate parent entity, measured by the Australian corporate tax rate (30%) minus the annual corporate tax rate of the country in which the immediate parent entity is located;
TRD_UP	The international tax rate differentials between a FOAC and its ultimate parent entity, measured by the Australian corporate tax rate (30%) minus the annual corporate tax rate of the country in which the ultimate parent entity is located;
ATRD_A	The average tax rate differentials between a FOAC and its affiliates in different host countries within the same MNE group, measured by the Australian corporate tax rate (30%) minus the unweighted average tax rate in the countries where other affiliates operate.
RTR_C	Tax rate ranking variable, measured by the ranking of the Australian corporate tax rate relative to the tax rates of all other countries in which the MNE group operates in percentile.

Table 3
Descriptive Statistics

Panel A: Descriptive statistics for variables used in Model 1a represented by equation (3)

Variables	N	Mean	Std.Dev	Min	1%	25%	Med	75%	99%	Max
logProfBTax	2,876	16.867	1.567	11.605	13.446	15.843	16.780	17.771	21.114	22.846
logCapital	2,876	17.201	2.220	8.365	11.864	15.850	17.145	18.698	22.726	25.077
logNumEmp	2,876	6.173	1.491	1.386	2.398	5.257	6.210	7.207	9.294	10.007
TRD_IP	2,876	0.015	0.093	-0.107	-0.107	-0.080	0.020	0.060	0.300	0.300

Panel B: Descriptive statistics for variables used in Model 1b represented by equation (4)

Variables	N	Mean	Std.Dev	Min	1%	25%	Med	75%	99%	Max
logProfBTax	3,428	16.850	1.597	10.255	13.379	15.794	16.761	17.790	21.092	22.846
logCapital	3,428	17.185	2.306	8.365	11.755	15.747	17.145	18.745	22.757	25.077
logCostEmp	3,428	17.702	1.550	10.490	13.822	16.628	17.752	18.811	20.887	22.320
TRD_IP	3,428	0.014	0.095	-0.107	-0.107	-0.084	0.020	0.060	0.300	0.300

Panel C: Descriptive statistics for variables used in Model 2a represented by equation (5)

Variables	N	Mean	Std.Dev	Min	1%	25%	Med	75%	99%	Max
logProfBTax	2,805	16.895	1.551	12.008	13.694	15.888	16.805	17.778	21.114	22.846
logCapital	2,805	17.257	2.184	8.365	12.236	15.909	17.188	18.724	22.726	25.077
logNumEmp	2,805	6.201	1.475	1.386	2.398	5.298	6.229	7.217	9.294	10.007
TRD_UP	2,805	-0.003	0.089	-0.107	-0.107	-0.100	-0.006	0.050	0.300	0.300
ATRD_A	2,805	0.063	0.017	-0.050	0.023	0.057	0.065	0.070	0.130	0.142

Panel D: Descriptive statistics for variables used in Model 2b represented by equation (6)

Variables	N	Mean	Std.Dev	Min	1%	25%	Med	75%	99%	Max
logProfBTax	3,354	16.879	1.585	10.255	13.446	15.831	16.780	17.813	21.093	22.846
logCapital	3,354	17.230	2.279	8.365	12.012	15.793	17.174	18.770	22.774	25.077
logCostEmp	3,354	17.725	1.538	10.490	13.827	16.673	17.769	18.828	20.890	22.320
TRD_UP	3,354	-0.004	0.090	-0.107	-0.107	-0.100	-0.006	0.050	0.300	0.300
ATRD_A	3,354	0.063	0.014	0.013	0.025	0.057	0.065	0.070	0.108	0.142

Panel E: Descriptive statistics for variables used in Model 3a represented by equation (7)

Variables	N	Mean	Std.Dev	Min	1%	25%	Med	75%	99%	Max
logProfBTax	2,800	16.899	1.548	12.008	13.702	15.890	16.808	17.782	21.116	22.846
logCapital	2,800	17.258	2.185	8.365	12.206	15.905	17.189	18.726	22.727	25.077
logNumEmp	2,800	6.201	1.476	1.386	2.398	5.301	6.229	7.220	9.300	10.007
RTR_C	2,800	0.766	0.093	0.000	0.500	0.725	0.765	0.809	1.000	1.000

Panel F: Descriptive statistics for variables used in Model 3b represented by equation (8)

Variables	N	Mean	Std.Dev	Min	1%	25%	Med	75%	99%	Max
logProfBTax	3,357	16.874	1.590	10.255	13.428	15.817	16.779	17.810	21.093	22.846
logCapital	3,357	17.230	2.278	8.365	12.012	15.796	17.178	18.769	22.774	25.077
logCostEmp	3,357	17.725	1.538	10.490	13.827	16.677	17.769	18.825	20.890	22.320
RTR_C	3,357	0.767	0.081	0.384	0.500	0.725	0.765	0.809	1.000	1.000

This table reports the descriptive statistics for variables included in the main test. *logProfBTax* is measured by the natural logarithm of accounting profit before tax; *logCapital* is measured by the natural logarithm of the sum of tangible fixed assets and intangible fixed assets; *logNumEmp* is measured by the natural logarithm of the number of employee; *logCostEmp* is measured by the natural logarithm of costs of employee; *TRD_IP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *TRD_UP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *ATRD_A* is measured by Australian corporate tax rate (30%) minus the unweighted average tax rate in the countries where other affiliates operate; *RTR_C* is measured by the ranking of Australian corporate tax rate relative to tax rates of all other countries in which the MNE group operates in percentile.

Table 4
Distribution of Observations by Industry

Industry Group (Title)	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b
1 (Agriculture, Forestry and Fishing)	27	28	21	22	21	22
2 (Mining)	240	303	240	302	240	302
3 (Manufacturing)	777	929	763	912	759	912
4 (Waste Service)	14	14	14	14	14	14
5 (Construction)	120	128	120	128	120	128
6 (Wholesale Trade)	593	749	561	719	561	721
7 (Retail Trade)	211	238	207	233	206	233
8 (Accommodation and Food Services)	44	54	44	54	44	54
9 (Transport, Postal and Warehousing)	116	120	116	120	116	120
10 (Information Media and Telecommunications)	146	178	142	175	142	175
12 (Rental, Hiring and Real Estate Services)	76	95	76	95	76	95
13 (Professional, Scientific & Technical Services)	349	387	338	376	338	376
14 (Administrative and Support Services)	70	80	70	79	70	80
15 (Public Administration and Safety)	25	34	25	34	25	34
16 (Education and Training)	0	2	0	2	0	2
17 (Health Care and Social Assistance)	10	10	10	10	10	10
18 (Arts and Recreation Services)	15	33	15	33	15	33
19 (Other Services)	43	46	43	46	43	46
Total	2,876	3,428	2,805	3,354	2,800	3, 357

This table reports the distribution of firm-year observations by industry groups in the six models. Model 1a is represented by equation (3). Model 1b is represented by equation (4). Model 2a is represented by equation (5). Model 2b is represented by equation (6). Model 3a is represented by equation (7). Model 3b is represented by equation (8).

Table 5
Correlation Matrix

Panel A: Correlation Matrix for variables used in Model 1a represented by equation (3)

	logProfBTax	*TRD_IP*	*logCapital*	*logNumEmp*	
logProfBTax	1.000				
TRD_IP	-0.015	1.000			
logCapital	0.656***	0.069***	1.000		
logNumEmp	0.373***	0.097***	0.451***	1.000	

Panel B: Correlation Matrix for variables used in Model 1b represented by equation (4)

	logProfBTax	*TRD_IP*	*logCapital*	*logCostEmp*	
logProfBTax	1.000				
TRD_IP	0.008	1.000			
logCapital	0.685***	0.079***	1.000		
logCostEmp	0.439***	0.104***	0.462***	1.000	

Panel C: Correlation Matrix for variables used in Model 2a represented by equation (5)

	logProfBTax	*TRD_UP*	*ATRD_A*	*logCapital*	*logNumEmp*
logProfBTax	1.000				
TRD_UP	-0.023	1.000			
ATRD_A	0.029	0.135***	1.000		
logCapital	0.658***	0.094***	-0.027	1.000	
logNumEmp	0.363***	0.140***	-0.049**	0.436***	1.000

Panel D: Correlation Matrix for variables used in Model 2b represented by equation (6)

	logProfBTax	*TRD_UP*	*ATRD_A*	*logCapital*	*logCostEmp*
logProfBTax	1.000				
TRD_UP	0.000	1.000			
ATRD_A	0.025	0.141***	1.000		
logCapital	0.687***	0.100***	-0.014	1.000	
logCostEmp	0.432***	0.121***	-0.006	0.453***	1.000

Panel E: Correlation Matrix for variables used in Model 3a represented by equation (7)

	logProfBTax	*RTR_C*	*logCapital*	*logNumEmp*	
logProfBTax	1.000				
RTR_C	-0.074***	1.000			
logCapital	0.659***	-0.046**	1.000		
logNumEmp	0.364***	0.052***	0.436***	1.000	

Panel F: Correlation Matrix for variables used in Model 3b represented by equation (8)

	logProfBTax	*RTR_C*	*logCapital*	*logNumEmp*	
logProfBTax	1.000				
RTR_C	-0.120***	1.000			
logCapital	0.685***	-0.063**	1.000		
logCostEmp	0.431***	0.013	0.452***	1.000	

This table reports Pearson correlation matrix of all continuous variables in the regression model. *logProfBTax* is measured by the natural logarithm of accounting profit before tax; *logCapital* is measured by the natural logarithm of the sum of tangible fixed assets and intangible fixed assets; *logNumEmp* is measured by the natural logarithm of the number of employee; *logCostEmp* is measured by the natural logarithm of costs of employee; *TRD_IP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *TRD_UP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *ATRD_A* is measured by Australian corporate tax rate (30%) minus the unweighted average tax rate in the countries where other affiliates operate; *RTR_C* is measured by the ranking of Australian corporate tax rate relative to tax rates of all other countries in which the MNE group operates in percentile.

***, ** and * represent significance at the 0.01, 0.05 and 0.1 percent level respectively.

Table 6
Main Regression Results
(Dependent variable: *logProfBTax*)

Panel A: Results of models using *TRD_IP* as tax rate difference variable		
	Model 1a	**Model 1b**
TRD_IP	-1.576 (0.004)	-1.035 (0.035)
PostBEPS×*TRD_IP*	0.748 (0.186)	0.182 (0.708)
logCapital	0.378 (0.000)	0.368 (0.000)
logNumEmp	0.212 (0.000)	
logCostEmp		0.244 (0.000)
PostBEPS	0.016 (0.777)	-0.044 (0.375)
Constant	8.508 (0.000)	5.817 (0.000)
Observations	2,876	3,428
R^2	0.514	0.553
Industry fixed effects	Yes	Yes
Standard errors clustered by firms	Yes	Yes

Panel B: Results of models using *TRD_UP* and *ATRD_A* as tax rate difference variables		
	Model 2a	**Model 2b**
TRD_UP	-2.139 (0.000)	-1.539 (0.004)
PostBEPS×TRD_UP	0.580 (0.235)	0.184 (0.678)
ATRD_A	6.460 (0.130)	5.319 (0.130)
PostBEP×ATRD_A	-1.429 (0.589)	-2.597 (0.356)
logCapital	0.375 (0.000)	0.370 (0.000)
logNumEmp	0.218 (0.000)	
logCostEmp		0.241 (0.000)
PostBEPS	0.172 (0.318)	0.152 (0.414)
Constant	8.343 (0.000)	5.674 (0.000)
Observations	2,805	3,354
R^2	0.522	0.559
Industry fixed effects	Yes	Yes
Standard errors clustered by firms	Yes	Yes

Panel C: Results of models using *RTR_C* as tax rate difference variable		
	Model 3a	**Model 3b**
RTR_C	-1.792 (0.015)	-1.776 (0.009)
PostBEPS×RTR_C	1.350 (0.110)	0.173 (0.719)
logCapital	0.376 (0.000)	0.366 (0.000)
logNumEmp	0.204 (0.001)	
logCostEmp		0.237 (0.000)
PostBEPS	-1.036 (0.115)	-0.192 (0.604)
Constant	9.866 (0.000)	7.143 (0.000)
Observations	2,800	3,357
R^2	0.515	0.555
Industry fixed effects	Yes	Yes
Standard errors clustered by firms	Yes	Yes

This table reports the regression results of models using *logProfBTax* as the dependent variable. Both Models 1a and 1b use *TRD_IP* as the tax rate differences variable. Labour input in Model 1a is measured by *logNumEmp*, while labour input in Model 1b is measured by *logCostEmp*. Both Models 2a and 2b use *TRD_UP* and *ATRD_A* as the tax rate differences variables. Labour input in Model 2a is measured by *logNumEmp*, while labour input in Model 2b is measured by *logCostEmp*. Both Models 3a and 3b use *RTR_C* as the tax rate differences variable. Labour input in Model 3a is measured by *logNumEmp*, while labour input in Model 3b is measured by *logCostEmp*.

logProfBTax is measured by the natural logarithm of accounting profit before tax; *logCapital* is measured by the natural logarithm of the sum of tangible fixed assets and intangible fixed assets; *logNumEmp* is measured by the natural logarithm of the number of employee; *logCostEmp* is measured by the natural logarithm of costs of employee; *PostBEPS* takes value of "1" if the year falls in the post-BEPS period (i.e. period from 2013 to 2020) and "0" otherwise (i.e. period from 2007 to 2012); *TRD_IP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *TRD_UP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *ATRD_A* is measured by Australian corporate tax rate (30%) minus the unweighted average tax rate in the countries where other affiliates operate; *RTR_C* is measured by the ranking of Australian corporate tax rate relative to tax rates of all other countries in which the MNE group operates in percentile.

P-value is reported in the parentheses below the regression coefficients.

Table 7
Regression Results for Additional Test
(Dependent variable: *logProfBTax*)

Panel A: Results of models using *TRD_IP* as the tax rate difference variable		
	Model 1a	**Model 1b**
TRD_IP	-1.578	-1.036
	(0.004)	(0.036)
TRD_IP ×Year2013	0.807	0.295
	(0.264)	(0.601)
TRD_IP ×Year2014	0.124	-0.002
	(0.869)	(0.998)
TRD_IP ×Year2015	0.377	-0.211
	(0.596)	(0.768)
TRD_IP ×Year2016	1.126	0.672
	(0.165)	(0.376)
TRD_IP ×Year2017	0.401	-0.493
	(0.632)	(0.505)
TRD_IP ×Year2018	1.364	0.032
	(0.279)	(0.977)
TRD_IP ×Year2019	2.577	2.263
	(0.019)	(0.018)
TRD_IP ×Year2020	-0.362	-0.691
	(0.791)	(0.518)
logCapital	0.380	0.369
	(0.000)	(0.000)
logNumEmp	0.210	
	(0.000)	
logCostEmp		0.243
		(0.000)
Year2013	-0.082	-0.123
	(0.229)	(0.026)
Year2014	0.079	0.056
	(0.243)	(0.340)
Year2015	-0.015	-0.076
	(0.829)	(0.244)
Year2016	0.010	-0.088
	(0.900)	(0.234)
Year2017	0.072	-0.010
	(0.369)	(0.890)
Year2018	0.071	0.073
	(0.509)	(0.477)
Year2019	-0.080	-0.162
	(0.454)	(0.105)
Year2020	-0.022	-0.069
	(0.843)	(0.473)
Constant	8.477	5.798
	(0.000)	(0.000)
Observations	2,876	3,428
R^2	0.516	0.555
Industry fixed effects	Yes	Yes
Standard errors clustered by firms	Yes	Yes

Panel B: Results of models using *TRD_UP* and *ATRD_A* as the tax rate difference variables		
	Model 2a	**Model 2b**
TRD_UP	-2.139 (0.000)	-1.541 (0.004)
TRD_UP ×Year2013	0.622 (0.370)	0.537 (0.347)
TRD_UP ×Year2014	-0.343 (0.625)	-0.090 (0.886)
TRD_UP ×Year2015	0.374 (0.596)	0.052 (0.943)
TRD_UP ×Year2016	0.663 (0.411)	0.353 (0.657)
TRD_UP ×Year2017	0.487 (0.528)	-0.482 (0.502)
TRD_UP ×Year2018	1.219 (0.394)	-0.039 (0.975)
TRD_UP ×Year2019	1.494 (0.219)	0.738 (0.504)
TRD_UP ×Year2020	-0.392 (0.765)	-0.710 (0.513)
ATRD_A	6.428 (0.134)	5.303 (0.133)
ATRD_A ×Year2013	5.288 (0.168)	1.706 (0.614)
ATRD_A ×Year2014	1.178 (0.747)	-3.419 (0.409)
ATRD_A ×Year2015	2.906 (0.422)	3.533 (0.392)
ATRD_A ×Year2016	-2.952 (0.429)	-3.057 (0.463)
ATRD_A ×Year2017	-6.789 (0.071)	-6.763 (0.108)
ATRD_A ×Year2018	-3.190 (0.375)	-5.242 (0.214)
ATRD_A ×Year2019	-1.309 (0.749)	-0.610 (0.899)
ATRD_A ×Year2020	-5.169 (0.196)	-7.471 (0.148)
logCapital	0.377 (0.000)	0.372 (0.000)
logNumEmp	0.217 (0.000)	
logCostEmp		0.240 (0.000)
Year2013	-0.359 (0.164)	-0.216 (0.348)
Year2014	0.013 (0.957)	0.262 (0.332)
Year2015	-0.157 (0.515)	-0.279 (0.313)
Year2016	0.262 (0.279)	0.148 (0.586)
Year2017	0.543 (0.025)	0.434 (0.105)
Year2018	0.387 (0.090)	0.461 (0.081)
Year2019	0.147 (0.600)	0.013 (0.967)
Year2020	0.387 (0.165)	0.450 (0.202)
Constant	8.301 (0.000)	5.644 (0.000)
Observations	2,805	3,354
R^2	0.524	0.561
Industry fixed effects	Yes	Yes
Standard errors clustered by firms	Yes	Yes

Panel C: Results of models using *RTR_C* as the tax rate difference variable

	Model 3a	**Model 3b**
RTR_C	-1.792 (0.015)	-1.774 (0.009)
RTR_C ×Year2013	1.654 (0.219)	0.260 (0.712)
RTR_C ×Year2014	1.402 (0.255)	-0.416 (0.586)
RTR_C ×Year2015	1.602 (0.061)	0.732 (0.342)
RTR_C ×Year2016	0.876 (0.306)	0.184 (0.802)
RTR_C ×Year2017	1.082 (0.243)	-0.137 (0.851)
RTR_C ×Year2018	1.158 (0.241)	-0.594 (0.399)
RTR_C ×Year2019	2.111 (0.010)	1.287 (0.150)
RTR_C ×Year2020	0.828 (0.394)	-0.019 (0.983)
logCapital	0.378 (0.000)	0.367 (0.000)
logNumEmp	0.203 (0.001)	
logCostEmp		0.236 (0.000)
Year2013	-1.333 (0.201)	-0.313 (0.566)
Year2014	-1.029 (0.285)	0.358 (0.540)
Year2015	-1.258 (0.061)	-0.651 (0.280)
Year2016	-0.661 (0.319)	-0.215 (0.705)
Year2017	-0.778 (0.278)	0.072 (0.899)
Year2018	-0.805 (0.284)	0.499 (0.354)
Year2019	-1.642 (0.010)	-1.073 (0.121)
Year2020	-0.764 (0.304)	-0.159 (0.811)
Constant	9.830 (0.000)	7.113 (0.000)
Observations	2,800	3,357
R^2	0.517	0.557
Industry fixed effects	Yes	Yes
Standard errors clustered by firms	Yes	Yes

This table reports regression results of additional test I. Both Model 1a and 1b use *TRD_IP* as the tax rate differences variable. Labour input in Model 1a is measured by *logNumEmp*, while labour input in Model 1b is measured by *logCostEmp*. Both Model 2a and 2b use *TRD_UP* and *ATRD_A* as the tax rate differences variables. Labour input in Model 2a is measured by *logNumEmp*, while labour input in Model 2b is measured by *logCostEmp*. Both Model 3a and 3b use *RTR_C* as the tax rate differences variable. Labour input in Model 3a is measured by *logNumEmp*, while labour input in Model 3b is measured by *logCostEmp*.
logProfBTax is measured by the natural logarithm of accounting profit before tax; *logCapital* is measured by the natural logarithm of the sum of tangible fixed assets and intangible fixed assets; *logNumEmp* is measured by the natural logarithm of the number of employee; *logCostEmp* is measured by the natural logarithm of costs of employee; *PostBEPS* takes value of "1" if the year falls in the post-BEPS period (i.e. period from 2013 to 2020) and "0" otherwise (i.e. period from 2007 to 2012); *TRD_IP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *TRD_UP* is measured by Australian corporate tax rate (30%) mins annual corporate tax rate of the country in which the immediate parent entity is located; *ATRD_A* is measured by Australian corporate tax rate (30%) minus the unweighted average tax rate in the countries where other affiliates operate; *RTR_C* is measured by the ranking of Australian corporate tax rate relative to tax rates of all other countries in which the MNE group operates in percentile.
P-value is reported in the parentheses below the regression coefficients.

APPENDIX 1

This appendix includes a table reporting the distribution/pattern of unbalanced panel data.

Table A1

Distribution of Unbalanced Panel Data

Frequency	Percent	Cumulated	Pattern
231	61.76	61,76	1111111111111
21	5.61	67.38	1111111111111.
16	4.28	741.66	..111111111111
14	3.74	75.40	...11111111111.
13	3.48	78.88	11111111111...
8	2.14	81.02	111111111111..
7	1.87	82.89	111111
6	1.60	84.49	111111111
5	1.34	85.83	11111111
53	14.17	100.00	(other patterns)
374	100.00		XXXXXXXXXXXXX

There are 374 firms with 4,726 firm-year observations. On average, a firm has only about 12.6 yearly observations. Only 231 firms out of 374 (61.8 percent) have data for all 14 years.

APPENDIX 2

This appendix includes a table reporting the regression coefficients of industry indicators in the main test.

Table A2
Regression Results of industry indicators in Main Test
(Dependent variable: *logProfBTax*)

	Model 1a	**Model 1b**	**Model 2a**	**Model 2b**	**Model 3a**	**Model 3b**
Ind2	1.685	1.584	1.385	1.365	1.750	1.753
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind3	0.274	0.224	0.037	0.048	0.404	0.436
	(0.183)	(0.197)	(0.885)	(0.815)	(0.178)	(0.088)
Ind4	-0.275	-0.477	-0.339	-0.531	-0.389	-0.663
	(0.191)	(0.009)	(0.146)	(0.004)	(0.183)	(0.009)
Ind5	0.904	0.526	0.676	0.369	0.942	0.629
	(0.002)	(0.043)	(0.026)	(0.152)	(0.008)	(0.055)
Ind6	0.666	0.493	0.312	0.244	0.709	0.650
	(0.006)	(0.015)	(0.279)	(0.287)	(0.029)	(0.019)
Ind7	0.004	0.074	-0.339	-0.148	0.149	0.333
	(0.988)	(0.737)	(0.286)	(0.553)	(0.671)	(0.253)
Ind8	0.970	0.719	0.717	0.539	1.137	1.026
	(0.003)	(0.012)	(0.030)	(0.063)	(0.004)	(0.006)
Ind9	-0.126	-0.181	-0.364	-0.348	-0.036	0.061
	(0.664)	(0.474)	(0.251)	(0.197)	(0.923)	(0.849)
Ind10	0.466	0.158	0.233	-0.032	0.633	0.416
	(0.145)	(0.589)	(0.520)	(0.920)	(0.091)	(0.213)
Ind12	0.060	-0.035	-0.266	-0.287	0.202	0.217
	(0.872)	(0.910)	(0.494)	(0.365)	(0.629)	(0.535)
Ind13	0.669	0.446	0.330	0.201	0.787	0.683
	(0.010)	(0.043)	(0.278)	(0.424)	(0.021)	(0.022)
Ind14	0.474	0.369	0.169	0.200	0.635	0.637
	(0.195)	(0.404)	(0.687)	(0.679)	(0.130)	(0.172)
Ind15	0.555	0.636	0.315	0.445	0.602	0.802
	(0.101)	(0.064)	(0.373)	(0.216)	(0.154)	(0.058)
Ind16		0.175		0.239		0.501
		(0.298)		(0.318)		(0.084)
Ind17	1.028	1.018	0.677	0.791	1.223	1.534
	(0.000)	(0.000)	(0.035)	(0.002)	(0.004)	(0.000)
Ind18	1.130	1.030	0.711	0.796	1.142	1.259
	(0.002)	(0.000)	(0.051)	(0.002)	(0.005)	(0.000)
Ind19	0.756	0.605	0.580	0.487	0.761	0.705
	(0.040)	(0.085)	(0.111)	(0.149)	(0.069)	(0.054)

This table reports the regression coefficients of industry indicators in the main test.
P-value is reported in the parentheses below the regression coefficients.

APPENDIX 3

This appendix includes a table reporting the mean values of accounting profit before tax (variable *ProfBTax* before the logarithm transformation).

Table A3

Mean values of profit before tax (*ProfBTax*)

Models	Mean values of profit before tax
Model 1a	$91,900,000
Model 1b	$91,800,000
Model 2a	$93,300,000
Model 2b	$93,500,000
Model 3a	$93,400,000
Model 3b	$93,400,000

APPENDIX 4

This appendix includes a table reporting the regression coefficients of industry indicators in the additional test.

Table A4
Regression Results of Industry Indicators in Additional Test
(Dependent variable: *logProfBTax*)

	Model 1a	**Model 1b**	**Model 2a**	**Model 2b**	**Model 3a**	**Model 3b**
Ind2	1.697	1.589	1.398	1.370	1.761	1.766
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind3	0.287	0.229	0.054	0.058	0.415	0.448
	(0.176)	(0.201)	(0.826)	(0.775)	(0.173)	(0.090)
Ind4	-0.253	-0.470	-0.312	-0.527	-0.378	-0.655
	(0.246)	(0.012)	(0.162)	(0.003)	(0.202)	(0.013)
Ind5	0.914	0.530	0.704	0.384	0.955	0.638
	(0.002)	(0.044)	(0.017)	(0.134)	(0.007)	(0.058)
Ind6	0.684	0.501	0.337	0.259	0.722	0.663
	(0.006)	(0.016)	(0.227)	(0.256)	(0.027)	(0.020)
Ind7	0.020	0.080	-0.318	-0.138	0.159	0.344
	(0.994)	(0.722)	(0.306)	(0.577)	(0.656)	(0.250)
Ind8	0.986	0.722	0.744	0.550	1.148	1.033
	(0.003)	(0.013)	(0.021)	(0.057)	(0.004)	(0.006)
Ind9	-0.105	-0.178	-0.338	-0.336	-0.025	0.069
	(0.720)	(0.487)	(0.275)	(0.211)	(0.946)	(0.834)
Ind10	0.480	0.160	0.256	-0.020	0.646	0.426
	(0.139)	(0.588)	(0.471)	(0.949)	(0.087)	(0.212)
Ind12	0.063	-0.038	-0.250	-0.281	0.209	0.225
	(0.864)	(0.905)	(0.514)	(0.375)	(0.619)	(0.527)
Ind13	0.687	0.450	0.354	0.214	0.801	0.695
	(0.009)	(0.047)	(0.233)	(0.395)	(0.020)	(0.022)
Ind14	0.481	0.369	0.188	0.213	0.653	0.654
	(0.198)	(0.409)	(0.652)	(0.663)	(0.123)	(0.166)
Ind15	0.570	0.638	0.339	0.458	0.621	0.817
	(0.091)	(0.065)	(0.323)	(0.200)	(0.137)	(0.054)
Ind16		0.075		0.142		0.453
		(0.681)		(0.667)		(0.141)
Ind17	1,070	1.040	0.727	0.832	1.243	1.548
	(0.000)	(0.000)	(0.022)	(0.001)	(0.003)	(0.000)
Ind18	1.139	1.033	0.729	0.818	1.156	1.274
	(0.002)	(0.000)	(0.041)	(0.001)	(0.005)	(0.000)
Ind19	0.773	0.609	0.607	0.503	0.776	0.715
	(0.039)	(0.086)	(0.087)	(0.130)	(0.067)	(0.055)

This table reports the regression coefficients of industry indicators in the additional test.
P-value is reported in the parentheses below the regression coefficients.