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A study of cross-border profit shifting channels

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Abstract

In this study, we investigate two cross-border profit shifting channels of foreign multinational enterprises (MNEs) in Australia and assess the effectiveness of the related measures adopted by the Australian Parliament to combat base erosion and profit shifting (BEPS). Specifically, we use propensity score matching (PSM) and coarsened exact matching (CEM) to match a group of foreign-owned Australian companies (FOACs) that are subsidiaries of foreign MNEs and have strong incentives to shift profits out of Australia to avoid Australian tax (the treatment group) with a group of predominantly domestic-owned listed Australian companies (DOLACs) that have little incentives to do so (the control group) to identify cross-border profit shifting activities using two channels: intra-group transfer pricing and debt financing and/or interest expense loading. We further use the difference-in-differences approach to compare the extent of cross-border profit shifting by FOACs between the pre-BEPS period (2007 to 2012) and the post-BEPS period (2013 to 2020) to evaluate the effectiveness of the related Australian BEPS countermeasures. Overall, we find that FOACs uses tax-induced intra-group transfer pricing and interest expense loading arrangements to shift profit out of Australia in the entire 14-year study period from 2007 to 2020. However, up to 2020 we cannot find any significant evidence indicating that the related Australian BEPS countermeasures are effective in reducing cross-border profit shifting. Perhaps it takes time for the effects of these measures to be reflected in the financial reports of FOACs due to administrative time lags.

Keywords: base erosion and profit shifting (BEPS), transfer pricing, debt financing, Australian countermeasures, propensity score matching, coarsened exact matching

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1. Introduction

The integration of national economies and markets imposes challenges to the existing international tax frameworks. The weakness of the international tax regime creates opportunities for multinational enterprises (MNEs) to artificially shift profits from high-tax jurisdictions to low-tax jurisdictions (including tax havens) to save corporate income taxes (OECD, 2015a).[1] This practice is referred to by the Organisation for Economic Co-operation and Development (OECD) as base erosion and profit shifting (BEPS). [2] Cross-border profit shifting has resulted in undesirable economic consequences, including great losses of corporate income tax revenues and inefficient allocations of resources across countries (OECD, 2014; OECD, 2015b; Vicard, 2015; Avi-Yonah and Xu, 2017; Davies et al, 2018).

To offer possible solutions towards cross-border profit shifting that are suitable for the contemporary economic environment, the OECD at the request of the Group of Twenty (G20) launched the BEPS Project in 2013 and released a series of BEPS final reports in 2015. This project contains 15 action items to address the BEPS issues related to different tax avoidance arrangements (e.g. tax motivated transfer pricing, thin capitalisation and hybrid mismatch arrangements), harmful tax practices and information asymmetry between taxpayers and tax authorities.[3]

Some studies have cast doubt on the effectiveness of the OECD/G20 BEPS Project. First, this project is more like a patch-up of the loopholes of existing rules and principles instead of a fundamental reconstruction of the international tax regime because it still

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[1] The main problem is the lack of a single "international tax regime". The differences between countries' tax bases, tax treaty provisions and tax rates (including the exemption by some countries for foreign sourced income regardless of whether it has been taxed in the country of source), the operations of tax havens and the ability to financially engineer related party dealings to create mismatches that produce corresponding gains and losses in different jurisdictions, combined with the inherent complexities and novelties presented by international trade and investment, present the opportunities of cross-border profit shifting. The risk appetite of some MNEs and the lack of transparency across their global value chains further exacerbate the problem.

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

[3] 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*.

adheres to the dysfunctional tax principles such as the traditional source and residence principle (Devereux and Vella, 2014).[4] The development of modern organisational structure of the MNE and its global value chain (GVC) undermine the conceptual basis of the residence and source dichotomies for identifying where profit is earned and weaken some fundamental concepts and design features of the current international tax regime (Devereux and Vella, 2014). Second, the insistence of developed countries on preserving their tax breaks for business to obtain advantages in international tax competition creates an impediment to the approval of some innovative reform proposals (Avi-Yonah and Xu, 2016).[5]

On the other hand, some studies have argued that the BEPS countermeasures help tax authorities to tackle BEPS issues. For example, the Country-by-Country Reporting[6] 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 2010-2018 financial and ownership data of MNEs located in the European Union (the EU), Joshi (2020) finds that the effective tax rates (ETRs) of firms within the Country-by-Country reporting regime are 1 to 2 percentage point higher than those of firms outside the regime, which signals a decline in tax avoidance after the implementation of private Country-by-Country Reporting in the EU.

Although prior studies have discussed the strengths and the weaknesses of the BEPS countermeasures mainly in relation to their legal and regulatory dimensions, the actual effect of these countermeasures remains to be quantified by empirical studies (OECD, 2015a).

Using publicly available 2007-2020 financial data, we conduct an empirical analysis to

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

[5] According to the BEPS Monitoring Group (2015), weak proposals on the Controlled Foreign Corporations (CFC), interest deductibility and innovation box schemes are particularly favoured by the United Kingdom (the UK). Some countries, especially the United States (the US), stubbornly defended the arm's length principle for transfer pricing adjustments and resisted alternative measures.

[6] 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 different countries where this MNE group operates (Joshi, 2020).

investigate:

(1) whether cross-border profit shifting happens in Australia, focusing on two main profit-shifting channels used by MNEs: tax-motivated intra-group transfer pricing and tax-motivated intra-group debt financing and/or interest expense loading; and

(2) whether the Australian BEPS countermeasures targeting these two channels are effective in reducing the extent of cross-border profit shifting out of Australia.

Specifically, MNEs could manipulate the prices charged on the export and import of goods and services between members within their group located in countries with different tax rates so that profits are shifted to no or low-tax jurisdictions (i.e. tax-motivated intra-group transfer pricing). They could also use debts, rather than equity, as a source of financing and funding. Internal debts within a group provide opportunities for MNEs to claim a high level of tax deductions for interest expense to minimise their overall tax payment in the high-tax jurisdictions (i.e. tax-motivated intra-group debt financing).[7] The interest rates applied to intra-group debts could be the market interest rates or even inflated interest rates (i.e. tax-motivated intra-group interest expense loading).

To evaluate the effectiveness of the related BEPS countermeasures, we conduct two stages of measurement in this study. In the first stage, we adopt an identification strategy that relies on the differences in profit shifting behaviours between foreign-owned Australian companies (FOACs)[8] and mainly domestic-owned listed Australian companies (DOLACs)[9] to measure the extent of international tax avoidance through two specific channels used by MNEs: intra-group transfer pricing and debt financing and/or interest expense loading. The extent of cross-border profit shifting by FOACs in Australia is estimated by comparing a set of financial ratios[10] of FOACs with those of

[7] For example, a subsidiary located in a low-tax country provides a loan to another subsidiary located in a high-tax country. The interest expense is then deducted from the tax base of the subsidiary in the high-tax country, transferred to the subsidiary in the low-tax country as income and taxed there at a low or zero tax rate.

[8] FOACs are Australian subsidiaries of multinational enterprises with headquarters overseas. FOACs mainly operate in Australia.

[9] Listed Australian companies with 20% or higher foreign ownership are excluded from the sample of DOLACs to ensure that DOLACs are not subject to any significant influence from foreign ownership.

[10] Nine financial ratios are designed to capture tax-motivated transfer pricing, debt financing and/or interest expense loading, and the overall effect of cross-border profit shifting. These financial ratios will be discussed in the research design section.

DOLACs.

The existence of dividend imputation system provides us with an opportunity to use DOLACs as a benchmark to detect cross-border profit shifting by FOACs. In Australia, as the Australian corporate income tax paid by DOLACs is not a real cost to the companies and their domestic shareholders under the dividend imputation system, they are expected have less incentives to shift profit out of Australia. In fact, when a DOLAC has foreign operations, it may even shift foreign profits back to Australia in order to pay Australian income tax and enjoy the benefits of dividend imputation because foreign taxes paid on foreign profits cannot be used as imputation credits to frank dividends (Li and Tran, 2019). On the contrary, FOACs have incentives to shift Australian-sourced profit out of the country to avoid Australian corporate income tax because their foreign parents and foreign shareholders cannot obtain the full benefits from paying Australian corporate income tax under the dividend imputation system. Therefore, we use DOLACs as a useful benchmark and expect that the extent of cross-border profit shifting via tax-induced intra-group transfer pricing and debt financing/interest expense loading was higher for FOACs than for comparable DOLACs, at least in the pre-BEPS period. Another reason for using DOLACs as the control group is that a DOLAC is the ultimate parent of the group, so the consolidated financial statements of a DOLAC only reflect transactions with independent parties outside the group, while a FOAC is only the Australian part of a foreign MNE, its consolidated financial statements reflect transactions with foreign affiliates within the group as well as transactions with independent parties outside the group. To achieve a fair comparison, we employ two matching techniques, namely propensity score matching (PSM) and coarsened exact matching (CEM), to match FOACs (i.e. the treatment group) with comparable DOLACs (i.e. the control group) in terms of industry and firm size to control for confounding effects such as different industry and firm size distributions between FOACs and DOLACs.

In the second stage, we adopt a difference-in-differences approach to estimate whether and to what extent cross-border profit shifting by FOACs is reduced in the period after the implementation of related BEPS countermeasures (i.e. the post-BEPS period). From the legal perspective, the relevant BEPS countermeasures tackle different types of tax planning schemes used by foreign MNEs and expand the reach of Australian tax law,

so FOACs might reduce the extent of profit shifting out of Australia in the post-BEPS period due to these measures. From the perspective of consumer and stock market, FOACs might also reduce profit shifting in the post-BEPS period in order to minimise the potential negative impacts on their reputations[11] and the stock prices of the foreign MNE groups. Therefore, compared to the pre-BEPS period, FOACs are expected to reduce the use of tax-motivated intra-group transfer pricing and debt financing/interest expense loading in the post-BEPS period.

Overall, we find that FOACs use both profit shifting channels, especially intra-group transfer pricing, to shift profits out of Australia throughout the entire 14-year study period. Specifically, FOACs had a lower gross profit to sales revenue ratio and a lower earnings before interest and tax (EBIT) to sales revenue ratio than the matched DOLACs, which indicates their engagement in tax-motivated intra-group transfer pricing activities. The lower gross profit margin (gross profit to sales revenue ratio) of FOACs, absent contrary indications, can reasonably be attributed to either suppressed selling prices in related-party sales[12] to report lower sales revenue and/or inflated prices for offshore related-party purchases to report higher cost of sales. Although FOACs also had a lower operating profit margin (EBIT to sales revenue ratio) than that of matched DOLACs, the difference in operating profit margin appears to be smaller than the difference in gross profit margin, suggesting that FOACs mainly used suppressed selling prices and/or inflated purchase prices to shift profit, rather than incurring higher royalties, management fees and other non-finance expenses in related-party transactions. Royalties might, however, be imbedded in the prices of trading stock purchases in order to avoid royalty withholding tax. Compared to matched DOLACs, FOACs also had a higher net interest expense to sales revenue ratio. However, they did not have a higher level of debt than comparable DOLACs. Absent any other explanation, this implies that FOACs might be charged inflated interest rates on related-party debts in order to claim more tax deductions. By using profit shifting arrangements, FOACs reported lower pre-tax accounting profits and lower tax liabilities in Australia than

[11] 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 GBP20 million to the UK tax authorities to pacify consumers.

[12] We use the term related-party transactions to refer to intra-group transactions between members of an MNE.

comparable DOLACs for every dollar of sales revenue.

We also find that cross-border profit shifting by FOACs using intra-group transfer pricing and interest expense loading has not reduced significantly in the post-BEPS period, suggesting that the related Australian BEPS countermeasures do not appear to be effective in reducing the extent of profit shifting up to the income year 2019-20. However, it is premature to conclude categorically that the said Australian BEPS countermeasures are not effective because it is likely that there are law enforcement or administrative time lags. It may take 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.

Moreover, there are other Australian BEPS countermeasures, such as the Multinational Anti-Avoidance Law (MAAL) and the Diverted Profits Tax (DPT), which may be effective in reducing profit shifting via other schemes, but their effectiveness is not evaluated in this study.

This study is significant in the following aspects. First, this study illustrates an alternative identification strategy to investigate the extent of cross-border profit shifting based on publicly available accounting data.[13] Although the final report on Action 11 *Measuring and Monitoring BEPS* of the BEPS Project has proposed six indicators[14] to measure BEPS, a major limitation of these indicators is that most of them (except Indicator 4) lack consistent counterfactuals and comparison groups as essential benchmarks that mimic a situation without profit shifting opportunities (Heckemeyer et al., 2021). Many previous studies (e.g. Rego, 2003; Dyreng et al., 2008; Kim et al., 2011; Lee and Swenson, 2016) have used different versions of ETRs as proxies to capture corporate tax avoidance.[15] However, ETRs can only capture book-tax non-conforming tax avoidance[16] but not book-tax conforming tax avoidance. As cross-

[13] Ideally, cross-border profit shifting would best be captured by analysing subsidiary-level financial and tax data and intra-group trade data which are not accessible to most researchers.
[14] Indicator 1 is concentration of high levels of foreign direct investment (FDI) relative to Gross Domestic Product (GDP); Indicator 2 is differential profit rates compared to effective tax rates; Indicator 3 is differential profit rates between lower-tax locations and worldwide MNE operations; Indicator 4 is effective tax rates of large MNE affiliates relative to non-MNE entities with similar characteristics; Indicator 5 is concentration of royalty receipts relative to research and development spending; Indicator 6 is interest expense to income ratios of MNE affiliates in high tax locations (OECD, 2015c, p.46).
[15] ETRs are also proposed by OECD (2015c) as one of the six indicators (Indicator 4) of BEPS. See footnote 11.
[16] ETR can be calculated by dividing tax expense by pre-tax accounting profit. Book-tax non-conforming tax

border profit shifting by MNEs using channels such as intra-group transfer pricing and debt financing/interest expense loading reduces both pre-tax accounting profit and taxable income (hence tax expense and tax liability) simultaneously, cross-border profit shifting cannot be captured by ETRs. Different proxies are required to capture the effect of BEPS. Therefore, we extend the existing literature by using the differences in profit shifting behaviours between FOACs and DOLACs as a source of identification of cross-border profit shifting. DOLACs have been selected as a benchmark without profit shifting activities. Instead of ETRs, we develop and compare a set of financial ratios between FOACs and DOLACs based on publicly available accounting data to measure the extent of profit shifting via tax-motivated transfer pricing and debt financing/interest expense loading.

Second, this study investigates profit shifting activities of foreign MNEs in Australia. Most prior studies have focused on the profit shifting activities of MNEs in the United States (US) and countries in the EU (e.g. Clausing, 2003; Mills and Newberry, 2004; Buettner and Wamser, 2013; Vicard, 2015) because of the availability of the relevant data. Little research has been done in Australia to quantify the scope and the effect of BEPS.

Third, although many previous studies have critically analysed the BEPS project from the perspectives of legal and regulatory systems (e.g. Brauner, 2014; Devereux and Vella, 2014; Avi-Yonah and Xu, 2016), the actual effect of BEPS countermeasures remains to be quantified by empirical studies (OECD, 2015b). In this study, we empirically quantify the extent of cross-border profit shifting by FOACs and the effect of the related countermeasures adopted by the Australian Parliament. Applying empirical methods allows us to assess the effectiveness of BEPS countermeasures based on objective empirical evidence instead of subjective judgements and opinions.

More importantly, assessing whether the current Australian BEPS countermeasures are effective in reducing the extent of cross-border profit shifting may help policy-makers,

avoidance exploits the differences between tax rules and financial reporting rules (Hanlon and Heitzman, 2010). For example, by exploiting tax concessions, taxable income (and tax expense, the numerator of ETR) can be reduced without affecting pre-tax accounting profit (the denominator of ETR). Therefore, ETRs reflect the consequences of book-tax non-conforming tax avoidance.

such as the Treasury, the ATO 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 BEPS countermeasures against transfer pricing and debt financing/interest expense loading adopted by the Australia Parliament. Section 3 reviews the relevant literature. Section 4 develops the hypotheses. Section 5 explains the sample selection, introduces the PSM and CEM techniques employed to construct the matched samples and discusses the design of the regression models. Section 6 reports the descriptive statistics and the results of the main test, an additional test and a further test. Section 7 concludes this paper.

2. Relevant BEPS Countermeasures Adopted by the Australian Parliament

The Australian Parliament has been in the process of implementing the recommendations from the OECD/G20 BEPS Project to tackle the BEPS issues. This section summaries the actions taken by the Australian Parliament to address the BEPS issues related to transfer pricing and debt financing/interest expense loading.

First, the Australian transfer pricing rules have undergone two reforms. The first reform was the inclusion of Subdivision 815-A in the *Income Tax Assessment Act* (*ITAA*) *1997* in September 2012 to confirm that transfer pricing rules contained in Australia's tax treaties and incorporated into domestic law provide assessment authority in treaty cases with retrospective effect from 1 July 2004. The second reform was the shift from Division 13 *ITAA 1936* and Subdivision 815-A *ITAA 1997* to the comprehensive transfer pricing regime articulated in Subdivision 815-B to D *ITAA 1997* from 1 July 2013. The Parliament has further ensured that the Australian transfer pricing provisions under Division 815 of the *ITAA 1997* reflect the arm's length principle developed by the OECD in its documents, including the 2015 final report on Actions 8-10 *Aligning Transfer Pricing Outcomes and Value Creations* of the OECD/G20 BEPS Project (Act 27, 2017, applicable to income years commencing on or after 1 July 2016) and the OECD's *Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations 2017*.

Second, to implement Action 13 *Transfer pricing documentation and Country-by-Country Reporting* of the OECD BEPS Project, the Parliament inserted Subdivision 815-E into the *ITAA 1997* which contains a requirement to prepare Country-by-Country Reporting as part of the current transfer pricing regime. The *Tax Laws Amendment (Combating Multinational Tax Avoidance) Act 2015* was enacted in 2015 and imposes Country-by-Country Reporting obligations in respect of income years starting on or after 1 January 2016 on significant global entities (SGE) with a global turnover of AUD 1 billion or more.[17]

Third, the *Tax and Superannuation Laws Amendment (2014 Measures No. 4) Act 2014* tightened the thin capitalisation rules[18] in Division 820 of the *ITAA 1997* to restrict the deduction of interest expense 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, in other words, a reduction in a debt to Australian assets ratio from 75% to 60%. For non-ADI financial investors, the safe harbour debt limit is 15:1 (down from 20:1). The thin capitalisation 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 capitalisation purposes, effective from 8 May 2018. However, the current Australian thin capitalisation rules use a different methodology from the recommendations in Action 4 *Limiting base erosion involving interest deduction and other financial payments* of the BEPS Project[19] in that the former restricts deduction of interest expense based on the

[17] 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).

[18] The Australian thin capitalisation rules, articulated in Division 820 of the *ITAA 1997*, apply to limit interest deductions if an entity's debts exceed its maximum allowable amount. The maximum allowable amount can be: (1) the safe harbour debt amount; (2) the arm's length debt amount; and (3) the worldwide gearing debt amount.

[19] 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 amortisation (EBITDA) is used to limit an entity's net deductions for interest payments within the following range (OECD, 2015d). The approach includes a corridor of the possible ratio of between 10% and 30% for adoption

level of debts relative to assets while the latter recommends restrictions based on the level of interest expense relative to earnings.

3. Literature Review

3.1 Cross-border profit shifting by MNEs

MNEs typically exploit the differences in tax laws and tax rates across jurisdictions to conduct cross-border profit shifting. The BEPS issues have attracted increasing attention from empirical researchers.

The two main channels utilised by MNEs to artificially shift profit across country borders are intra-group transfer pricing and debt financing/interest expense loading. Prior empirical studies have documented that the tax rate differentials between MNEs' home countries and the host countries affect their related-party trade prices and profit reporting behaviours (e.g. Clausing, 2003; Bernard et al., 2006; Egger et al., 2010; Vicard, 2015; Cristea and Nguyen, 2016). The capital structures of MNEs and their subsidiaries are also sensitive to the tax rates of both their home countries and the host countries of subsidiaries (e.g. Desai et al, 2004; Mills and Newberry, 2004; Huizinga et al., 2008).

3.1.1 Intra-group transfer pricing

Tax-induced intra-group transfer pricing refers to the manipulation of "the monetary value attaching to goods and services traded between units of the same group which cross national boundaries" (Elliott and Emmanuel, 2000, p. 216). Using transfer pricing (or mispricing), profits are artificially shifted from countries with relatively high tax rates to countries with relatively low tax rates, and larger amounts of profits are reported in low-tax jurisdictions.

A few empirical studies with access to intra-group trade data have provided direct evidence about the use of tax-motivated intra-group transfer pricing by MNEs. Their

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, 2015d). 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.

findings indicate that MNEs make substantial price adjustments corresponding to the variation in corporate tax rates. For instance, using monthly US intra-group import and export prices data from 1997 to 1999, Clausing (2003) documents a strong relation between tax rates across different countries and the prices charged within the intra-group trade. Specifically, a 1% lower tax rate in the trade country is related to intra-group export prices that are 1.8% lower and intra-group import prices that are 2% higher, relative to non-intra-group trade prices.

Using 1993-2000 US trade data for transactions taking place at arm's length or between related parties (i.e. the Linked/Longitudinal Firm Trade Transaction Database (LFTTD)), Bernard et al. (2006) investigate how export prices set by MNEs vary across arm's-length or related-party customers. After matching a related-party sale by a firm to an arm's-length sale,[20] they find that the average prices of arm's-length sales are 43 percent higher than the prices of related-party sales (Bernard et al., 2006). They also report that one percentage point decrease in the destination-country corporate tax rate is associated with 0.56 to 0.66 percent increase in the gap in prices between arm's-length and related-party transactions.[21]

In the EU context, Vicard (2015) does a similar analysis using 2008 French firm-level export and import data and shows that the price wedge between arm's-length sales and related-party sales varies systematically with the tax rate differential between France and the trade country. The empirical evidence indicates that a one percentage point increase in the tax rate differential with all trade countries reduces the consolidated EBIT of multinational companies that trade with related parties by 0.5%.[22]

Based on 1999-2006 firm and transaction level data for Denmark, Cristea and Nguyen (2016) find that when the tax rate of a low tax jurisdiction decreases by 10 percentage points, the export unit values of Danish multinationals with affiliates in this jurisdiction

[20] A related-party sale and its matched arm's-length sale should be made by the same company for the same product to the same destination country in the same month using the same transport mode (Bernard et al., 2006).
[21] Bernard et al. (2006) also document that a one percentage point increase in the foreign customs duty increases the price gap between arm's-length sales and related-party sales by 0.56 to 0.60 percent.
[22] Profit shifting through intra-group transfer pricing is estimated to have reduced the French corporate tax base by USD 8 billion in 2008 (Vicard, 2015).

drop by 5.7 to 9.1 percent, compared to exporters without affiliates in such jurisdiction.[23]

Without any access to intra-group/arm's-length trade data, Egger et al. (2010) examine the impact of foreign ownership on tax payments by comparing profit shifting behaviours between foreign-owned manufacturing plants and their comparable domestic-owned manufacturing plants in 31 European countries based on 1999-2006 cross-sectional data from Amadeus. They raise the concern that foreign operations including foreign plant ownership should be treated as endogenous.[24] To address such endogeneity problem, Egger et al. (2010) use the PSM[25] to remove the impact of the self-selection bias on the final results. They detect a significant amount of tax saving by foreign-owned plants in the high-tax jurisdictions. On average, foreign-owned plants pay approximately EUR 1.3 million less corporate income tax than comparable domestic-owned plants do. On the contrary, foreign-owned plants pay higher taxes than their matched domestic-owned plants do in low-tax countries. These results are consistent with the flow of tax liability from high-tax jurisdictions to low-tax jurisdictions under tax-motivated profit shifting. In addition, foreign-owned manufacturing plants located in high-tax countries report significantly less profit than matched domestic-owned manufacturing plants do, which further implies a shift of tax base from high-tax countries to low-tax host countries.

In Australia, using the 2012[26] accounting data manually collected from financial reports to construct several financial ratios, Li and Tran (2020) compare the profit shifting behaviours between Australian subsidiaries of foreign MNEs and listed Australian companies with mainly domestic ownership. They find that foreign-owned companies have lower gross profit to sales revenue ratio and lower EBIT to sales revenue ratio than matched listed Australian companies using PSM. Specifically, foreign-owned companies report 11.1 cents lower gross profits and 4.7 cents lower

[23] Intra-group transfer pricing is estimated to correspond to a tax revenue loss of 3.24 percent of Danish MNEs' tax collection (Cristea and Nguyen, 2016).
[24] MNEs may establish plants in a certain foreign country because of its beneficial tax rate and tax policy. Therefore, the endogeneity problem accrues to the self-selection of plants into foreign plant ownership.
[25] Egger et al. (2010) match foreign-owned European manufacturing plants with those domestically-owned plants based on nine firm-level, region-level, industry-level and region-industry-level factors that could affect the probability of a plant being foreign owned.
[26] 2012 is the last year to examine cross-border profit shifting without the impact of the BEPS Project and the related amendments to the Australian tax legislations.

EBIT than comparable list companies do for every dollar of sales revenue. The results indicate that Australian subsidiaries of foreign MNEs engaged in intra-group transfer pricing activities to shift profits out of Australia.

3.1.2 Intra-group debt financing/interest expense loading

Tax-induced intra-group debt and interest expense loading, or thin capitalisation, refers to the heavy use of debt, rather than equity, as a source of financing the group members located in high-tax jurisdictions. It is an indirect way of cross-border profit shifting as internal debt within a group provides the opportunities for MNEs to claim a high level of deductions for interest expenses to minimise their tax payments in the high-tax jurisdictions with a corresponding receipt of interest by an affiliate in a low or no-tax jurisdiction. Such profit shifting is popular because of its simplicity of use (OECD, 2015d). The fluidity and fungibility of money make it easy for MNE groups to adjust the proportion of debt and equity in a controlled entity (OECD, 2015d) without any movements of assets or labour within the groups (Ting, 2017).

Similar to the trade prices, the financial structure (capital structure) of the members (affiliates) of an MNE group is expected to reflect the tax systems, including the local tax rates and the tax rate differentials across the countries where its affiliates operate (Huizinga et al., 2008). In the US, using a matched sample of financial data and confidential US income tax return data during 1987-1996, Mills and Newberry (2004) report that US subsidiaries of foreign MNEs with relatively lower average foreign tax rate[27] have higher leverage ratios and interest expenses to sales revenue ratio (i.e. have proportionately more debts and incur proportionately more interest expenses) than those with relatively higher average foreign tax rate. Desai et al (2004) also find that the leverage levels of foreign subsidiaries of US MNEs respond strongly to local tax rate incentives based on a confidential data collected by the Bureau of Economic Analysis (BEA) for its Benchmark Survey of US Direct Investment Abroad in 1982, 1989 and 1994. Specifically, a 10% increase in local tax rates is related to a 2.8% increase in subsidiaries' leverage as a fraction of assets (Desai et al, 2004).

[27] This means that the US corporate tax rate is relatively high compared to tax rates of other countries in which MNEs operate.

Different from the empirical results about intra-group debt financing in the US, the results in prior studies regarding the tax effect of intra-group debt financing/interest expense loading based on the European data are mixed. The empirical results of Huizinga et al. (2008)[28] suggest that for a stand-alone domestic company, a 10% overall tax rate increase in one country would lead to a 1.8% increase in the leverage ratio. On the other hand, Egger et al. (2010) do not find a significant relation between the level of debts used by foreign-owned plants and the tax rates of the host countries in the EU. Buettner and Wamser (2013) document a relatively small tax effect on intra-group debt financing of German multinationals. Both a one percentage point increase in a foreign affiliate's host country tax rate and a one percentage point decrease in the lowest tax rate within the MNE group only triggers an approximately 0.07% increase in the amount of internal debts received by this foreign affiliate within the group. Both Egger et al. (2010) and Buettner and Wamser (2013) suspect that taxable profit shifting by internal debt is likely to be a rather unimportant channel in Europe. Instead, intra-group transfer pricing is the dominant profit shifting channel.

In Australia, Li and Tran (2020) find that in comparison with matched domestic-owned listed Australian companies, Australian subsidiaries of foreign MNEs have higher interest expense to sales revenue ratios, yet similar leverage ratios.[29] They suggest that foreign-owned companies may pay interest at higher rates than comparable listed companies do. Inflated interest rates allow these foreign-owned companies to claim more tax deductions for interest expenses in Australia.

Overall, prior studies have estimated the extent of tax-motivated intra-group transfer pricing and debt financing/interest expense loading mainly in the US (e.g. Clausing 2003; Mill and Newberry, 2004; Bernard et al., 2006) and European countries (e.g. Egger et al.,2010; Buettner and Wamser, 2013; Vicard, 2015). Using 2012 accounting data, Li and Tran (2020) compare profit shifting behaviours between mainly domestic-owned listed Australian company and foreign-owned Australian companies to capture cross-border profit shifting by foreign MNEs in the Australian context. We extend the single year study of Li and Tran (2020) to a 14-year study period. We have also

[28] Huizinga et al. (2008) use 10-year (from 1994 to 2003) accounting and ownership data of European multinationals from Amadeus.

[29] The average interest expense to sales revenue ratio of foreign-owned Australian companies is 0.029, compared to 0.017 of domestic-owned listed Australian companies.

strengthened the research design, using an additional matching technique, CEM, in addition to the PSM. This methodology allows us to gauge the intensity of cross-border profit shifting by foreign MNEs relative to DOLACs over a sufficient timeframe to evaluate the effectiveness of BEPS countermeasures adopted by the Australian Parliament to reduce profit shifting.

3.2 The effectiveness of BEPS countermeasures

To address issues related to cross-border profit shifting, the OECD released a series of BEPS final reports for the BEPS Action Plan and has been issuing extensive guidance to help countries implement its recommendations. Previous studies have critically evaluated the effectiveness of this OECD/G20's BEPS Project from the perspectives of the legislative and regulatory systems (e.g. Brauner, 2014; Devereux and Vella, 2014; Avi-Yonah and Xu, 2016).

Avi-Yonah and Xu (2016) explain the 15 action items of the OECD/G20 BEPS Project in detail and critically analyse the strengths and the weaknesses of this project. The BEPS Project was intended to send a clear message to MNEs that cross-border profit shifting would not be tolerated in the future. Also, it was an achievement for OECD to involve non-member major economies and developing countries in the process of designing and negotiating the action items of the project to enhance the prospects of a globally consistent approach to facilitate trade and investment. This represents a major step for international tax law in the direction of inclusiveness and multilateralism. However, the inclusiveness and multilateralism are still limited. 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 (Avi-Yonah and Xu, 2016).

Another criticism is that the BEPS Project is less than a fundamental and bold tax reform. Although it proposes to allocate the tax rights of income based on the places where economic activities take place, the entire project is still designed based on the traditional benefit principle within the existing international tax framework, which determines the basic allocation of tax rights between source and residence countries (Devereux and Vella, 2014; Avi-Yonah and Xu, 2016). Such principle may be reasonable in 1920s in which companies usually operated only in one country, but the

development of modern organisational structure of MNEs and GVCs undermine the conceptual basis of source and residence principle for identifying where profit is earned. Also, the post-BEPS international tax regime will be less coherent, as the basic source/residence structure is kept in place and the proposed principle of 'place of economic activity' basis is overlaid on top of it (Devereux and Vella, 2014).[30]

Moreover, Avi-Yonah and Xu (2016) 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 addition to the discursive studies above, some recent studies (e.g. De Simone and Olbert, 2020; Joshi, 2020) have empirically examined the effect of the Country-by-Country Reporting in the EU context. The Country-by-Country Reporting is informative for the tax authorities because it contains new information like a detailed geographical breakdown of key operating, financial and tax metrics across the jurisdictions in which 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 operations (BEPS Monitoring Group, 2015).

Using 2010-2018[31] financial and ownership data of EU MNEs and their subsidiaries, Joshi (2020) examines the effect of the implementation of private Country-by-Country Reporting on corporate tax outcomes (i.e. tax avoidance and profit shifting) in the EU by treating such implementation as a shock to private disclosure requirements. Preliminary graphical evidence reflects a positive discontinuity in the ETRs at the €750 million cut-off point, which suggests a decline in corporate tax avoidance by firms with

[30] Devereux and Vella (2014) provide examples to illustrate incoherence of the post-BEPS international tax regime: tax right is aligned on the basis of economic activities in some situations, but in others it is not.
[31] 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.

the reporting obligation in the post-implementation period.[32] Regression results further indicate that the ETRs of firms falling into 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 MNE groups operated in the EU and their subsidiaries, De Simone and Olbert (2020) investigate how the Country-by-Country Reporting affects MNEs' organisational structures in the EU. 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, MNEs within the reporting regime not only shut down their tax haven operations, but also unwound obsolete entities in order to reduce organisational complexity and simplified their legal structures (De Simone and Olbert, 2020).

In Australia, Ting (2017) uses the tax structures of Chevron Australia[33] as a case study to evaluate the effectiveness of current Australian thin capitalisation rules and that of the OECD's best practice approach recommended by Action 4 of the BEPS Project.

[32] 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).

[33] Ting (2017) focuses on two tax structures used by Chevron Australia. The first one is 2004 to 2009 tax structure, and the second one is the tax structure from 2010.

Under Chevron's 2004-2009 tax structure,[34] although the 9 per cent interest rate on US$2.45 billion intra-group debts is substantially higher than the 1.2% interest rate attached to third-party commercial loans, Chevron Australia had no problem satisfying the requirements of the thin capitalisation rules.[35] The debt-to-asset ratio of Chevron Australia was around 68% in 2002, which was lower than the 75% safe harbour debt limit at that time.[36] This indicates that the Australian thin capitalisation rule, which supposes to be the first line of defence against tax avoidance structure related to debt financing/interest expense loading, was actually ineffective (Ting, 2017). In contrast, the earnings-based fixed ratio rules[37] recommended by Action 4 of the BEPS Project would be more effective in disallowing excessive interest deductions than the thin capitalisation rules do, as revealed by the Chevron case. Although such fixed ratio rule is useful, Ting (2017) further points out that Chevron Australia would not be able to claim any interest deductions under the group-wide rules considered in the Discussion Draft of Action 4. Specifically, under the group-wide rules, if an MNE group does not have any net third party interest expense, group members should not be allowed to deduct any net interest expense (OECD, 2015e). Unfortunately, the OECD did not take

[34] In *Chevron Australia Holdings Pty Ltd v FCT* [2015], the taxpayer was the Australian holding company of the Chevron group of companies. Its ultimate United States parent company is Chevron Corporation. Chevron Texaco Funding Corporation was a United States subsidiary of the taxpayer. Under a credit facility agreement between the taxpayer and Chevron Texaco Funding Corporation dated 6 June 2003, the taxpayer borrowed the Australian dollar equivalent of US$2.45 billion at an interest rate of approximately 9%. Chevron Texaco Funding Corporation raised the money, which it lent to the taxpayer, by issuing commercial paper in the United States at an interest rate of about 1.2%. Such loan agreement between the taxpayer and its US subsidiary was made on an unsecured basis. It neither included any operational or financial covenants, nor discussed the management of the exchange rate risk. In each of the five income tax years from 2004 to 2008, the taxpayer claimed tax deductions in Australia for the interest it paid to Chevron Texaco Funding Corporation. In 2010 and 2012, the Commissioner issued amended income tax assessments to the taxpayer. In substance, each of the assessments was made on the basis that the interest paid by the taxpayer was greater than it would have been under an arm's length dealing between independent parties. The Federal Court (*Chevron Australia Holdings Pty Ltd v FC* of *T* [2015] FCA 1092) stated that the loan in question would always be secured by, at the very least, some form of guarantee from someone in the Chevron group and thus determined that this kind of credit facility agreement was not likely to occur in financial dealings between independent parties dealing at the arm's length with each other. Therefore, it is reasonable to conclude that Chevron Australia Holdings Pty Ltd and Chevron Texaco Funding Corporation did not deal with each other at arm's length, and the dominant purpose for Chevron Australia Holdings Pty Ltd to enter into such agreement was to obtain a 'scheme benefit'. Following these findings, the Federal Court ruled that the taxpayer's challenges to the amended assessments under Division 13 of the *ITAA 1936* and the amended assessments under Division 815 of the *ITAA 1997* failed. The taxpayer appealed to the Full Federal Court of Australia. The Full Federal Court dismissed the appeal of the taxpayer (*Chevron Australia Holdings Pty Ltd v FC* of *T* [2017] FCAFC 62). A confidential settlement was reached in 2018 before the High Court heard the taxpayer's special leave application (Collins, 2020).

[35] The details of the current Australian thin capitalisation rules are provided in Section 2.

[36] The safe harbour limit was tightened from 75% to 60% on 1 July 2014 under the *Tax and Superannuation Laws Amendment (2014 Measures No. 4) Act 2014*.

[37] Australian thin capitalisation rule's safe harbour limit ratio is a debt-to-asset ratio. On the contrary, Action 4 of the BEPS Project contains (1) an earnings-based fixed ratio rule and (2) an earnings-based group ratio rule. According to the fixed ratio rule, a ratio of net interest to earnings before interest, taxes, depreciation and amortisation (EBITDA) is used to limit an entity's net deductions for interest and payment within the range (OECD, 2015d). 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 group ratio rule allows an entity to deduct net interest expense up to its group's net interest to EBITDA ratio.

such rules into considerations when designing the best practice approach in the Final Report of Action 4 (Ting, 2017). This means Action 4 fails to prevent excessive interest deductions over an MNE's net third party interest expense (i.e. the 'real interest expense') (Ting, 2018).

Instead of conducting case studies, Kayis-Kumar (2016) uses simulation to compare the effectiveness of the tightened Australian thin capitalisation rules and the fixed ratio rule recommended in Action 4 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.[38] 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 current 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.

As the OECD only 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 prior empirical studies that evaluate the effectiveness of the BEPS countermeasures in different countries. We attempt to extend the literature by empirically assessing the effectiveness of the Australian BEPS countermeasures.

4. Hypotheses Development

4.1 Cross-border profit shifting by MNEs

[38] 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 simulation 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 the capital structure and both the quantum and directions of funds flow remain the same.

In this study, we first investigate the extent of cross-border profit shifting in Australia based on an identification strategy that uses DOLACs as the benchmark for comparison to detect the profit shifting activities of FOACs.

Prior studies (e.g. Babcock, 2000; Wilkinson et al., 2001; Ikin and Tran, 2013; Amiram et al., 2019; Li and Tran, 2019) have suggested that the dividend imputation system reduces companies' incentives to pursue tax avoidance strategies. Under the Australian dividend imputation system, DOLACs and FOACs exhibit distinct attitudes towards avoidance of Australian corporate income tax. For DOLACs, the imputation system allows them to pass their Australian corporate income tax to domestic (i.e. Australian) shareholders in the form of franking credits, if they distribute franked dividends to these shareholders. The franking credits can then be used by domestic shareholders to offset against their individual income tax. In other words, Australian corporate tax does not reduce after-tax returns on the investments in the companies by domestic shareholders (Li and Tran, 2020). Therefore, DOLACs have little incentives to avoid Australian income tax because corporate tax avoidance not only requires extra tax planning costs, but also impedes the company's ability to distribute franked dividends to its Australian resident shareholders who see the receipt of franking credits as an important element of their investment strategy.

In line with such argument, Li and Tran (2019) find that companies distributing a higher proportion of their after-tax profits as franked dividends engage in less tax avoidance. When an Australian company with some foreign ownership pays more franked dividends to meet the demands of its domestic shareholders, it tends to engage in less corporate tax avoidance. They also find that when an Australian company has foreign operations, it may even shift foreign profits back to Australia in order to pay Australian income tax and enjoy greater benefits from the dividend imputation system.

In this study, FOACs refer to Australian subsidiaries of foreign MNEs. They are mainly owned by foreign parents outside Australia. Unlike domestic shareholders of DOLACs, foreign shareholders of FOACs view Australian corporate tax as a real cost as they cannot claim the franking credit tax offsets either in Australia or in their resident countries (Li and Tran, 2020). Given that Australian corporate tax rate (30%) is relatively high compared to the tax rates of many countries and foreign shareholders of

FOACs cannot enjoy the same benefit of dividend imputation as domestic shareholder of DOLACs, FOACs have incentives to shift profits out of Australia to reduce their Australian income tax. Also, as Huizinga and Laeven (2008) point out, cross-border profit shifting opportunity is a function of the scale of the foreign operations within a MNE group across countries. The development of global operations and GVCs across a wide range of countries provides foreign MNEs with the opportunities to shift profit from their Australian subsidiaries (i.e. FOACs) to other subsidiaries located in low-tax jurisdictions within the MNE groups.

More specifically, FOACs have the opportunity to use intra-group transfer pricing arrangements, which take the form of selling goods and services to offshore related parties (i.e. other members within the MNE group, especially those located in low or no-tax countries) at a depressed selling price, or purchasing goods and services from related parties overseas at an inflated purchase price. Suppressed sales revenue and/or inflated cost of sales would lead to lower gross profit margin. Therefore, if a FOAC engages in tax-motivated intra-group transfer pricing arrangements, its gross profit[39] to sales ratio (i.e. gross profit margin) is expected to be lower than that of a DOLAC comparable in terms of firm size and industry. This leads to hypothesis 1a:

> ***H1a:*** *After matching firm size and industry, FOACs have a lower gross profit to sales ratio than that of comparable DOLACs, especially in the pre-BEPS period.*

Moreover, FOACs could also manipulate expenses in the form of royalty payments for the use of intellectual properties, payments of management fees, etc. to related parties overseas in intra-group transfer pricing arrangements, leading to a low operating profit margin, measured by EBIT to sales ratio. Therefore, if a FOAC more aggressively uses intra-group transfer pricing arrangements to shift profit out of the country, it is expected to have a lower EBIT to sales ratio relative to a comparable DOLAC. This leads to hypothesis 1b:

> ***H1b:*** *After matching firm size and industry, FOACs have a lower EBIT to sales ratio than that of comparable DOLACs, especially in the pre-BEPS period.*

[39] See Appendix 1 for the relation of these accounting terms. Briefly, in financial accounting, Sales Revenue minus Cost of Sales equal to Gross Profit; Gross Profit minus Non-financial Expenses equal to Earnings before Interest and Tax (EBIT); EBIT minus Net Financial Expenses equal to Profit before Tax.

Another profit shifting channel is intra-group debt financing and/or interest expense loading. Under the dividend imputation system, DOLACs have little incentives to use debt financing and/or interest expense loading to avoid tax. Fan et al. (2012) examine how tax system differentials affect companies' capital structures and find that the extent of debt financing used by companies depends on the level of tax gain they are able to obtain under the tax system being targeted. Debt financing is used less in countries with the dividend relief tax system and the dividend imputation system than those with the classical tax system because double taxation arises under the classical tax system. Twite (2001) finds a decrease in leverage ratios of Australian listed companies after the introduction of the dividend imputation system. DOLACs, of course, may adopt a highly geared capital structure if the cost of debt capital is low, or when raising equity capital is not feasible. Foreign MNEs, on the contrary, can obtain tax savings from their Australian operations if their Australian subsidiaries can use interest charges and related borrowing expenses to shift profits out of Australia. Therefore, instead of the foreign parent providing equity capital to finance a FOAC, related parties in low or no-tax countries may finance the FOAC by intra-group debts and charge the FOAC interest at the market interest rate or even at an inflated interest rate based on the low stand-alone credit rating of the highly geared subsidiary to allow the FOAC to claim tax deductions for high interest expense to reduce its Australian profit. FOACs' greater use of highly geared structures and/or inflated interest expense is manifested in a higher leverage ratio and/or higher net interest expense[40] to sales ratio, relative to DOLACs that are comparable in terms of firm size, industry and the need to finance long-term productive assets (capital intensity). This leads to hypothesis 1c and 1d:

H1c: *After matching firm size, industry and capital intensity, FOACs have a higher net interest expense to sales ratio than that of comparable DOLACs, especially in the pre-BEPS period.*

H1d: *After matching firm size, industry and capital intensity, FOACs have a higher leverage ratio than that of comparable DOLACs, especially in the pre-BEPS period.*

[40] Net interest expense equals to interest expense minus interest revenue. It is the net amount of interest expense incurred by a company.

Regardless of the choice of profit shifting channels, cross-border profit shifting activities of FOACs are likely to result in reduced accounting profit before tax in Australia and reduced Australian tax expense reported in their financial statements. If a FOAC shifts profit out of Australia, it would have a lower accounting profit before tax to sales ratio and a lower income tax expense to sales ratio than a comparable DOLAC does. This leads to hypothesis 1e and 1f:

H1e: *After matching firm size and industry, FOACs have a lower profit before tax to sales ratio than that of comparable DOLACs, especially in the pre-BEPS period.*

H1f: *After matching firm size and industry, FOACs have a lower income tax expense to sales ratio than that of comparable DOLACs, especially in the pre-BEPS period.*

4.2 The effect of BEPS countermeasures

In this study, we also compare the degrees of cross-border profit shifting by FOACs using transfer pricing and debt financing/interest expense loading between the pre-BEPS period and the post-BEPS period to assess the effectiveness of the relevant Australian BEPS countermeasures in reducing the use of these profit shifting channels. These countermeasures are expected to reduce the extent of cross-border profit shifting by FOACs in a number of ways.

From the legal perspective, the Australian countermeasures sought to tackle the two major profit shifting channels used by foreign MNEs and expand the reach of current Australian tax law, with the objective of forcing foreign MNEs to change their tax planning strategies and pay more corporate income tax in Australia. Specifically, Division 13 of the *ITAA 1936* was supplemented with Subdivision 815-A of the *ITAA 1997* (which was enacted in 2012) and both Division 13 and Subdivision 815-A were replaced, in respect of income years beginning on or after 29 June 2013, by a comprehensive set of transfer pricing rules covering all cases, whether or not a double tax agreement applied. These rules are articulated in Subdivisions 815-B to D of the *ITAA 1997*. Such tax reform addressed the limitations in the previous transfer pricing

rules discussed in the SNF case[41] and the Chevron case.[42] Current transfer pricing rules can also be applied in cases where trusts and partnerships are involved in profit shifting (Subdivision 815-D).

Moreover, as mentioned in Section 2, the Australian Parliament has updated current Australian transfer pricing rules under Division 815 of the *ITAA 1997* to ensure that these rules are applied insofar as relevant in a manner that is consistent with the OECD *Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations 2017*, and has imposed the Country-by-Country Reporting obligations on significant global entities with a global turnover of AUD 1 billion or more from 1 January 2016 (Subdivision 815-E of the *ITAA 1997*).

The Australian Parliament has also tightened the thin capitalisation rules to restrict the deduction of interest expense in Division 820 of the *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%.

From the capital market perspective, foreign MNEs may reduce the extent of profit shifting activities due to potential loss of reputation and the potential downward risk of stock prices. Hanlon and Slemrod (2009) find that a company's stock price declines when there is news about its involvement in corporate tax avoidance. Also, aggressive tax planning increases the crash risk of firm-specific stock price (Kim et al., 2011). Therefore, if a company's tax planning triggers actions by the tax authorities under the BEPS countermeasures, depending on the aggressiveness of the tax positions the company has taken and the scale of the potential increase in tax liability, investors may

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[41] SNF case refers to *FC of T v SNF (Australia) Pty Ltd* [2010] FCA 635 and on appeal *FC of T v SNF (Australia) Pty Ltd* [2011] FCAFC 74. In this case, despite a good sales performance, SNF (Australia) made persistent losses because of its high purchased prices for products. In 2007, the commissioner determined under the former Division 13 that the purchased prices paid by SNF (Australia) were higher than prices would been paid in arm's length transactions, resulting in trading losses. However, the Federal Court accepted all three sets of comparable transactions provided by SNF (Australia) and held that the purchase prices were not higher than price in the arm's length transactions. In this case, the economic contribution of SNF (Australia) to the MNE's global economic value chain in the competitive market system was not considered under the former Division 13 (Killaly, 2017). The Federal Court was undecided as to whether tax treaties were a separate head of legislative power that authorised transfer pricing adjustments. The weaknesses of the former Division 13 and doubts about the operation of treaties in transfer pricing cases exposed by this case called for legislative changes to make sure that the tax law addressed the underlying structural dynamics used in cross-border profit shifting arrangements, not just the symptom of the mispricing of intra-group supplies and services and to remove any doubt about the operation of tax treaties (Killaly, 2017).

[42] See footnote 32 for detail information about the Chevron case.

reduce their investments to an extent that stock price is adversely impacted. To avoid this situation, managers of MNEs may have to temper their tax avoidance activities.

MNEs may also be forced to reduce the extent of profit shifting due to the fear of potential losses of reputation and consumer loyalty. Under the stakeholder theory, corporate tax avoidance is an indicator for corporate social irresponsibility. MNEs depend on the existence of a local economy in different countries to operate businesses. It is their responsibilities to contribute to the economies that they operate. 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 suggest a lack of corporate social responsibility (CSR) (Hoi et al., 2013). If tax avoidance by MNEs result in penalties or other actions from the tax authorities under the countermeasures, the public may perceive the MNE's conduct as immoral and lacking in social responsibility. This perception may lead to negative consumer reactions including negative word of mouth, protest activities and consumer boycotts and thus negatively affect the relationship between the company and its consumers (Grappi et al., 2013). In the long run, negative consumer reactions may harm companies' reputations, brand images and overall operations (Brunk, 2010).

On the other hand, the flexible changes between different tax planning strategies and schemes could undermine the effectiveness of these BEPS countermeasures. MNEs can switch to other tax planning schemes not subject to BEPS countermeasures. For example, the indifferent reaction of the hypothetical MNE under the tightened thin capitalisation rules in Kayis-Kumar (2016)'s simulation indicates that alternative configurations of intercompany funding such as leasing and licencing may allow MNEs to obtain the same total tax payable regardless of the implementation of stronger thin capitalisation rules.

If the implementation of related BEPS countermeasures has resulted in FOACs reducing the extent of profit shifting out of Australia through transfer pricing and debt financing and/or interest expense loading, FOACs' gross profit to sales ratios and EBIT to sales ratios are expected to increase, and their net interest expense to sales ratios and leverage ratios are expected to decrease in the post-BEPS period. This leads to hypotheses 2a to 2d below:

H2a: *FOACs have a higher gross profit to sales ratio in the post-BEPS period than that in the pre-BEPS period.*

H2b: *FOACs have a higher EBIT to sales ratio in the post-BEPS period than that in the pre-BEPS period.*

H2c: *FOACs have a lower net interest expense to sales ratio in the post-BEPS period than that in the pre-BEPS period.*

H2d: *FOACs have a lower leverage ratio in the post-BEPS period than that in the pre-BEPS period.*

If FOACs shift less profit out of Australia in the post-BEPS period, they will report more accounting profit before tax and more income tax expense relative to its sales revenue than they did in the pre-BEPS period. This leads to hypothesis 2e and 2f:

H2e: *FOACs have a higher profit before tax to sales ratio in the post-BEPS period than that in the pre-BEPS period.*
H2f: *FOACs have a higher income tax expense to sales ratio in the post-BEPS period than that in the pre-BEPS period.*

5. Research Design

5.1 Sample and data

The study period is the 14 years comprising 2007 to 2020. We divide the 14 years into two parts: 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 major changes to the Australian transfer pricing rules took effect from 2013 and the Australian thin capitalisation rules were tightened in 2014. Also, the OECD started the BEPS Project in early 2013, and the BEPS issues drew the attention of the media and the public at large since then.

The population of interest in this study is FOACs, with DOLACs serving as the control group for comparison to detect cross-border profit shifting by FOACs. In this study, FOACs are the Australian subsidiaries of foreign MNEs. As FOACs are owned by

foreign parents who cannot benefit from the Australian dividend imputation system, FOACs tend to shift their Australian profit to other affiliates within the groups that are located in low or no-tax jurisdictions. DOLACs refers to mainly domestic-owned listed Australian companies which may have operations overseas. DOLACs are the ultimate parent entities of the groups, so the consolidated financial statements of a DOLAC only reflect transactions with independent parties outside the group.

Although the full list of Australian companies listed on the Australian Stock Exchange (ASX) is available from the ASX, there is no readily available list of FOACs. We start with the sample of FOACs and listed Australian companies (LACs) in the study of Li and Tran (2020) which was drawn from the list of Australia's top 2,000 companies in the year 2012 obtained from the IBISWorld website.[43] As we extended the study period to a 14-year period from 2007 to 2020 in this study and there might be natural attritions over time, further efforts were made to identify additional FOACs and LACs from the 2016 IBISWorld list of Australia's top 2,000 companies to form the initial sample which includes 458 FOACs and 383 LACs.[44]

We checked whether each FOAC in the initial sample was in fact owned by a foreign MNE and whether it had real business operations in each of the 14-year sample period based on the financial reports acquired from the ASIC. If a company is determined to be not owned by a foreign MNE or to be a dormant company in a certain year, the corresponding firm-year observations were excluded from the sample of FOACs.[45]

We also checked whether each LAC in the initial sample was listed on the ASX and that it did not have significant foreign ownership in any of the years covered by the 14-year sample period.[46] Prior studies (e.g. Wilkinson et al., 2001; Li and Tran, 2019)

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[43] The IBISWorld top 2,000 Australian companies include listed Australian companies, Australian-owned non-listed companies, foreign-owned Australian companies and government-owned companies, universities and other non-government organisations. There are more foreign-owned Australian companies than listed Australian companies on the IBISWorld list because many listed Australian companies are relatively small in size and are not on the IBISWorld list.

[44] Li and Tran (2020) is in fact a pilot study of this study. We greatly appreciate the financial support of the Australian National University College of Business and Economics Research School Grant which funded the study of Li and Tran (2020) and helped to secure an Australian Research Council Discovery Projects Grant which has funded the extension of the study period from a single year (2012) in Li and Tran (2020) to a period of 14 years (2007 to 2020) in this study to allow an assessment of the related BEPS countermeasures.

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

[46] For example, if a DOLAC was listed on the ASX in 2012 but delisted in 2015, only 2007-2014 firm-year observations are included in the sample.

have revealed that the extent of foreign ownership can affect firms' tax avoidance strategies under the dividend imputation systems.[47] Therefore, only LACs with less than 20 percent foreign ownership are included in the sample of DOLACs to control for the impact of foreign ownership on LACs' tax avoidance behaviours.[48] The 20 percent threshold ensures that DOLACs in the sample have predominantly domestic ownership and, at the same time, allows us to maintain a reasonable sample size.

All banks and insurance companies are excluded from the study because they are subject to different tax rules, different regulatory and financial reporting requirements so financial data used by the study may not be available.[49] Companies in the public utility industry (i.e. electricity, gas and water) are subject to government regulation and are also excluded.

Firm-level data including firm characteristic data and financial statement data for both FOACs and DOLACs for 2007 to 2016 were downloaded from the Orbis database and cross-checked against the financial reports downloaded from the Morningstar database for DOLACs and the financial reports acquired from ASIC for FOACs. As the data downloaded from Orbis were found to have errors when cross-checked against financial reports, data for 2017 to 2020 were hand-collected directly from the financial reports. Firm-year observations with operating revenue equal to or less than zero are excluded from the sample.[50] Table 1 reports the sample selection process. There are 4,767 FOAC firm-year observations (380 FOACs) and 3,455 DOLAC firm-year observations (325 DOLACs) in the final sample.[51]

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[47] Wilkinson et al. (2001) find that average effective tax rates are lowest for companies with high foreign ownership. Li and Tran (2019) document a significant and negative relation between current effective tax rate and foreign ownership.

[48] Foreign ownership is based on (1) a very time-consuming analysis of the list of the top 20 shareholders in the 2012 financial reports of DOLACs by Li and Tran (2020) and additional Osiris Ownership Data purchased from Bureau Van Dijk, and (2) Orbis shareholders data downloaded from Bureau Van Dijk for this study in March 2019. After applying such foreign ownership criteria, dual listed companies like Rio Tinto Limited and BHP Group Limited are not in the sample because the foreign ownership of Rio Tinto plc and BHP Group plc listed on the London Stock Exchange must be taken into account.

[49] The big four banks (e.g. Commonwealth Bank) and the big insurance companies are excluded from the sample of DOLACs because they are in the financial and insurance services industry.

[50] Observations with operating revenue smaller than 0 are excluded from the sample to avoid potential data error. Observations with operating revenue equal to 0 are also excluded because operating revenue is the denominator of most financial ratios (outcome variables) and thus cannot be 0.

[51] The number of FOACs is greater than the number of DOLACs in the initial sample because there are fewer DOLACs with firm size comparable to FOACs on the IBISWorld top 2,000 companies. Note that very large Australian listed companies such as BHP, Rio Tinto and the big four Australian banks have been excluded from the sample for reasons already provided.

[Insert Table 1 here]

5.2 Propensity score matching (PSM)

Prior empirical studies (e.g. Girma and Görg, 2007; Egger et al., 2010; Dharmapala and Riedel, 2013) have suggested that the endogeneity problem of foreign ownership existed in the tax avoidance literature. The endogeneity accrues to systematic selection into foreign-owned companies (i.e. FOACs) (Egger et al., 2010). Therefore, the extent of cross-border profit shifting by FOACs can neither be estimated from a simple mean comparison of profit shifting outcome variables such as gross profit and EBIT to sales ratios and interest expense to sales ratio between FOACs and DOLACs, nor directly from an Ordinary Least Squares (OLS) regression model.

To achieve a fair comparison in profit shifting behaviours between FOACs and DOLACs, we employ PSM to match each FOAC to a DOLAC with the closest propensity score. Specifically, we use the logit model to compute propensity scores, and the matching variables are firm characteristics including industry affiliation (*Ind*), firm size (*Size*), year (*Year*) and also capital intensity (*CapInt*) in the case of intra-group debt financing/interest expense loading. Table 2 reports the definition of matching variables.

[Insert Table 2 here]

The use of these matching variables may be rationalised as follows. *Ind* is included as a matching variable, as industry affiliation is a determinant of profitability, capital intensity and capital structure. Industry affiliation is also a foreign ownership influential factor (Li and Tran, 2020). For instance, foreign MNEs may cluster on certain industries such as wholesale/distribution and technology-intensive industries (Girma and Görg, 2007). Firm size is also to be positively and correlated with the propensity to be a FOAC, and can also have an impact on profitability, capital intensity and capital structure for reasons such as economies of scale. Given that we intend to compare FOACs and DOLACs with similar firm size, *Size* is included as another matching variable, which

is measured by the natural logarithm of sales revenue.[52] *Year* is also included, as the period covered by this study is relatively long. In addition, capital intensity is one of the significant determinants of corporate capital structure (Fan et al., 2012), and it is also a foreign ownership influential factor (Li and Tran, 2020). Therefore, *CapInt* is included in the matching model in the case of intra-group debt financing/interest expense (equation (2) below). *CapInt* is measured by the ratio of non-current assets to total assets.

Based on the discussion above, the propensity score in the case of intra-group transfer pricing is estimated by the logit model represented by equation (1). In the case of debt financing/interest expense loading, the propensity score is estimated using the logit model represented by equation (2).

$$FOAC_i = \beta_0 + \beta_1 Size_{i,t} + \beta_{2-19} Ind_i + \beta_{20-33} Year_t + \varepsilon_{i,t} \quad (1)$$

$$FOAC_i = \beta_0 + \beta_1 Size_{i,t} + \beta_{2-19} Ind_i + \beta_{20-33} Year_t + \beta_{34} CapInt_{i,t} + \varepsilon_{i,t} \quad (2)$$

where:

FOAC	is FOAC indicator, taking value of "1" if the company is a FOAC, and "0" otherwise;
Size	is firm size, measured by the natural logarithm of sales revenue;
Ind	is industry indicator, taking the value of "1" for the correct industry, and "0" otherwise;
Year	is year indicator, taking the value of "1" for the correct year, and "0" otherwise;
CapInt	is capital intensity, measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets;
ε	is the regression error term.

5.3 Coarsened exact matching (CEM)

[52] Sales revenue is considered as the most appropriate proxy for firm size compared to other common proxies such as total assets. Total assets may not measure the operating scale of some FOACs. For example, Apple Pty Ltd, the Australian subsidiary of Apple Inc., not only has its own retailing stores in major Australian cities, but also acts as the distributor of Apple products to other consumer electronic stores such as Harvey Norman and JB Hi-Fi.

Iacus et al. (2012) argue that the widely used matching methods, such as PSM and Mahalanobis matching (both are members of equal percent bias reducing), do not guarantee any level of imbalance[53] reduction in any given dataset. King and Nielsen (2019) even point out that PSM, as a matching technique that is supposed to reduce imbalance, often accomplishes the opposite of its intended goal. Specifically, it may increase imbalance, inefficiency, model dependence and statistical bias in both real data and data generated to meet the requirements of PSM. Such weakness results from its attempt to approximate a completely randomised experiment instead of a more efficient fully-blocked randomised experiment (King and Nielsen, 2019). Therefore, a single use of PSM could increase the level of imbalance as PSM reduces a number of matching variables (such as firm size, year and industry in this study) to a single scale (propensity score) and uses it to match a treatment unit to the nearest control unit.

Acknowledging this weakness of PSM, we also adopt coarsened exact matching (CEM)[54] as an alternative matching technique to match a FOAC with a comparable DOLAC based on matching variables including firm size, year (i.e. 14 year variables from 2007 to 2020), industry affiliation (i.e. 18 industry indicator variables) and capital intensity in the case of intra-group debt financing/interest expense loading. Appendix 2 reports a list of variables used in CEM.

There are two options in relation to the application of CEM: CEM (weighted) and CEM (k-to-k). CEM (weighted) produces strata that include different numbers of treatment and control units and applies weighting to achieve balance (Blackwell et al., 2009). This means that, in the case of this study, the number of FOAC observations might be different from the number of matched DOLAC observations within one industry group or one year group, and weighting is needed to balance them. On the contrary, CEM (k-to-k) tries to achieve the same number of treatment and control units in each stratum

[53] The key goal of matching is to remove observations from the data so that the remaining observations have better *balance* between the treated and control group with respect to available pre-treatment variables (Iacus et al., 2012). If the data is exactly balanced, then further controlling for covariates is unnecessary. A simple difference in means on the matched data can estimate the causal effect (Blackwell et al., 2009).

[54] CEM belongs to the class of monotonic imbalance bounding (MIB). It requires no assumptions about the data generation process (Iacus et al., 2012). It focuses on the actual in-sample imbalance and guarantees that imbalance between the matched treatment and control groups will not be greater than the user's choice (Iacus et al., 2011).

(i.e. an industry group or a year group).[55] We adopt both options of CEM when conducting the matching.

The use of matching either by PSM or CEM allows us to rule out alternative explanations related to non-tax factors leading to the differences in financial ratios between FOACs and DOLACs that we use to detect profit shifting. These non-tax factors can be firm size, industry affiliation and capital intensity. Confounding factors that affect profitability, net interest expense and leverage, etc. are supposed to be same for both FOACs and their comparable or matched DOLACs.

5.4 Research models and variables of interest

The following regression models (for firm *i* and year *t*) represented by equations (3) to (8) measure the extent of tax-motivated intra-group transfer pricing and debt financing/interest expense loading by FOACs, compared to DOLACs, in the study period using an indicator variable *FOAC*. The regression models further adopt the difference-in-differences approach to compare changes in the extent of tax-induced intra-group transfer pricing and debt financing/interest expense loading for FOACs versus DOLACs from the pre-BEPS period to the post-BEPS period using an interaction term between the two indicator variables *FOAC* and *PostBEPS*. We run regression models based on different matching specifications: (1) unmatched specification; (2) PSM specification; (3) CEM (weighted) specification and (4) CEM (k-to-k) specification. Table 2 summarises the definition of variables in the regression models.

$$GrosProfR = \beta_0 + \beta_1 FOAC_i + \beta_2 PostBEPS + \beta_3 FOAC_i \times PostBEPS + \beta_{4\text{-}21} Ind_i + \beta_{22} Size_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$EBITR = \beta_0 + \beta_1 FOAC_i + \beta_2 PostBEPS + \beta_3 FOAC_i \times PostBEPS + \beta_{4\text{-}21} Ind_i + \beta_{22} Size_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$NFinExpR = \beta_0 + \beta_1 FOAC_i + \beta_2 PostBEPS + \beta_3 FOAC_i \times PostBEPS + \beta_{4\text{-}21} Ind_i + \beta_{22} Size_{i,t} + \beta_{23} CapInt_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$Lev = \beta_0 + \beta_1 FOAC_i + \beta_2 PostBEPS + \beta_3 FOAC_i \times PostBEPS + \beta_{4\text{-}21} Ind_i + \beta_{22} Size_{i,t} + \beta_{23} CapInt_{i,t} + \varepsilon_{i,t} \quad (6)$$

[55] When using the 'k-to-k' option, CEM matches observations randomly within the strata presumably using internally generated random numbers.

$$ProfBTaxR = \beta_0 + \beta_1 FOAC_i + \beta_2 PostBEPS + \beta_3 FOAC_i \times PostBEPS + \beta_{4\text{-}21} Ind_i + \beta_{22} Size_{i,t} + \varepsilon_{i,t} \quad (7)$$

$$TaxExpR = \beta_0 + \beta_1 FOAC_i + \beta_2 PostBEPS + \beta_3 FOAC_i \times PostBEPS + \beta_{4\text{-}21} Ind_i + \beta_{22} Size_{i,t} + \varepsilon_{i,t} \quad (8)$$

Where:

GrosProfR	is gross profit ratio, measured by gross profit divided by sales revenue;
EBITR	is operating profit ratio, measured by EBIT divided by sales revenue;
NFinExpR	is net interest expense ratio, measured by interest expense minus interest revenue and then divided by sales revenue;
Lev	represents different versions of leverage ratio, measured by non-current debts divided by total assets (*Lev1*), or by the sum of non-current debts and current loans divided by total asset (*Lev2*), or by non-current liabilities divided by total assets (*Lev3*), or by total liabilities divided by total asset (*Lev4*);
ProfBTaxR	is profit before tax ratio, measured by accounting profit before tax divided by sales revenue;
TaxExpR	is tax expense ratio, measured by tax expense divided by sales revenue;
FOAC	is FOAC indicator, taking value of "1" if the company is a FOAC, and "0" otherwise;
PostBEPS	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);
Size	is firm size, measured by the natural logarithm of sales revenue;
Ind	industry indicator, taking the value of "1" for the correct year, and "0" otherwise;
CapInt	is capital intensity, measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets;
ε	is the regression error term.

Equations (3) and (4) capture the extent of cross-border profit shifting via intra-group transfer pricing by FOACs, and equations (5) and (6) capture the extent of cross-border

profit shifting via intra-group debt financing/interest expense loading by FOACs. Equations (7) and (8) measure the overall results of cross-border profit shifting by FOACs.

Although the problem of heteroscedasticity may exist,[56] we do not employ panel data analysis (i.e. firm fixed effects models) because the key independent variable in the regression models is *FOAC*, an indicator variable, and the within-firm variation in *FOAC* is zero. 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. Instead of firm fixed effects model, we use the cluster robust-variance option for all regression models to relax the independent errors assumption in a limited way when errors are correlated within subgroups or clusters of data. Standard errors across all models are clustered by firms.

5.4.1 Dependent variables

In this study, we use three groups of outcome variables, i.e. financial ratios that measure the outcomes of profit shifting, as the dependent variables to capture (1) tax-induced intra-group transfer pricing; (2) tax-induced debt financing/interest expense loading; and (3) the overall effect of cross-border profit shifting by FOACs respectively.

First, we use two financial ratios to capture tax-induced intra-group transfer pricing. When a FOAC sells goods or services to foreign affiliates within the group at reduced prices and/or purchases goods or services from foreign affiliates at inflated prices (including fees paid for the licences to use intellectual properties held by foreign affiliates and the management services of foreign affiliates), it would have reduced gross profit margins (due to the lower sales revenue or higher cost of sales) and reduced operating profit margins (due to the higher royalties and other non-finance expenses such as management fees). Previous studies (e.g. Egger et al., 2010; Dharmapala and Riedel, 2013) argue that EBIT is closely related to firms' operating profits, and it is commonly used by those studies to measure the effect of tax-motivated transfer pricing. Both gross profit and EBIT are scaled by sales revenue (*GrosProfR* and *EBITR*) to measure relative profitability. If a FOAC has a lower *GrosProfR* or *EBITR* than its

[56] 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.

comparable DOLAC does, it reflects tax-induced intra-group transfer pricing in relation to the FOAC. The comparisons of these two financial ratios between FOACs and DOLACs are also in line with the OECD transfer pricing guidelines to determine whether the trade prices of related-party transactions are at arm's length.[57]

For each dependent variable, observations with the ratio greater than 1 or smaller than 0 are excluded. For example, in the *GrosProfR* subsample which is used to test hypotheses H1a and H2a, observations with *GrosProfR* greater than 1 or smaller than 0 are excluded. This is to ensure that the regression results are not dominated by extreme values. Also, as sales revenue is used as the denominator, any *GrosProfR* greater than 1 is likely to be a data error. Thus, the size of each subsample varies, depending on the number of observations with extreme values.

Second, we use the following leverage ratios or debt-to-assets ratios to capture tax-induced debt financing. Debt-to-assets ratio is widely used by previous studies of international tax avoidance to measure corporate capital structure and leverage,[58] and is also used to measure the extent of debt (including intra-group debt) used to fund the assets and operations of FOACs in this study.[59] We choose to measure tax-motivated debt financing by different versions of debt-to-assets ratio. Specifically, *Lev1* is measured by non-current (i.e. long-term) debts divided by total assets; *Lev2* is measured by the sum of non-current debts and current (i.e. short-term) loans divided by total assets; *Lev3* is measured by non-current liabilities divided by total assets, and *Lev4* is measured by total liabilities divided by total assets. *Lev1* and *Lev2* only include interest-bearing debts in the numerator. *Lev3* and *Lev4* also include non-interest-bearing liabilities in the numerator such as deferred tax liability in non-current liabilities and accounts payable in current liabilities.

[57] One important method that the OECD uses to determine the 'arm's length' transfer prices is by referring to the gross profit margins or the operating profit margins achieved in similar transactions between independent enterprises (OECD, 2015f).

[58] A few studies, such as Fan et al. (2012), use the proportion of total debt to market value of a firm (i.e. market value of common equity plus the book value of preferred stock plus total debt) as a measure of capital structure. We cannot adopt this capital market-based measurement due to the absence of data for FOACs which do not have equity shares listed on any stock exchanges.

[59] We cannot study the related-party debts of FOACs separately because most FOACs claim that they are not reporting entities so they are not required to follow Australian Accounting Standards and disclose related-party transactions and balances.

In addition to highly geared financing structures, FOACs can also manipulate the interest rates applied to intra-group debts in order to claim tax deduction of high interest expense. Therefore, we use net interest expense to sales revenue ratio (*NFinExpR*)[60] to capture the effects of interest expense loading.[61]

Last but not least, two financial ratios are included to measure the overall effect of FOACs' cross-border profit shifting arrangements. The first one is profit before tax to sales revenue ratio (*ProfBTaxR*) because FOACs are expected to report lower profits in Australia if they shift some profit out of the country. The second one is income tax expense to sales revenue ratio (*TaxExpR*) because FOACs are expected to report lower Australian income tax if they shift some profit out of Australia. While FOACs mainly operate in Australia[62] and pay Australian income tax, DOLACs' tax expense may comprise both Australian income tax and foreign income tax if they have foreign operations. However, as DOLACs may shift foreign profit to Australia in order to pay more Australian income tax and less foreign income tax to enhance franking credit availability which is preferred by the Australian capital market under the dividend imputation system (Li and Tran, 2019), DOLACs' tax expense can still serve as a benchmark to measure the overall effects of cross-border profit shifting by FOACs because DOLACs' total tax expense reflects the level of tax expense without significant corporate tax avoidance.

For each dependent variable discussed above, observations with the ratio greater than 1 or smaller than 0 are also excluded.

5.4.2 Independent variables and control variables

The first independent variable, *FOAC*, is a FOAC indicator. *FOAC* takes the value of "1" if the company is a FOAC, and "0" otherwise. In equations (3) and (4), *FOAC* is expected to have a negative association with *GrosProfR* and *EBITR* respectively in the case of transfer pricing because FOACs are expected to have lower gross profit margins

[60] An alternative financial ratio to capture interest expense loading is interest expense to sales revenue ratio (*FinExpR*). There are 2,680 observations with negative *NFinExpR* (i.e. financial revenue is higher than financial expense). *NFinExpR* is a better proxy than *FinExpR* because there are a large number of observations with small financial expenses which become negative when financial revenue is taken into account (i.e. no real financial costs).
[61] Note that *NFinExpR* actually covers two channels: (a) charging an artificially high interest rate (price) is a transfer pricing issue, (b) loading more debts (quantity) to charge more interest expense is a debt financing (thin capitalisation) issue.
[62] FOACs are Australian operations of foreign MNEs. Some FOACs operate in both Australia and New Zealand.

and operating profit margins than comparable DOLACs do, if they use intra-group transfer pricing scheme to shift profits out of Australia in the study period. Negative coefficients of *FOAC* (β_1) in equations (3) and (4) will support hypotheses 1a and 1b. On the contrary, *FOAC* is predicted to have a positive relation to all versions of leverage ratio as well as *NFinExpR* in the case of intra-group debt financing/interest expense loading in equations (5) and (6), as FOACs are expected to have more debts and/or higher net financial expense than comparable DOLACs do if they use highly geared structures and/or inflated interest rates to shift profits out of Australia in the study period. Positive coefficients of *FOAC* (β_1) in equations (5) and (6) will support hypotheses 1c and 1d. In equation (7) and (8), negative relations between FOAC and *ProfBTaxR*/*TaxExpR* are expected because cross-border profit shifting using these two channels by FOACs leads to reduced profit reported in Australia and reduced Australian tax expense. Negative coefficients of *FOAC* (β_1) in equations (7) and (8) will support hypotheses 1e and 1f.

PostBEPS is a post-BEPS period indicator.[63] This indicator variable takes the value of "1" if the year falls in the post-BEPS period (2013 to 2020) and "0" otherwise. As the interaction term between *FOAC* and *PostBEPS* is also included in the models, the coefficients of *PostBEPS* (β_2) in equations (3) to (8) capture the changes in the financial ratios of DOLACs from the pre-BEPS period to the post-BEPS period. The sign of β_2 is not predicted because DOLACs are the control group.

The interaction term between *FOAC* and *PostBEPS*, $FOAC \times PostBEPS$, is also included in the models. This interaction term measures the change in the difference in each financial ratio between FOACs and DOLACs from the pre-BEPS period to the post-BEPS period and thus captures the incremental effect of the implementation of the related BEPS countermeasures on cross-border profit shifting via the two channels by FOACs. It enables us to evaluate whether the BEPS countermeasures implemented by the Australian Parliament have been effective in reducing the cross-border profit shifting by way of transfer pricing and debt financing/interest expense loading by

[63] Instead of *PostBEPS*, a set of year indicators for the post-BEPS period and interaction terms with $FOAC_i$ are included to detect the trend in the use of tax-motivated transfer pricing and debt financing by FOACs in the additional test. As the Australian government has implemented additional BEPS countermeasures year by year, the effect of these countermeasures on cross-border profit shifting is expected to be different across seven years in the post-BEPS period.

FOACs. If the related Australian BEPS countermeasures are effective, regression coefficients of this interaction term (β_3) are expected to be positive in the case of intra-group transfer pricing in equations (3) and (4), which will support hypotheses 2a and 2b. On the contrary, negative coefficients of this interaction term (β_3) in the case of intra-group debt financing/interest expense loading in equations (5) and (6) will support hypotheses 2c and 2d. If the related Australian BEPS countermeasures are effective, positive coefficients of this interaction term (β_3) in equations (7) and (8) are expected which will support hypotheses 2e and 2f.

Control variables are included in this study. A series of industry indicator variables, *Ind*, is included in the model to control for industry differences. 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 indicator variables are used to control for the industry differences between the base industry, namely, Agriculture, Forestry and Fishing (industry group 1) and other industries. Appendix 3 provides detailed information about these industry groups. *Size* is included to control for firm size effect and is measured by the natural logarithm of sales revenue. Larger firms may have economies of scale and may have access to more resources for tax planning. Also, as larger firms may have wider ranges of global activities, they have more opportunities to shift profit to other low-tax jurisdictions. *CapInt*, measured by the sum of tangible fixed assets and intangible fixed assets[64] divided by total assets, is only included in equations (5) and (6) in the case of intra-group debt financing/interest expense loading to control for the need for capital to fund long-term productive assets (capital intensity).

6. Results and Discussion

6.1 Descriptive statistics

Table 3 shows the distribution of observations by industry.

[Insert Table 3 here]

In the full sample before matching, the largest proportion of observations comes from

[64] Goodwill is excluded from intangible fixed assets.

Manufacturing (industry group 3), while the smallest comes from Education and Training (industry group 16). There are no observations in industry group 11 (Financial and Insurance Services) because we exclude all the financial and insurance companies from the final sample. No DOLAC observations falls in Public Administration and Safety (industry group 15), so observations in industry group 15 (Public Administration and Safety) are automatically dropped in the PSM and CEM matching process.

Table 4 shows the distribution of observations by year in the full sample before matching.

[Insert Table 4 here]

According to Table 4, the number of FOAC observations is greater than that of DOLAC observations across all 14 years because only DOLACs with size comparable to FOACs are included in the IBISWorld lists of top 2,000 Australian companies and hence included in the sample. The largest proportion of observations comes from 2014, because the sample is based on the IBISWorld 2012 and 2016 lists of top 2,000. The smallest proportion of observations comes from 2020, because (a) there have been natural attritions over time and (b) some firms had not released their financial reports at the time when we collected the 2020 financial data in April 2021.

The distributions of observations by industry and by year vary depending on the dependent variable of each regression model (i.e. *GrosProfR*, *EBITR*, …, *TaxExpR*) and whether any matching method is used (i.e. unmatched, PSM, CEM). Due to space limitations, the details of industry and year distributions of different subsamples are omitted here.

Table 5 reports the descriptive statistics of different subsamples.

[Insert Table 5 here]

Panel A of table 5 shows the descriptive statistics of subsamples before matching. Panels B to D report the descriptive statistics of subsamples after different matching specifications. Overall, the number of observations in every subsample is reduced significantly after the matching. For example, there are 6,111 observations in the full (unmatched) gross profit ratio subsample. However, the number of observations drops

to 1,930 after PSM,[65] 5,282 after CEM (weighted) and 3,144 after CEM (k-to-k). Such sample attrition is inevitable because significant size and industry distribution differences exist between FOACs and DOLACs in the sample before matching.

Across all four panels, the mean gross profit ratio and mean EBIT ratio of FOACs appear to be lower than those of DOLACs consistent with FOACs' profit shifting by transfer pricing. FOACs also appear to have higher mean net financial expense ratio than DOLACs, consistent with FOACs' profit shifting by interest expense loading. However, the mean leverage ratios of FOACs can be either higher or lower than those of DOLACs. The lack of consistency between the FOAC-DOLAC differences in net financial expense ratio and the leverage ratios suggests possible higher interest rates being charged on the debts of FOACs relative to DOLACs (i.e. a transfer pricing issue), without loading more debts on FOACs (i.e. not a thin capitalisation issue). Overall, the mean profit before tax ratio and the mean tax expense ratio of FOACs are lower than those of DOLACs, consistent with profit shifting by FOACs. The above are some general observations without taking into account any control variables and without any tests of significance. The results of the regression models after controlling for firm size, industry, capital intensity (where applicable) and period (pre- and post-BEPS) are reported below with significance tests.

6.2 Regression results

Table 6 summarises the regression results of the pooled OLS model without matching and the models with different matching specifications (i.e. PSM, CEM (weighted) and CEM (k-to-k)). The full regression results can be found in Appendix 4.

[Insert Table 6 here]

6.2.1 Evidence about cross-border profit shifting in the study period

As explained in the research design, the regression coefficients of *FOAC* (β_1) capture the differences in the relevant financial ratios of FOACs relative to DOLACs in the study period, especially the pre-BEPS period. For the post-BEPS period, the regression

[65] In propensity score matching, the caliper (the difference in propensity scores between a FOAC and a matched DOLAC) has to be reduced progressively until there is no significant difference in firm size between the group of FOACs and the group of matched DOLACs, and the industry and year distributions of the two groups are also not significantly different.

coefficients (β_3) of the interaction term, *FOAC*×*PostBEPS*, which capture the change in the behaviours, if any, of FOACs in the post-BEPS period relative to the pre-BEPS period, must also be taken into account. In sum, β_1 is the key coefficient to test the presence of profit shifting in the study period, especially the pre-BEPS period, and β_3 is the key coefficient to test the effectiveness of the relevant BEPS countermeasures.

Evidence of tax-motivated transfer pricing

The results of the ordinary least squares (OLS) regression model without any matching are consistent with those of the matching models, so the following discussion focuses on the results of the regression models with different matching specifications. In general, the negative and statistically significant regression coefficients of *FOAC* across the matching models using *GrosProfR* and *EBITR* as dependent variables suggest that FOACs have used intra-group transfer pricing to shift profits out of Australia in the study period, especially pre-BEPS period, which supports hypotheses 1a and 1b.

For the matching models with *GrosProfR* as the dependent variable, the regression coefficient of *FOAC* in the PSM model is -0.05294 ($p < 0.01$). The regression coefficients of *FOAC* in the CEM (weighted) model and the CEM (k-to-k) model are respectively -0.05133 and -0.048933 (both $p < 0.01$). These coefficients indicate that FOACs have *GrosProfR* about 0.05 lower than comparable DOLACs do, after controlling for firm size and industry affiliation. In other words, for every dollar of sales revenue, FOACs' gross profit is about 5 cents lower than that of DOLACs, either by selling goods and services to related parties overseas at a depressed transfer price or by purchasing goods and services from related parties overseas at an inflated transfer price in the study period, especially the pre-BEPS period.[66]

The regression coefficients of *FOAC* can be used to estimate the size of profit shifting and even the Australian income tax saved by FOACs. For instance, the regression coefficient of *FOAC* is -0.05294 in the PSM model. As the average sales revenue of FOACs in the PSM sample is AUD805,000,000,[67] the average gross profit shifted out

[66] As explained earlier, for the pre-BEPS period, only the coefficient of *FOAC* is relevant to detecting profit shifting by FOACs. For the post-BEPS period, in addition to the coefficient of *FOAC*, the coefficient of the interaction term, *FOAC*×*PostBEPS*, which captures the changes in profit shifting by FOACs, if any, from the pre-BEPS period to the post-BEPS period, should also be taken into account.

[67] Appendix 5 includes a table that reports the mean values of sales revenue (i.e. operating revenue) in models with different matching specifications and different dependent variables.

of Australia by each FOAC using suppressed sale price or inflated purchase price is AUD42,616,700 (AUD805,000,000 × 0.05294) per year using a matched DOLAC as a benchmark or counterfactual. Similar estimation can also be made by using the regression coefficients of *FOAC* in the CEM (weighted) model and the CEM (k-to-k) model.

For the matching models using *EBITR* as dependent variable, the regression coefficient of *FOAC* in the PSM model is -0.04091 ($p < 0.01$), which indicates that on average the *EBITR* of FOACs is about 0.04 lower than that of the matched DOLACs, after controlling for firm size and industry affiliation. The regression coefficients of *FOAC* in the CEM (weighted) model and the CEM (k-to-k) model are -0.02549 ($p < 0.05$) and -0.02943 ($p < 0.01$), respectively, indicating that FOACs have *EBITR* about 0.03 lower than comparable DOLACs do, after controlling for firm size and industry affiliation.

The regression coefficients of *FOAC* in all matching models using *EBITR* as the dependent variable are lower than the regression coefficients in matching models using *GrosProfR* as the dependent variable. Taking the PSM model as an example, the regression coefficient of *GrosProfR* is -0.05294 (due to transfer mispricing in sales and purchases), while *EBITR*'s regression coefficient is -0.04091 (due to transfer mispricing in sales and purchases, plus other expenses). As absolute value of the regression coefficient of *FOAC* decreases from the *GrosProfR* model to the *EBITR* model after the inclusion of transfer pricing related to other expenses, it appears that FOACs mainly use suppressed sale price and/or inflated purchase price to shift profit, rather than using expenses such as royalty and management fees to shift profit in the study period, especially the pre-BEPS period.

Evidence of tax-motivated debt financing and interest expense loading

Empirical results related to tax-induced debt financing and interest expense loading are mixed. Among the matching models using *NFinExpR* as the dependent variable, only the regression coefficient of *FOAC* after the CEM (k-to-k) supports hypothesis 1c and thus provides evidence about the use of tax-induced intra-group interest expense loading. For this model, the regression coefficient of *FOAC* is 0.00906 ($p < 0.05$), which indicates that *NFinExpR* of FOACs is about 0.01 higher than that of matched DOLAC, after controlling for firm size, industry affiliation and capital intensity. In other words,

in comparison with comparable DOLACs, on average FOACs might incur a higher net interest expense of nearly one cent per dollar of sales revenue in order to claim more tax deductions.

Among the matching models using the four different versions of leverage ratio (*Lev1*, *Lev2*, *Lev3* and *Lev4*) as the dependent variables, only the regression coefficients of *FOAC* across the models with *Lev4* (total liabilities divided by total assets) as the dependent variable are positive and statistically significant at 0.01 level. Specifically, the regression coefficients of *FOAC* are 0.09911 after PSM, 0.08878 after CEM (weighted), and 0.10317 after CEM (k-to-k). On average, FOACs have *Lev4* about 0.1 higher than the matched DOLACs do, after controlling for firm size, industry affiliation and capital intensity. Although this result indicates that FOACs may have larger total liabilities to total assets ratio than DOLACs do, we cannot conclude that FOACs utilise intra-group debt financing to shift profit out of Australia because some liabilities, such as accounts payable and deferred tax liability, are not interest-bearing. In fact, judging from the regression coefficients of *FOAC* in matching models using *Lev1* to *Lev3* as dependent variables, FOACs are more likely to have similar, if not lower, level of interest-bearing debts (current and non-current) compared to the matched DOLACs.

Based on the regression results of the matching models with *NFinExpR* and *Lev1* to *Lev4* as dependent variables, it is likely that compared to matched DOLACs, FOACs may pay more interest expenses and claim more tax deductions by bearing inflated interest rates attached to the related-party debts, but have a similar level of total debts. The findings in this study are consistent with those of Li and Tran (2020), who also find that compared with matched listed Australian company, foreign-owned Australian companies have higher interest expense to sales revenue ratio but similar leverage ratio for the year 2012.

Evidence of overall effects of cross-border profit shifting arrangements

The negative and statistically significant coefficients of *FOAC* across matching models using *ProfBTaxR* and *TaxExpR* as dependent variable suggest that cross-border profit shifting schemes using transfer pricing and/or interest expense loading by FOACs could reduce profits reported in Australia and hence Australian tax expense, which support hypotheses 1e and 1f.

In the matching models using *ProfBTaxR* as the dependent variable, the regression coefficients of *FOAC* are -0.03253 ($p < 0.01$) after PSM, -0.02185 ($p < 0.05$) after CEM (weighted) and -0.02729 ($p < 0.01$) after CEM (k-to-k). This suggest that, for example, after the PSM, FOACs have *ProfBTaxR* around 0.03 lower than matched DOLACs do, after controlling for firm size and industry affiliation. In other words, for every dollar of sales revenue, the profit before tax reported by FOACs is approximately 3 cents lower than that reported by comparable DOLACs in the study period, especially the pre-BEPS period.

Using these regression coefficients, we could also estimate the size of tax-motivated profit shifting. For instance, the regression coefficient of *FOAC* is -0.03253 in the PSM model. As the average sales revenue of FOACs in the PSM sample is AUD953,000,000, the average profit before tax shifted out of Australia by each FOAC using different channels is AUD31,001,090 (AUD953,000,000 × 0.03253) per year using a matched DOLAC as a benchmark.

We would like to point out that the absolute values of the regression coefficients of *FOAC* in all the matching models using *EBITR* and *ProfBTaxR* as dependent variables are lower than those in matching models using *GrosProfR* as dependent variable. Taking the PSM model as an example, *GrosProfR*'s coefficient is -0.05294, which captures transfer mispricing in sales and purchases). *EBITR*'s coefficient which captures transfer mispricing in sales and purchases, plus expenses is -0.044091. *ProfBTaxR*'s coefficient, which captures the overall effect of transfer mispricing in sales and purchases, plus expenses, plus interest expense loading, is -0.03253. The fact that the absolute values of the regression coefficients are smaller and smaller when more and more channels are included suggests that FOACs mainly use suppressed sale price and/or inflated purchase price to shift profit, rather than using expenses such as royalty, management fees, and interest expense loading to shift profit. This is true for all models.

In matching models using *TaxExpR* as the dependent variable, the regression coefficients of *FOAC* are -0.00707 ($p < 0.05$) in the PSM model, -0.00742 ($p < 0.01$) in the CEM (weighted) model and -0.00813 ($p < 0.01$) in the CEM (k-to-k) model. These indicate that FOACs have *TaxExpR* nearly 0.01 lower than matched DOLACs do, after controlling for firm size and industry affiliation. In other words, for every

dollar of sales revenue, income tax expense incurred by FOACs in Australia is nearly one cent lower than that incurred by comparable DOLACs in the study period.

6.2.2 Evidence about the effectiveness of Australian BEPS countermeasures

The regression coefficients of *FOAC* × *PostBEPS* that capture the differences in *GrosProfR* and in *EBITR* of FOACs in the post-BEPS period relative to the pre-BEPS period are not significantly different from zero, indicating that profit shifting by FOACs via intra-group transfer pricing did not change significantly in the post-BEPS period after the introduction of the related Australian BEPS countermeasures. The sum of the regression coefficients of *FOAC* and *FOAC*×*PostBEPS* which captures the difference in *GrosProfR* (*EBITR*) of FOACs relative to DOLACs in the post-BEPS period remains to be -0.05294 (-0.04091) after PSM, -0.05133 (-0.02549) after CEM (weighted) and -0.04893 (-0.02943) after CEM (k-to-k) because the regression coefficients of *FOAC*×*PostBEPS* are not significantly different from zero.

The regression coefficients of *FOAC* × *PostBEPS*, which capture the difference in *NFinExpR* and different versions of leverage ratios of FOACs in the post-BEPS period relative to the pre-BEPS period, also are not significantly different from zero in most matching models. This implies that FOACs might still make use of interest expense loading to avoid Australian income tax in the post-BEPS period. Such results are consistent with the possibility of charging a high interest rate without loading additional debts.

The regression coefficients of *FOAC* × *PostBEPS* that capture the difference in *ProfBTaxR* and *TaxExpR* of FOACs in the post-BEPS period relative to the pre-BEPS period also are not significantly different from zero, indicating that FOACs are still able to shift profits out of Australia by transfer pricing and/or interest expense loading and thus reduce their Australian tax expense in the post-BEPS period after the introduction of the related Australian BEPS countermeasures. The sum of the regression coefficients of *FOAC* and *FOAC*×*PostBEPS* which captures the difference in *ProfBTaxR* (*TaxExpR*) of FOACs relative to DOLACs in the post-BEPS period and remain to be -0.03253 (-0.00707) after PSM, -0.02185 (-0.00742) after CEM (weighted) and -0.02729 (-0.00813) after CEM (k-to-k) because the regression coefficients of *FOAC*×*PostBEPS* are not significantly different from zero.

6.3 Additional test

We are aware of the possibility that the effectiveness of BEPS countermeasures cannot be captured by a single post-BEPS indicator (*PostBEPS*) because these BEPS countermeasures were introduced at different points in time in the post-BEPS period. Also, even though they 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. In other words, there may be law enforcement or administrative time lags.

As an additional test to find out whether the relevant BEPS countermeasures are effective in more recent years, we replace the post-BEPS indicator (*PostBEPS*) with a set of year indicators (*Year2013*, *Year2014*, *Year2015*, *Year2016*, *Year2017*, *Year2018*, *Year2019* and *Year2020*) for the post-BEPS period. According to results of the main test, the regression coefficients of *FOAC* in all models using *Lev1*, *Lev2* and *Lev3* as dependent variable do not support the hypothesis 1c. Therefore, Table 7 only reports the regression results of models using *GrosProfR*, *EBITR*, *NFinExpR*, *Lev4*, *ProfBTaxR* and *TaxExpR* in this additional test. Panel A of Table 7 reports the regression results of the additional test without any matching. Panels B to D report the regression results of the additional test after PSM, CEM (k-to-k) and CEM (weighted), respectively. The regression coefficients of industry group are reported in Appendix 6.

[Insert Table 7 here]

In general, the signs, magnitudes and significance levels of the regression coefficients of *FOAC* in matching models using different financial ratios as dependent variables are similar to those reported in the main test.

As for the interaction terms between *FOAC* and the year indicators for the post-BEPS period (*FOAC×Year2013*, *FOAC×Year2014*, etc.), most regression coefficients of these interaction terms are not significantly different from zero at the 0.05 level across different matching models.[68] This indicates that cross-border profit shifting via intra-

[68] Although several regression coefficients of the interactions between FOAC and the year indicators are statistically significant at 0.05 level, their signs may not be correct and do not signal any systematic reduction in cross-border profit shifting by FOACs via different channels over time. As Table 7 reports the results of a large number of significance tests, some significant results may have simply occurred by chance.

group transfer pricing and interest expense loading has not decreased systematically across the years throughout the post-BEPS period (i.e. 2013-2020).

6.4 Further test

As explained before, the difference-in-differences setting in the main test (and the additional test) relies on two differences: one difference is the difference in the outcome variables (financial ratios) between FOACs and DOLACs after matching. DOLACs are treated as a benchmark or a counterfactual that mimics a situation without profit shifting. The other difference is the difference between the pre-BEPS period and the post-BEPS period, i.e., before and after the implementation of relevant Australian BEPS countermeasures.

In this further test, we use an alternative difference-in-differences setting. The first difference is the difference in the average financial ratio between the pre-BEPS and post-BEPS periods for each firm. Specifically, for a FOAC or a DOLAC, we first calculate the average value of five outcome variables (*GrosProfR*, *EBITR*, *NFinExpR*, *ProfBTaxR* and *TaxExpR*)[69] for the pre-BEPS period and the post-BEPS period respectively. We then take the first difference being the average ratio for the post-BEPS period minus the average ratio for the pre-BEPS period. This first difference enables us to eliminate time-invariant unobserved firm characteristics which may confound the results.

Even after those time-invariant unobserved firm characteristics have been eliminated, there might still be time-varying unobserved confounders affecting the outcome variables (e.g. events happened in the study period other than the implementation of Australian BEPS countermeasures) that need to be eliminated. Therefore, we incorporate the second difference, which is the difference between FOACs and DOLACs (as the control group). PSM is also adopted in this second difference to match a FOAC with a comparable DOLAC, and the matching variables are same as those used in the main test. The second difference enables us to eliminate time-varying confounders because DOLACs are subject to the same time-varying confounders as

[69] Given that there is limited evidence to support the use of intra-group debt financing by FOACs to shift profit out of Australia, outcome variable *Lev1*, *Lev2*, *Lev3* and *Lev4* are not used in this additional test.

FOACs.

Table 8 reports the results of this further test. Note that only z-tests are used to compare FOACs and PSM-matched DOLACs in this further test. The second column of Table 8 shows the difference in the pre-BEPS average ratios between FOACs and matched DOLACs after PSM, while the third column shows the difference in the post-BEPS average ratios between the two groups. The last column of Table 8 shows the difference-in-differences, i.e., the comparison between FOACs and matched DOLACs in term of the change in average ratios from the pre-BEPS period to the post-BEPS period.

[Insert Table 8 here]

According to Table 8, in the pre-BEPS period, the average *GrosProfR* of FOACs is about 0.06 ($p < 0.01$) lower than that of matched DOLACs, and this difference remains at about 0.06 ($p < 0.01$) in the post-BEPS period. The average change in *GrosProfR* from the pre-BEPS period to the post-BEPS period of FOACs is 0.00011 less than that of matched DOLACs, but this gap is not significantly different from zero. This insignificant difference-in-differences indicates that the BEPS countermeasures targeting transfer pricing have not been effective in reducing the profit shifting of FOACs, consistent with the findings of the main test.

FOACs have average *EBITR* about 0.03 ($p < 0.01$) lower than that of matched DOLACs both in the pre-BEPS period and in the post-BEPS period. The average change in *EBITR* from the pre-BEPS period to the post-BEPS period of FOACs is 0.0027 more than that of matched DOLACs, but this gap is again not significantly different from zero, supporting the findings in the main test that the BEPS countermeasures targeting transfer pricing are not effective.

The average *NFinExpR* of FOACs is about 0.01 ($p < 0.01$) higher than that of matched DOLACs in the pre-BEPS period, and this difference remains at around 0.01 ($p < 0.05$) in the post-BEPS period. The average change in *NFinExpR* from the pre-BEPS period to the post-BEPS period of FOACs is 0.0033 less than that of matched DOLACs. However, this gap is also not significantly different from zero. This insignificant difference-in-differences indicates that the BEPS countermeasures targeting interest expense loading have not been effective in reducing the profit shifting of FOACs,

consistent with the findings of the main test.

FOACs' average *ProfBTaxR* is about 0.027 ($p < 0.01$) lower than that of matched DOLAC in the pre-BEPS period, and is about 0.023 ($p < 0.05$) lower than that of matched DOLACs in the post-BEPS period. The average change in *ProfBTaxR* from the pre-BEPS period to the post-BEPS period of FOACs is 0.0004 more than that of matched DOLACs but this gap is not significantly different from zero.

The average *TaxExpR* of FOACs is about 0.007 ($p < 0.01$) lower than that of matched DOLACs in the pre-BEPS period, but the difference becomes insignificant in the post-BEPS period. However, we cannot conclude that the relevant Australian BEPS countermeasures are effective in increasing FOACs' tax expense ratio because the pre-BEPS vs post-BEPS changes in average *TaxExpR* between FOACs and matched DOLACs are not significantly different from zero.

Overall, the results of this further test are consistent with the findings reported in the main test and the additional test, suggesting that the relevant BEPS countermeasures are not effective in reducing profit shifting by transfer pricing and interest expenses loading by FOACs. Although the alternative difference-in-differences setting of this further test is theoretically superior to the original difference-in-differences setting of the regression models in the main test because the former eliminates time-invariant firm heterogeneity as well as time-varying unobserved confounders, we prefer to report the regression models as the main test because the regression models measure the extent of profit shifting by FOACs as well as assessing the effectiveness of BEPS countermeasures. The breaking down of the post-BEPS indicator into the year indicators in the regression models further allow us to track the impact of the relevant BEPS countermeasures on cross-border profit shifting year by year in the additional test.

6.5 Discussion of the findings

In sum, although we find evidence that supports the presence of cross-border profit shifting by FOACs using transfer pricing and/or interest expense loading in the study period, especially by suppression of selling prices and/or inflation of purchase costs in related party transactions, we cannot find any evidence that supports hypotheses 2a to

2f and hence indicates that the current Australian BEPS countermeasures that tighten the transfer pricing rules and thin capitalisation rules are effective in reducing the cross-border profit shifting activities of FOACs. The empirical results reported above are robust because the results are quite consistent across models that use different matching techniques and even after breaking down the post-BEPS period by years.

The lack of effectiveness of the BEPS countermeasures targeting transfer pricing and thin capitalisation might be explained by the fact that the arm's length principle underlying the transfer pricing rules may be difficult to apply in situations where a comparable independent party is not available, and the tightened debt-to-equity ratios may not be effective because alternative financing arrangements such as leasing and licencing exist, and inflated interest rates can also be charged on related party debts. Another possible explanation might be law enforcement time lags, because the ATO may spend years to conduct tax audits, raise amended assessments and go through the lengthy tax dispute resolution process before the effect of these BEPS countermeasures can be reflected in the financial reports of FOACs.

Even though the Australian BEPS countermeasures related to transfer pricing and thin capitalisation may not be effective up to 2020, other BEPS countermeasures such as the MAAL and the DPT may be effective in reducing profit shifting, but these other measures are not assessed in this study. For example, after the MAAL, several MNE groups (e.g. Google and Microsoft) have announced intentions to restructure their Australian business and transit their Australian subsidiaries from marketing and distribution agents to local resellers/wholesalers, devolving responsibility for entering into contracts with customers into the Australian subsidiaries. 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, 2019b). The DPT is another main tool to tackle BEPS. It 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. It ensures 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.

7. Conclusion

To address the cross-border profit shifting issues, the OECD launched the BEPS Project in 2013. The Australian Parliament has been making changes to Australian tax law in order to implement the recommendations of the OECD/G20 BEPS Project and has also adopted additional unilateral measures to tackle cross-border profit shifting.

Even though some studies have discussed the strengthens and the weaknesses of the BEPS Project from the perspectives of the legislative and regulatory systems, the actual effect of the BEPS countermeasures remains to be quantified by empirical studies (OECD, 2015b). Therefore, we conducted an empirical study to investigate whether FOACs shift profit out of Australia and whether the Australian BEPS countermeasures are effective in reducing the extent of cross-border profit shifting, focusing on two main profit-shifting channels: tax-motivated intra-group transfer pricing and debt financing/interest expense loading.

By constructing several financial ratios as outcome variables and adopting two matching techniques, namely propensity score matching and coarsened exact matching, we document the existence of cross-border profit shifting by FOACs via these two channels throughout the entire 14-year study period: for every dollar of sales revenue earned, FOACs report less profits before tax in Australia and thus incur less Australian tax expense than comparable DOLACs do due to their profit shifting arrangements.

Specifically, throughout the entire 14-year study period, FOACs' gross profit is about 5 cents per dollar of sales lower than that of comparable DOLACs after controlling for firm size and industry affiliation. FOACs' operating profit (earnings before interest and tax) is about 4 cents per dollar of sales lower than that of matched DOLACs after propensity score matching, and about 3 cents per dollar of sales lower than that of matched DOLACs after coarsened exact matching. These results signal the use of tax-motivated intra-group transfer pricing by foreign MNEs, especially the mispricing of related party sales and purchases of FOACs, to shift profit out of Australia.

As to tax-motivated debt financing/interest expense loading, we find that the net financial expense of FOACs is about 1 cent per dollar of sales higher than that of the

matched DOLACs after coarsened exact (k-to-k) matching and after controlling for firm size, industry affiliation and capital intensity. This indicates that FOACs might be charged inflated interest rates on intra-group debts. However, the leverage ratios of FOACs (except *Lev4*) are not higher than those of their matched DOLACs, which implies that FOACs do not have a higher level of interest-bearing debts than comparable DOLACs. Similar to the findings of Egger, et al. (2010) in the context of Europe, we find that profit shifting by related-party debt is likely to be an unimportant channel in Australia. Instead, tax-motivated intra-group transfer pricing is the dominant profit shifting channel in Australia.[70]

We cannot find any evidence to support the hypotheses that the relevant Australian BEPS countermeasures are effective in reducing cross-border profit shifting by FOACs through the two channels discussed above, possibly because of the limitations of the current transfer pricing rules and thin capitalisation rules.

However, it is premature for us to conclude that the BEPS countermeasures adopted by the Australian Parliament are not effective because, first, we only evaluate the effectiveness of Australian BEPS countermeasures related to the transfer pricing rules and thin capitalisation rules. Other BEPS countermeasures, such as the MAAL and the DPT, might be effective in reducing profit shifting activities, but their effectiveness is not assessed in this study. Second, there can be law enforcement time lags that delay the effects of BEPS countermeasures to be reflected in the financial reports of FOACs. According to the ATO (2019b), many tax audit cases and disputes involving BEPS countermeasures are still in progress, 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.

This study is significant in the following aspects. First, we demonstrate an identification strategy to measure the extent of cross-border profit shifting based on publicly available accounting and tax data. Specifically, DOLACs are used as a benchmark or control group that mimics a situation without profit shifting. Second, we investigate the profit shifting activities of foreign MNEs in the Australian context. Most prior studies focus on the profit shifting activities of MNEs in the US and the EU (e.g. Clausing, 2003;

[70] Note that charging an artificially high interest rate is also a transfer pricing issue.

Mills and Newberry, 2004; Buettner and Wamser, 2013; Vicard, 2015). Little research has been done in Australia to quantify the scope or the effect of BEPS. Third, we use empirical methods to assess the effectiveness of current Australian BEPS countermeasures to tackle cross-border profit shifting by transfer pricing and debt financing/interest expense loading. Applying empirical methods allows the study to assess the effectiveness of BEPS countermeasures based on objective empirical evidence instead of subjective judgements and opinions. In addition, assessing whether the BEPS countermeasures are effective in the Australian context may help policy-makers to fine-tune the measures to tackle international tax avoidance.

However, this study has several limitations. First, although we make our best efforts to construct relevant financial ratios to capture different profit shifting channels, these ratios are not perfect proxies. For example, we acknowledge that financial ratios scaled by sales revenue might be biased, given the possibility that FOACs could manipulate sales revenue by suppressing sale prices. Also, MAAL and DPT introduced in the later years of the study period may have caused restructures of some FOACs and have changed some of the accounting numbers that we use to compute the outcome variables in our study.

Second, the number of observations in the matched samples, especially the PSM samples, are relatively small compared to the full sample. However, the sample attrition is inevitable in order to achieve a fair comparison, as significant size and industry distribution differences exist between FOACs and DOLACs before matching.

With these results and limitations in mind, some future research directions are suggested. First, due to the possible law enforcement time lags, if resources permit, the study period and sample size can be extended in future studies.

Second, in this study we only focus on two main channels used by MNEs to shift profits out of Australia, namely tax-induced intra-group transfer pricing and debt financing/interest expense loading. However, MNEs actually can use other channels or schemes to avoid corporate income tax in high-tax countries such as hybrid mismatch and the utilisation of tax treaties. Therefore, future studies can develop identification strategies that construct proxies to detect cross-border profit shifting through channels other than intra-group transfer pricing and debt financing/interest expense loading.

Third, this study only evaluates the effectiveness of the relevant BEPS countermeasures implemented by the Australian Parliament to reduce MNEs' profit shifting out of Australia. Future studies can investigate countries other than Australia and empirically evaluate the effectiveness of the BEPS countermeasures implemented by other countries.

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Table 1
Sample Selection

Panel A: FOACs sample selection	**Number of observations**
FOAC observations based on 2012 and 2016 IBISWorld lists of top 2,000 Australian companies	5,307
Less: observations determined to be not foreign-owned or to be dormant	(380)
Less: observations in financial and insurance industry	(90)
Less: observations in public utility industry	(48)
Less: observations with operating revenue smaller than 0	(0)
Less: observations with operating revenue equal to 0	(22)
Final sample of FOAC observations	**4,767**
Number of FOACs	**381**
Panel B: DOLACs sample selection	
DOLACs observations based on 2012 and 2016 IBISWorld lists of top 2,000 Australian companies	4,135
Less: observations determined to be not listed companies	(203)
Less: observations with foreign ownership greater than 20%	(326)
Less: observations in financial and insurance industry	(41)
Less: observations in public utility industry	(41)
Less: observations with operating revenue smaller than 0	(1)
Less: observations with operating revenue equal to 0	(68)
Final sample of DOLAC observations	**3,455**
Number of DOLACs	**325**

Table 2
Variable Definitions

Variable	Definition
Dependent variables	
GrosProfR	Gross profit ratio, measured by gross profit divided by operating revenue;
EBITR	Operating profit ratio, measured by earnings before interest and tax (EBIT) divided by operating revenue;
NFinExpR	Net interest expense ratio, measured by interest expense minus interest revenue then divided by operating revenue;
Lev1	Leverage ratio 1, measured by non-current debts divided by total assets;
Lev2	Leverage ratio 2, measured by the sum of non-current debts and current loans divided by total asset;
Lev3	Leverage ratio 3, measured by non-current liabilities divided by total assets;
Lev4	Leverage ratio 4, measured by total liabilities divided by total asset;
ProfBTaxR	Profit before tax ratio, measured by profit before tax divided by operating revenue;
TaxExpR	Tax expense ratio, measured by tax expense divided by operating revenue;
Main test variables	
FOAC	FOAC indicator, taking value of "1" if the company is a FOAC, and "0" otherwise;
PostBEPS	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);
FOAC×PostBEPS	Interaction term between *FOAC* and *PostBEPS*;
Other variables	
Size	Firm size, measured by the natural logarithm of sales revenue, used as a matching criterion or to control for firm size effect;
Year	Year indicator variables taking the value of "1" for the correct year, and "0" otherwise, used as a matching criterion or to capture the yearly effect when the post-BEPS period is broken down into years;
Ind	Industry indicator variables taking the value of "1" for the correct industry, and "0" otherwise, used as a matching criterion or to control for industry effect;
CapInt	Capital intensity, measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets, used as a matching criterion or to control for the impact of the intensity of long-term productive assets on the need for debt capital.

Table 3
Distribution of Observations by Industry Group

Industry Group (Title)	FOAC Obs	DOLAC Obs	Total
1 (Agriculture, Forestry and Fishing)	48	60	108
2 (Mining)	538	376	914
3 (Manufacturing)	1,317	897	2,214
4 (Electricity, Gas, Water and Waste Service)	21	11	32
5 (Construction)	186	279	465
6 (Wholesale Trade)	921	297	1,218
7 (Retail Trade)	328	239	567
8 (Accommodation and Food Services)	62	37	99
9 (Transport, Postal and Warehousing)	136	118	254
10 (Information Media and Telecommunications)	269	324	593
11 (Financial and Insurance Services)	0	0	0
12 (Rental, Hiring and Real Estate Services)	111	102	213
13 (Professional, Scientific and Technical Services)	550	473	1,023
14 (Administrative and Support Services)	126	105	231
15 (Public Administration and Safety)	38	0	38
16 (Education and Training)	9	12	21
17 (Health Care and Social Assistance)	14	70	84
18 (Arts and Recreation Services)	42	36	78
19 (Other Services)	51	19	70
Total	4,767	3,455	8,222

This table reports the distribution of FOAC and DOLAC observations by industry. There are no observations in industry group 11 (Financial and Insurance Services) because all the financial and insurance companies are excluded from the final sample.

Table 4
Distribution of Observations by Year

	Year	FOAC Observations	DOLAC Observations	Total
Pre-BEPS period	2007	298	250	548
	2008	303	259	562
	2009	325	264	589
	2010	341	273	614
	2011	348	283	631
	2012	361	291	652
Post-BESP period	2013	362	291	653
	2014	367	287	654
	2015	367	275	642
	2016	364	246	610
	2017	356	210	566
	2018	341	188	529
	2019	333	174	507
	2020	301	164	465
Total		4,767	3,455	8,222

Table 5
Descriptive Statistics

Panel A: Descriptive statistics –unmatched sample

Sub-samples	Variables	All observations Mean (Std.Dev.)	FOACs Mean (Std.Dev.)	DOLACs Mean (Std.Dev.)
Gross profit ratio subsample	*GrosProfR*	0.350	0.336	0.373
		(0.200)	(0.202)	(0.194)
	Size	19.562	19.668	19.392
		(1.510)	(1.250)	(1.843)
	No. of Obs	6,111	3,772	2,339
Operating profit ratio subsample	*EBITR*	0.114	0.096	0.138
		(0.121)	(0.115)	(0.124)
	Size	19.664	19.690	19.627
		(1.422)	(1.197)	(1.686)
	No. of Obs	6,553	3,825	2,728
Net finance expense ratio subsample	*NFinExpR*	0.026	0.028	0.023
		(0.053)	(0.063)	(0.040)
	Size	19.687	19.763	19.612
		(1.536)	(1.225)	(1.790)
	CapInt	0.309	0.277	0.340
		(0.230)	(0.229)	(0.227)
	No. of Obs	5,520	2,756	2,764
Leverage ratio 1 subsample	*Lev1*	0.120	0.105	0.139
		(0.162)	(0.176)	(0.139)
	Size	19.506	19.611	19.362
		(1.569)	(1.310)	(1.857)
	CapInt	0.261	0.217	0.323
		(0.225)	(0.215)	(0.225)
	No. of Obs	8,185	4,733	3,452
Leverage ratio 2 subsample	*Lev2*	0.190	0.189	0.191
		(0.194)	(0.217)	(0.157)
	Size	19.510	19.615	19.366
		(1.564)	(1.300)	(1.856)
	CapInt	0.262	0.217	0.323
		(0.225)	(0.215)	(0.225)
	No. of Obs	8,153	4,709	3,444
Leverage ratio 3 subsample	*Lev3*	0.169	0.155	0.188
		(0.176)	(0.192)	(0.149)
	Size	19.507	19.612	19.363
		(1.567)	(1.307)	(1.856)
	CapInt	0.261	0.216	0.323
		(0.225)	(0.214)	(0.225)
	No. of Obs	8,167	4,717	3,450
Leverage ratio 4 subsample	*Lev4*	0.528	0.578	0.462
		(0.208)	(0.219)	(0.172)
	Size	19.536	19.649	19.387
		(1.542)	(1.253)	(1.844)
	CapInt	0.262	0.214	0.324
		(0.225)	(0.213)	(0.224)
	No. of Obs	7,889	4,480	3,409
Profit before tax ratio subsample	*ProfBTaxR*	0.109	0.094	0.130
		(0.120)	(0.114)	(0.125)
	Size	19.666	19.684	19.641
		(1.413)	(1.192)	(1.672)
	No. of Obs	6,353	3,691	2,662
Tax expense ratio subsample	*TaxExpR*	0.030	0.028	0.034
		(0.042)	(0.045)	(0.038)
	Size	19.569	19.649	19.460
		(1.544)	(1.277)	(1.843)
	No. of Obs	6,812	3,935	2,877

Panel B: Descriptive statistics – PSM sample				
Sub-samples	**Variables**	**All observations Mean (Std.Dev.)**	**FOACs Mean (Std.Dev.)**	**DOLACs Mean (Std.Dev.))**
Gross profit ratio subsample	*GrosProfR*	0.360	0.334	0.386
		(0.197)	(0.196)	(0.195)
	Size	19.298	19.292	19.302
		(1.398)	(1.112)	(1.636)
	No. of Obs	1,930	965	965
Operating profit ratio subsample	*EBITR*	0.117	0.093	0.141
		(0.121)	(0.110)	(0.127)
	Size	19.605	19.579	19.632
		(1.289)	(1.026)	(1.507)
	No. of Obs	2,486	1,243	1,243
Net finance expense ratio subsample	*NFinExpR*	0.025	0.028	0.021
		(0.050)	(0.058)	(0.041)
	Size	19.802	19.772	19.832
		(1.528)	(1.175)	(1.814)
	CapInt	0.304	0.310	0.297
		(0.208)	(0.219)	(0.196)
	No. of Obs	2,714	1,357	1,357
Leverage ratio 1 subsample	*Lev1*	0.126	0.121	0.131
		(0.163)	(0.188)	(0.135)
	Size	19.475	19.479	19.470
		(1.589)	(1.340)	(1.803)
	CapInt	0.281	0.282	0.279
		(0.204)	(0.213)	(0.195)
	No. of Obs	3,860	1,930	1,930
Leverage ratio 2 subsample	*Lev2*	0.195	0.204	0.185
		(0.191)	(0.223)	(0.153)
	Size	19.481	19.495	19.467
		(1.630)	(1.377)	(1.850)
	CapInt	0.285	0.280	0.290
		(0.203)	(0.210)	(0.195)
	No. of Obs	4,334	2,167	2,167
Leverage ratio 3 subsample	*Lev3*	0.170	0.171	0.170
		(0.174)	(0.201)	(0.142)
	Size	19.462	19.468	19.456
		(1.524)	(1.309)	(1.712)
	CapInt	0.262	0.265	0.259
		(0.209)	(0.221)	(0.197)
	No. of Obs	3,064	1,532	1,532
Leverage ratio 4 subsample	*Lev4*	0.519	0.572	0.466
		(0.199)	(0.214)	(0.168)
	Size	19.490	19.448	19.531
		(1.488)	(1.251)	(1.691)
	CapInt	0.257	0.250	0.264
		(0.199)	(0.203)	(0.194)
	No. of Obs	2,404	1,202	1,202
Profit before tax ratio subsample	*ProfBTaxR*	0.116	0.097	0.135
		(0.125)	(0.122)	(0.125)
	Size	19.621	19.639	19.604
		(1.302)	(1.057)	(1.508)
	No. of Obs	2,292	1,146	1,146
Tax expense ratio subsample	*TaxExpR*	0.032	0.029	0.036
		(0.041)	(0.040)	(0.038)
	Size	19.497	19.456	19.538
		(1.307)	(0.992)	(1.559)
	No. of Obs	2,802	1,401	1,401

Panel C: Descriptive statistics – CEM (weighted) sample				
Sub-samples	**Variables**	**All observations Mean (Std.Dev.)**	**FOACs Mean (Std.Dev.)**	**DOLACs Mean (Std.Dev.)**
Gross profit ratio subsample	*GrosProfR*	0.344	0.330	0.370
		(0.192)	(0.191)	(0.192)
	Size	19.587	19.581	19.597
		(1.282)	(1.139)	(1.503)
	No. of Obs	5,282	3,372	1,910
Operating profit ratio subsample	*EBITR*	0.112	0.096	0.138
		(0.119)	(0.115)	(0.121)
	Size	19.577	19.611	19.524
		(1.143)	(1.073)	(1.243)
	No. of Obs	5,390	3,302	2,088
Net finance expense ratio subsample	*NFinExpR*	0.021	0.025	0.017
		(0.038)	(0.047)	(0.023)
	Size	19.560	19.548	19.574
		(1.119)	(1.067)	(0.180)
	CapInt	0.261	0.249	0.275
		(0.200)	(0.200)	(0.200)
	No. of Obs	2,190	1,200	990
Leverage ratio 1 subsample	*Lev1*	0.114	0.104	0.129
		(0.160)	(0.175)	(0.132)
	Size	19.472	19.460	19.489
		(1.160)	(1.095)	(1.249)
	CapInt	0.222	0.199	0.256
		(0.194)	(0.187)	(0.200)
	No. of Obs	4,226	2,513	1,713
Leverage ratio 2 subsample	*Lev2*	0.180	0.183	0.176
		(0.189)	(0.211)	(0.150)
	Size	19.471	19.459	19.489
		(1.160)	(1.095)	(1.250)
	CapInt	0.222	0.198	0.256
		(0.194)	(0.187)	(0.199)
	No. of Obs	4,211	2,502	1,709
Leverage ratio 3 subsample	*Lev3*	0.160	0.149	0.176
		(0.171)	(0.188)	(0.142)
	Size	19.472	19.460	19.490
		(1.160)	(1.094)	(1.248)
	CapInt	0.222	0.198	0.256
		(0.194)	(0.187)	(0.199)
	No. of Obs	4.214	2,507	1,707
Leverage ratio 4 subsample	*Lev4*	0.527	0.572	0.462
		(0.200)	(0.209)	(0.165)
	Size	19.487	19.476	19.503
		(1.156)	(1.088)	(1.248)
	CapInt	0.220	0.198	0.253
		(0.192)	(0.186)	(0.196)
	No. of Obs	3,930	2,326	1,604
Profit before tax ratio subsample	*ProfBTaxR*	0.108	0.094	0.130
		(0.118)	(0.115)	(0.119)
	Size	19.574	19.600	19.533
		(1.131)	(1.065)	(1.227)
	No. of Obs	5,215	3,194	2,021
Tax expense ratio subsample	*TaxExpR*	0.030	0.027	0.034
		(0.038)	(0.040)	(0.035)
	Size	19.578	19.612	19.526
		(1.247)	(1.142)	(1.392)
	No. of Obs	5,868	3,566	2,302

Panel D: Descriptive statistics – CEM (k-to-k) sample				
Sub-samples	**Variables**	**All observations Mean (Std.Dev.)**	**FOACs Mean (Std.Dev.)**	**DOLACs Mean (Std.Dev.)**
Gross profit ratio subsample	*GrosProfR*	0.357	0.331	0.383
		(0.196)	(0.197)	(0.192)
	Size	19.591	19.601	19.580
		(1.298)	(1.249)	(1.346)
	No. of Obs	3,144	1,572	1,572
Operating profit ratio subsample	*EBITR*	0.119	0.101	0.137
		(0.120)	(0.116)	(0.121)
	Size	19.586	19.593	19.579
		(1.179)	(1.166)	(1.192)
	No. of Obs	3,346	1,673	1,673
Net finance expense ratio subsample	*NFinExpR*	0.023	0.028	0.018
		(0.040)	(0.051)	(0.024)
	Size	19.586	19.610	19.561
		(1.151)	(1.119)	(1.184)
	CapInt	0.280	0.279	0.280
		(0.203)	(0.204)	(0.201)
	No. of Obs	1,584	792	792
Leverage ratio 1 subsample	*Lev1*	0.125	0.121	0.129
		(0.161)	(0.186)	(0.131)
	Size	19.510	19.520	19.500
		(1.199)	(1.161)	(1.236)
	CapInt	0.248	0.246	0.250
		(0.201)	(0.202)	(0.199)
	No. of Obs	2,772	1,386	1,386
Leverage ratio 2 subsample	*Lev2*	0.186	0.195	0.177
		(0.186)	(0.215)	(0.150)
	Size	19.505	19.523	19.488
		(1.200)	(1.164)	(1.235)
	CapInt	0.248	0.246	0.249
		(0.201)	(0.202)	(0.199)
	No. of Obs	2,766	1,383	1,383
Leverage ratio 3 subsample	*Lev3*	0.176	0.174	0.179
		(0.173)	(0.199)	(0.142)
	Size	19.512	19.531	19.493
		(1.198)	(1.166)	(1.229)
	CapInt	0.248	0.246	0.249
		(0.200)	(0.201)	(0.199)
	No. of Obs	2,762	1,381	1,381
Leverage ratio 4 subsample	*Lev4*	0.520	0.578	0.463
		(0.196)	(0.208)	(0.165)
	Size	19.529	19.546	19.513
		(1.208)	(1.165)	(1.250)
	CapInt	0.243	0.241	0.245
		(0.197)	(0.198)	(0.195)
	No. of Obs	2,610	1,305	1,305
Profit before tax ratio subsample	*ProfBTaxR*	0.115	0.100	0.130
		(0.120)	(0.116)	(0.121)
	Size	19.587	19.598	19.576
		(1.162)	(1.154)	(1.170)
	No. of Obs	3,260	1,630	1,630
Tax expense ratio subsample	*TaxExpR*	0.031	0.027	0.035
		(0.039)	(0.041)	(0.036)
	Size	19.538	19.549	19.526
		(1.275)	(1.238)	(1.311)
	No. of Obs	3,732	1,866	1,866

This table reports the descriptive statistics of variables used for the regression analyses after different matching specifications. *GrosProfR* is measured by gross profit divided by operating revenue; *EBITR* is measured by EBIT divided by operating revenue; *NFinExpR* is measured by interest expense minus interest revenue and divided by operating revenue; Leverage ratio is measured by non-current debts divided by total assets (*Lev1*), or by the sum of non-current debts and current loans divided by total asset (*Lev2*), or by non-current liabilities divided by total assets (*Lev3*), or by the sum of non-current and current liabilities divided by total asset (*Lev4*); *ProfBTaxR* is measured by profit before tax divided by operating revenue; *TaxExpR* is measured by tax expense divided by operating revenue; *Size* is measured by the natural logarithm of sales revenue; *CapInt* is measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets. Observations with values of outcome variables smaller than zero or greater than one are excluded to avoid the impact of extreme values on the regression results. Observations with *CapInt* greater than one are excluded.

Table 6
Summary of Regression Results
(p-value is reported in the parentheses below the regression coefficient)

	OLS (clustered)		PSM		CEM (k-to-k)		CEM (weighted)	
	FOAC	***FOAC×PostBEPS***	***FOAC***	***FOAC×PostBEPS***	***FOAC***	***FOAC×PostBEPS***	***FOAC***	***FOAC×PostBEPS***
GrosProfR	-0.03661	0.00555	-0.05294	-0.00214	-0.04893	-0.00441	-0.05133	0.01225
(p-value)	(0.019)	(0.626)	(0.005)	(0.909)	(0.008)	(0.766)	(0.002)	(0.401)
No. of Obs	6,111		1,930		3,144		5,282	
EBITR	-0.03508	-0.00528	-0.04091	-0.01502	-0.02943	-0.01391	-0.02549	-0.01076
(p-value)	(0.000)	(0.448)	(0.000)	(0.121)	(0.003)	(0.164)	(0.011)	(0.265)
No.of Obs	6,553		2,486		3,346		5,390	
NFinExpR	0.00836	0.00179	0.00480	0.00372	0.00906	0.00314	0.00525	0.00479
(p-value)	(0.070)	(0.610)	(0.233)	(0.357)	(0.031)	(0.437)	(0.173)	(0.197)
No. of Obs	5,520		2,714		1,584		2,190	
Lev1	-0.01902	0.01921	-0.02562	0.02693	-0.02734	0.03127	-0.03744	0.03618
(p-value)	(0.069)	(0.040)	(0.035)	(0.051)	(0.047)	(0.024)	(0.004)	(0.008)
No. of Obs	8,185		3,860		2,772		4,226	
Lev2	0.01581	0.02059	0.00469	0.02909	-0.01108	0.05236	-0.03290	0.07230
(p-value)	(0.226)	(0.069)	(0.755)	(0.065)	(0.495)	(0.002)	(0.132)	(0.001)
No. of Obs	8,153		4,334		2,766		4,211	
Lev3	-0.00899	0.01331	-0.01095	0.01954	-0.01648	0.02127	-0.03255	0.03388
(p-value)	(0.424)	(0.190)	(0.441)	(0.228)	(0.273)	(0.145)	(0.032)	(0.027)
No. of Obs	8,167		3,064		2,762		4,214	
Lev4	0.11438	-0.00213	0.09911	0.01679	0.10317	0.01939	0.08878	0.01944
(p-value)	(0.000)	(0.859)	(0.000)	(0.409)	(0.000)	(0.264)	(0.000)	(0.347)
No. of Obs	7,889		2,404		2,610		3,930	
ProfBTaxR	-0.02764	-0.00816	-0.03253	-0.01082	-0.02729	-0.00560	-0.02185	-0.00870
(p-value)	(0.001)	(0.257)	(0.002)	(0.313)	(0.005)	(0.565)	(0.021)	(0.350)
No. of Obs	6.353		2,292		3,260		5,215	
TaxExpR	-0.00536	0.00192	-0.00707	0.00083	-0.00813	0.00122	-0.00742	0.00176
(p-value)	(0.023)	(0.413)	(0.036)	(0.816)	(0.002)	(0.655)	(0.006)	(0.493)
No. of Obs	6,812		2,802		3,732		5,868	

This table is a summary of regression results after different matching specifications. *GrosProfR* is measured by gross profit divided by operating revenue; *EBITR* is measured by EBIT divided by operating revenue; *NFinExpR* is measured by interest expense minus interest revenue and divided by operating revenue; Leverage ratio is measured by non-current debts divided by total assets (*Lev1*), or by the sum of non-current debts and current loans divided by total asset (*Lev2*), or by non-current liabilities divided by total assets (*Lev3*), or by the sum of non-current and current liabilities divided by total asset (*Lev4*); *ProfBTaxR* is measured by profit before tax divided by operating revenue; *TaxExpR* is measured by tax expense divided by operating revenue; *Size* is measured by the natural logarithm of sales revenue; *CapInt* is measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets. *FOAC* takes value of "1" if the company is a FOAC, and "0" otherwise; *FOAC×PostBEPS* is the interaction term between *FOAC* and *PostBEPS.* Standard errors are clustered by firms.

Table 7
Regression Results of Additional Test
(p-value is reported in the parentheses below the regression coefficient)

Panel A: Results of pooled OLS model (unmatched sample)

	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
FOAC	-0.03661	-0.03506	0.00836	0.11410	-0.02761	-0.00535
	(0.019)	(0.000)	(0.071)	(0.000)	(0.001)	(0.024)
FOAC×Year2013	-0.00749	-0.01507	0.00500	0.01153	-0.01360	-0.00284
	(0.437)	(0.026)	(0.139)	(0.282)	(0.038)	(0.307)
FOAC×Year2014	-0.00145	0.00606	0.00513	0.01061	0.00868	0.00449
	(0.892)	(0.462)	(0.137)	(0.393)	(0.250)	(0.201)
FOAC×Year2015	0.00005	0.00235	0.00446	0.00675	-0.00682	0.00475
	(0.997)	(0.778)	(0.279)	(0.624)	(0.466)	(0.308)
FOAC×Year2016	0.00828	-0.00845	0.00676	-0.01176	-0.01317	-0.00147
	(0.577)	(0.381)	(0.205)	(0.458)	(0.194)	(0.619)
FOAC×Year2017	0.00283	-0.01823	0.00640	-0.00285	-0.02060	-0.00179
	(0.871)	(0.087)	(0.302)	(0.865)	(0.092)	(0.733)
FOAC×Year2018	0.01335	-0.00450	0.00161	0.00561	-0.00899	0.00460
	(0.460)	(0.712)	(0.738)	(0.756)	(0.464)	(0.149)
FOAC×Year2019	0.00828	-0.00736	-0.00253	-0.01341	-0.01608	0.00402
	(0.671)	(0.547)	(0.623)	(0.455)	(0.239)	(0.278)
FOAC×Year2020	0.01859	0.00124	-0.01732	-0.04094	0.00340	0.00443
	(0.396)	(0.926)	(0.010)	(0.048)	(0.797)	(0.418)
Year2013	-0.01230	-0.00752	-0.00676	-0.02317	-0.00614	0.00058
	(0.101)	(0.153)	(0.002)	(0.001)	(0.251)	(0.757)
Year2014	-0.01268	-0.01857	-0.00804	-0.02508	-0.01978	-0.00554
	(0.116)	(0.002)	(0.000)	(0.004)	(0.001)	(0.002)
Year2015	-0.00358	-0.01754	-0.00578	-0.01595	-0.00664	-0.00240
	(0.736)	(0.007)	(0.025)	(0.092)	(0.378)	(0.199)
Year2016	-0.01303	-0.00598	-0.00760	-0.00704	-0.00065	-0.00119
	(0.273)	(0.418)	(0.006)	(0.545)	(0.937)	(0.598)
Year2017	-0.00774	-0.00144	-0.00491	-0.01916	0.00344	0.00117
	(0.613)	(0.872)	(0.150)	(0.111)	(0.736)	(0.796)
Year2018	-0.00214	-0.01070	-0.00722	-0.02769	-0.00431	-0.00589
	(0.893)	(0.296)	(0.027)	(0.035)	(0.675)	(0.011)
Year2019	0.00028	-0.00787	-0.00509	-0.01551	0.00039	-0.00399
	(0.987)	(0.462)	(0.139)	(0.245)	(0.974)	(0.160)
Year2020	-0.00609	-0.01577	0.00513	0.04271	-0.01711	-0.00276
	(0.754)	(0.161)	(0.400)	(0.007)	(0.124)	(0.561)
Size	-0.01673	-0.00122	-0.00421	0.02167	-0.00277	-0.00035
	(0.000)	(0.580)	(0.000)	(0.000)	(0.227)	(0.666)
CapInt			0.03958	-0.01482		
			(0.004)	(0.649)		
Constant	0.55707	0.19509	0.12321	0.09837	0.20951	0.04847
	(0.000)	(0.013)	(0.000)	(0.214)	(0.011)	(0.053)
Adjusted R^2	0.174	0.207	0.112	0.152	0.190	0.134
No. of Obs	6,111	6,553	5,520	7,889	6, 353	6,812

Panel B: Results of PSM model						
	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
FOAC	-0.05291	-0.04093	0.00482	0.09904	-0.03262	-0.00706
	(0.006)	(0.000)	(0.232)	(0.000)	(0.002)	(0.036)
FOAC×Year2013	-0.02465	-0.01564	0.00362	0.03926	-0.01845	-0.00204
	(0.255)	(0.222)	(0.386)	(0.200)	(0.105)	(0.636)
FOAC×Year2014	-0.00924	0.01748	0.00399	0.09142	0.04841	-0.00190
	(0.689)	(0.249)	(0.268)	(0.053)	(0.008)	(0.641)
FOAC×Year2015	-0.04114	-0.00768	0.00505	0.01288	-0.00818	0.00055
	(0.238)	(0.569)	(0.327)	(0.613)	(0.549)	(0.924)
FOAC×Year2016	0.06426	-0.03992	0.00441	-0.01143	-0.02508	0.00110
	(0.138)	(0.066)	(0.452)	(0.678)	(0.196)	(0.843)
FOAC×Year2017	0.03124	0.00505	0.01334	0.01075	-0.05324	0.00466
	(0.659)	(0.830)	(0.183)	(0.724)	(0.056)	(0.531)
FOAC×Year2018	0.01209	-0.04488	0.00917	0.04953	0.02666	0.01230
	(0.736)	(0.030)	(0.295)	(0.137)	(0.248)	(0.191)
FOAC×Year2019	-0.04287	-0.01223	0.01081	0.04416	-0.04381	-0.00464
	(0.413)	(0.425)	(0.486)	(0.168)	(0.039)	(0.375)
FOAC×Year2020	0.02398	-0.03392	-0.02264	-0.06257	-0.01353	0.00869
	(0.672)	(0.052)	(0.065)	(0.140)	(0.628)	(0.387)
Year2013	-0.01626	-0.00641	-0.00299	-0.02274	-0.00936	-0.00205
	(0.271)	(0.520)	(0.375)	(0.257)	(0.292)	(0.462)
Year2014	-0.01621	-0.03028	-0.00637	-0.04339	-0.03413	-0.00570
	(0.276)	(0.002)	(0.009)	(0.057)	(0.001)	(0.058)
Year2015	-0.02126	-0.01263	-0.00511	-0.00377	-0.01427	-0.00059
	(0.352)	(0.202)	(0.092)	(0.811)	(0.163)	(0.850)
Year2016	-0.05424	0.02849	-0.00546	-0.01989	0.01804	0.00081
	(0.040)	(0.096)	(0.049)	(0.266)	(0.272)	(0.796)
Year2017	-0.00351	-0.00418	-0.00692	-0.00812	0.02001	-0.00217
	(0.939)	(0.832)	(0.048)	(0.653)	(0.382)	(0.555)
Year2018	0.02650	0.03540	-0.00615	-0.03166	-0.02622	-0.00866
	(0.296)	(0.055)	(0.048)	(0.111)	(0.165)	(0.049)
Year2019	0.03583	-0.00917	-0.00721	-0.02598	0.01583	-0.00248
	(0.366)	(0.458)	(0.223)	(0.201)	(0.420)	(0.533)
Year2020	-0.02962	0.00844	0.01199	0.06892	-0.00058	-0.00108
	(0.465)	(0.603)	(0.225)	(0.008)	(0.980)	(0.879)
Size	-0.01637	0.00040	-0.00406	0.02452	-0.00212	0.00030
	(0.006)	(0.910)	(0.004)	(0.000)	(0.553)	(0.773)
CapInt			0.03423	0.00193		
			(0.023)	(0.971)		
Constant	0.54534	0.16964	0.15162	0.02003	0.11561	0.05314
	(0.000)	(0.085)	(0.000)	(0.852)	(0.149)	(0.140)
Adjusted R^2	0.153	0.210	0.126	0.145	0.191	0.125
No. of Obs	1,930	2,486	2,714	2,404	2,292	2,802

Panel C: Results of CEM (k-to-k) model						
	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
FOAC	-0.04893	-0.02943	0.00905	0.10315	-0.02729	-0.00813
	(0.008)	(0.003)	(0.031)	(0.000)	(0.005)	(0.002)
FOAC×Year2013	-0.02534	-0.02029	0.00717	0.00540	-0.00101	-0.00472
	(0.133)	(0.102)	(0.302)	(0.818)	(0.926)	(0.144)
FOAC×Year2014	-0.01735	0.01329	0.00463	0.03918	0.02412	0.00254
	(0.334)	(0.269)	(0.387)	(0.091)	(0.037)	(0.495)
FOAC×Year2015	0.00891	-0.00974	0.00825	0.03136	-0.00770	0.00453
	(0.663)	(0.451)	(0.197)	(0.205)	(0.551)	(0.507)
FOAC×Year2016	-0.00884	-0.03051	0.00354	0.02335	-0.01863	-0.00029
	(0.700)	(0.046)	(0.543)	(0.396)	(0.178)	(0.507)
FOAC×Year2017	0.00470	-0.01960	0.00281	0.01483	-0.01248	0.00417
	(0.861)	(0.170)	(0.692)	(0.629)	(0.466)	(0.442)
FOAC×Year2018	0.01160	-0.02128	-0.00656	0.00360	-0.01176	0.00272
	(0.662)	(0.190)	(0.243)	(0.906)	(0.505)	(0.540)
FOAC×Year2019	-0.02043	-0.01508	-0.00215	0.03732	-0.01406	-0.00310
	(0.481)	(0.335)	(0.741)	(0.230)	(0.357)	(0.460)
FOAC×Year2020	0.02470	-0.00694	0.00121	-0.02536	-0.00765	0.00505
	(0.419)	(0.712)	(0.899)	(0.450)	(0.682)	(0.559)
Year2013	-0.01991	-0.00735	-0.00508	-0.02796	-0.01661	-0.00057
	(0.062)	(0.397)	(0.252)	(0.040)	(0.037)	(0.801)
Year2014	-0.01556	-0.03169	-0.00517	-0.03082	-0.03373	-0.00629
	(0.142)	(0.000)	(0.071)	(0.026)	(0.000)	(0.011)
Year2015	-0.01921	-0.01382	-0.00790	-0.03827	-0.00765	-0.00568
	(0.137)	(0.148)	(0.006)	(0.014)	(0.450)	(0.019)
Year2016	-0.00375	0.00614	-0.00379	-0.03535	-0.00185	-0.00232
	(0.791)	(0.570)	(0.168)	(0.034)	(0.855)	(0.434)
Year2017	-0.00411	-0.00339	-0.00349	-0.03552	-0.00611	-0.00287
	(0.829)	(0.729)	(0.232)	(0.051)	(0.622)	(0.339)
Year2018	-0.00448	-0.00140	-0.00504	-0.02830	0.00204	-0.00671
	(0.810)	(0.917)	(0.107)	(0.128)	(0.875)	(0.020)
Year2019	-0.00452	-0.01171	-0.00471	-0.04932	-0.01058	-0.00216
	(0.828)	(0.336)	(0.173)	(0.013)	(0.375)	(0.494)
Year2020	-0.01644	-0.00855	-0.00171	0.03055	-0.00798	-0.00011
	(0.457)	(0.541)	(0.703)	(0.182)	(0.589)	(0.986)
Size	-0.01494	0.00263	-0.00187	0.01966	0.00034	-0.00041
	(0.021)	(0.402)	(0.168)	(0.002)	(0.912)	(0.616)
CapInt			0.03266	0.00932		
			(0.043)	(0.860)		
Constant	0.47106	0.17724	0.15940	0.07308	0.15312	0.06076
	(0.000)	(0.045)	(0.080)	(0.593)	(0.026)	(0.013)
Adjusted R^2	0.150	0.210	0.160	0.133	0.186	0.125
No. of Obs	3,144	3,346	1,584	2,610	3,260	3,732

Panel D: Results of CEM (weighted) model						
	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
FOAC	-0.05133	-0.02549	0.00525	0.08876	-0.02185	-0.00742
	(0.003)	(0.011)	(0.174)	(0.000)	(0.021)	(0.006)
FOAC×Year2013	-0.00756	-0.01779	0.00732	0.01165	-0.01078	0.00156
	(0.508)	(0.089)	(0.197)	(0.633)	(0.246)	(0.619)
FOAC×Year2014	-0.00474	0.00297	0.00797	0.02787	0.00928	-0.00004
	(0.739)	(0.770)	(0.079)	(0.221)	(0.340)	(0.991)
FOAC×Year2015	0.00943	-0.00261	0.00542	0.03155	-0.00156	0.00443
	(0.553)	(0.829)	(0.295)	(0.224)	(0.891)	(0.363)
FOAC×Year2016	0.01832	-0.00876	0.00901	0.02045	-0.00945	0.00049
	(0.373)	(0.487)	(0.185)	(0.425)	(0.448)	(0.891)
FOAC×Year2017	0.01858	-0.01513	0.00317	0.02544	-0.00949	0.00234
	(0.395)	(0.246)	(0.537)	(0.2349)	(0.488)	(0.570)
FOAC×Year2018	0.00953	-0.01652	-0.00270	0.03190	-0.02320	0.00200
	(0.652)	(0.280)	(0.528)	(0.259)	(0.226)	(0.597)
FOAC×Year2019	0.03452	-0.02498	-0.00006	0.00401	-0.02429	-0.00240
	(0.180)	(0.103)	(0.989)	(0.903)	(0.093)	(0.529)
FOAC×Year2020	0.02711	-0.00334	0.00484	-0.02881	-0.00080	0.00635
	(0.332)	(0.836)	(0.553)	(0.364)	(0.961)	(0.222)
Year2013	-0.01406	-0.00667	-0.00783	-0.01982	-0.00950	-0.00379
	(0.140)	(0.473)	(0.045)	(0.314)	(0.258)	(0.096)
Year2014	-0.01447	-0.02103	-0.00746	-0.04581	-0.02166	-0.00345
	(0.218)	(0.018)	(0.008)	(0.017)	(0.011)	(0.196)
Year2015	-0.01599	-0.01482	-0.00697	-0.03536	-0.01410	-0.00444
	(0.239)	(0.162)	(0.032)	(0.106)	(0.163)	(0.154)
Year2016	-0.02655	-0.01022	-0.00586	-0.04252	-0.00851	-0.00351
	(0.147)	(0.346)	(0.070)	(0.047)	(0.439)	(0.256)
Year2017	-0.02635	-0.00846	-0.00524	-0.03973	-0.00746	-0.00395
	(0.183)	(0.451)	(0.092)	(0.072)	(0.515)	(0.190)
Year2018	-0.00838	-0.00387	-0.00667	-0.03901	0.00575	-0.00449
	(0.663)	(0.775)	(0.021)	(0.088)	(0.749)	(0.120)
Year2019	-0.02617	0.00097	-0.00642	-0.02222	-0.00065	-0.00163
	(0.268)	(0.944)	(0.014)	(0.432)	(0.960)	(0.636)
Year2020	-0.01627	-0.01436	-0.00328	0.02031	-0.01584	-0.00404
	(0.528)	(0.313)	(0.391)	(0.412)	(0.267)	(0.343)
Size	-0.01612	0.00501	-0.00122	0.01689	0.00309	0.00040
	(0.010)	(0.114)	(0.0332)	(0.012)	(0.339)	(0.620)
CapInt			0.03586	0.01399		
			(0.015)	(0.799)		
Constant	0.49524	0.11053	0.16041	0.11535	0.11234	0.03459
	(0.000)	(0.182)	(0.077)	(0.395)	(0.123)	(0.082)
Adjusted R^2	0.126	0.220	0.167	0.100	0.215	0.172
No. of Obs	5,282	5,390	2,190	3,930	5,215	5,868

This table reports regression results of models for the additional test. Dependent variables are *GrosProfR*, *EBITR*, *NFinExpR*, *Lev4*, *ProfBTaxR* and *TaxRxpR* respectively. *GrosProfR* is measured by gross profit divided by operating revenue; *EBITR* is measured by EBIT divided by operating revenue; *NFinExpR* is measured by interest expense minus interest revenue and divided by operating revenue; *Lev4* is measured by the sum of non-current and current liabilities divided by total asset; *ProfBTaxR* is measured by profit before tax divided by operating revenue; *TaxExpR* is measured by tax expense divided by operating revenue; *FOAC* takes value of "1" if the company is a FOAC and "0" otherwise; *Year2013* takes value of "1" if the year falls in 2013 and "0" otherwise; *Year2014* takes value of "1" if the year falls in 2014 and "0" otherwise; *Year2015* takes value of "1" if the year falls in 2015 and "0" otherwise; *Year2016* takes value of "1" if the year falls in 2016 and "0" otherwise; *Year2017* takes value of "1" if the year falls in 2017 and "0" otherwise; *Year2018* takes value of "1" if the year falls in 2018 and "0" otherwise; *Year2019* takes value of "1" if the year falls in 2019 and "0" otherwise; *Year2020* takes value of "1" if the year falls in 2020 and "0" otherwise; *FOAC×Year2013* is the interaction term between *FOAC* and *Year2013*; *FOAC×Year2014* is the interaction term between *FOAC* and *Year2014*; *FOAC×Year2015* is the interaction term between *FOAC* and *Year2015*; *FOAC×Year2016* is the interaction term between *FOAC* and *Year2016*; *FOAC×Year2017* is the interaction term between *FOAC* and *Year2017*; *FOAC×Year2018* is the interaction term between *FOAC* and *Year2018*; *FOAC×Year2019* is the interaction term between *FOAC* and *Year2019*; *FOAC×Year2020* is the interaction term between *FOAC* and *Year2020*; *Size* is measured by the natural logarithm of sales revenue; *CapInt* is measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets. Standard errors are clustered by firms.

Table 8
Differences in average financial ratios between FOACs and DOLACs
(p-value for the z-test is reported in the parentheses below the difference)

	Pre-BEPS average (FOACs vs DOLACs)	Post-BEPS average (FOACs vs DOLACs)	Pre- vs Post-BEPS difference (FOACs vs DOLACs)
GrosProfR	-0.05977	-0.05987	-0.00011
	(0.003)	(0.002)	(0.992)
EBITR	-0.03002	-0.02732	0.00270
	(0.002)	(0.010)	(0.767)
NFinExpR	0.01383	0.01055	-0.00328
	(0.003)	(0.012)	(0.415)
ProfBTaxR	-0.02713	-0.02347	0.00366
	(0.003)	(0.024)	(0.668)
TaxExpR	-0.00727	-0.00194	0.00533
	(0.010)	(0.592)	(0.150)

This table reports (1) the difference in pre-BEPS average financial ratios between FOACs and matched DOLACs after PSM; (2) the difference in post-BEPS average ratios between FOACs and matched DOLACs after PSM and (3) the pre- and post-BEPS change in average ratios between FOACs and matched DOLACs after PSM. Financial ratios or outcome variables include gross profit to sales revenue ratio (*GrosProfR*), EBIT to sales revenue ratio (*EBITR*), net finance expense to sales revenue ratio (*NFinExpR*), profit before tax to sales revenue ratio (*ProfBTaxR*) and income tax expense to sales revenue ratio (*TaxExpR*).

APPENDIX 1

This appendix summarises the relations between the numerators and the denominator of the profit shifting outcome variables used as the dependent variables in the regression models.

Sales revenue	XX
Less: Cost of sales	XX
Gross profit	XX
Less: Non-financial expenses	XX
Earnings before interest and tax (EBIT)	XX
Less: Net finance expense	XX
Profit before tax	XX
Add/less: permanent book-tax differences	XX
Taxable profit	XX
Multiply: corporate tax rates	XX
= Tax expense	XX

APPENDIX 2

This appendix contains a list (Table A2) of matching variables capturing firm size, industry affiliations, capital intensity (in the case of debt financing/interest expense loading) and years used in coarsened exact matching.

Table A2
Variables Used in the CEM

Industry affiliations[71]	
IND1	Indicator variables, taking value of "1" for industry group 1 (Agriculture, Forestry and Fishing) and "0" otherwise;
IND2	Indicator variables, taking value of "1" for industry group 2 (Mining) and "0" otherwise;
IND3	Indicator variables, taking value of "1" for industry group 3 (Manufacturing) and "0" otherwise;
IND4	Indicator variables, taking value of "1" for industry group 4 (Electricity, Gas, Water and Waste Service) and "0" otherwise;
IND5	Indicator variables, taking value of "1" for industry group 5 (Construction) and "0" otherwise;
IND6	Indicator variables, taking value of "1" for industry group 6 (Wholesale Trade) and "0" otherwise;
IND7	Indicator variables, taking value of "1" for industry group 7 (Retail Trade) and "0" otherwise;
IND8	Indicator variables, taking value of "1" for industry group 8 (Accommodation and Food Services) and "0" otherwise;
IND9	Indicator variables, taking value of "1" for industry group 9 (Transport, Postal and Warehousing) and "0" otherwise;
IND10	Indicator variables, taking value of "1" for industry group 10 (Information Media and Telecommunications) and "0" otherwise;
IND12	Indicator variables, taking value of "1" for industry group 12 (Rental, Hiring and Real Estate Services) and "0" otherwise;
IND13	Indicator variables, taking value of "1" for industry group 13 (Professional, Scientific and Technical Services) and "0" otherwise;
IND14	Indicator variables, taking value of "1" for industry group 14 (Administrative and Support Services) and "0" otherwise;
IND15	Indicator variables, taking value of "1" for industry group 15 (Public Administration and Safety) and "0" otherwise;
IND16	Indicator variables, taking value of "1" for industry group 16 (Education and Training) and "0" otherwise;
IND17	Indicator variables, taking value of "1" for industry group 17 (Health Care and Social Assistance) and "0" otherwise;
IND18	Indicator variables, taking value of "1" for industry group 18 (Arts and Recreation Services) and "0" otherwise;
IND19	Indicator variables, taking value of "1" for industry group 19 (Other Services) and "0" otherwise;
Sample year	
Year2007	Indicator variables, taking value of "1" for 2007 and "0" otherwise;
Year2008	Indicator variables, taking value of "1" for 2008 and "0" otherwise;
Year2009	Indicator variables, taking value of "1" for 2009 and "0" otherwise;
Year2010	Indicator variables, taking value of "1" for 2010 and "0" otherwise;
Year2011	Indicator variables, taking value of "1" for 2011 and "0" otherwise;
Year2012	Indicator variables, taking value of "1" for 2012 and "0" otherwise;
Year2013	Indicator variables, taking value of "1" for 2013 and "0" otherwise;
Year2014	Indicator variables, taking value of "1" for 2014 and "0" otherwise;
Year2015	Indicator variables, taking value of "1" for 2015 and "0" otherwise;
Year2016	Indicator variables, taking value of "1" for 2016 and "0" otherwise;
Year2017	Indicator variables, taking value of "1" for 2017 and "0" otherwise;
Year2018	Indicator variables, taking value of "1" for 2018 and "0" otherwise;
Year2019	Indicator variables, taking value of "1" for 2019 and "0" otherwise;
Year2020	Indicator variables, taking value of "1" for 2020 and "0" otherwise;
Size	Firm size, measured by the natural logarithm of operating revenue;
CapInt	Capital intensity, measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets.

[71] We do not include an indicator for industry group 11 (Financial and Insurance Services) because financial and insurance companies are excluded in the sample selection.

APPENDIX 3

This appendix includes a table showing information about industry groups included in this study.

Table A3
Industry Information

Industry group	Industry name	ANZSIC code
1	Agriculture, Forestry and Fishing	Division A
2	Mining	Division B
3	Manufacturing	Division C
4	Electricity, Gas, Water and Waste Service	Division D
5	Construction	Division E
6	Wholesale Trade	Division F
7	Retail Trade	Division G
8	Accommodation and Food Services	Division H
9	Transport, Postal and Warehousing	Division I
10	Information Media and Telecommunications	Division J
11	Financial and Insurance Services	Division K
12	Rental, Hiring and Real Estate Services	Division L
13	Professional, Scientific and Technical Services	Division M
14	Administrative and Support Services	Division N
15	Public Administration and Safety	Division O
16	Education and Training	Division P
17	Health Care and Social Assistance	Division Q
18	Arts and Recreation Services	Division R
19	Other Services	Division S

APPENDIX 4

This appendix includes tables reporting detailed regression results. Table A4.1 shows the results of the pooled OLS regression models with standard errors clustered by firms.

Table A4.1
Pooled OLS Regression Results
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	*EBITR*	*NFinExpR*	*Lev1*	*Lev2*	*Lev3*	*Lev4*	*ProfBTaxR*	*TaxExpR*
FOAC	-0.03661	-0.03508	0.00836	-0.01902	0.01581	-0.00899	0.11438	-0.02764	-0.00536
	(0.019)	(0.000)	(0.070)	(0.069)	(0.226)	(0.424)	(0.000)	(0.001)	(0.023)
PostBEPS	-0.00796	-0.01095	-0.00546	-0.01392	-0.02872	-0.00364	-0.01366	-0.00666	-0.00243
	(0.393)	(0.051)	(0.025)	(0.032)	(0.000)	(0.586)	(0.104)	(0.261)	(0.135)
FOAC×PostBEPS	0.00555	-0.00528	0.00179	0.01921	0.02059	0.01331	-0.00213	-0.00816	0.00192
	(0.626)	(0.448)	(0.610)	(0.040)	(0.069)	(0.190)	(0.859)	(0.257)	(0.413)
Size	-0.01666	-0.00124	-0.00428	0.01599	0.01307	0.01745	0.02151	-0.00280	-0.00034
	(0.000)	(0.575)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.221)	(0.674)
CapInt			0.03954	0.22598	0.24635	0.27358	-0.01219		
			(0.004)	(0.000)	(0.000)	(0.000)	(0.707)		
IND2	0.17690	0.10509	-0.01174	-0.03249	-0.11787	0.00715	-0.13588	0.10793	0.03499
	(0.000)	(0.101)	(0.531)	(0.268)	(0.000)	(0.860)	(0.002)	(0.107)	(0.080)
IND3	0.13555	-0.04573	-0.03159	0.03165	-0.04928	0.02650	-0.06617	-0.04182	-0.01270
	(0.000)	(0.457)	(0.061)	(0.247)	(0.073)	(0.494)	(0.096)	(0.514)	(0.500)
IND4	0.50115	-0.05374	-0.04386	0.09881	-0.02813	0.09282	-0.09254	-0.05812	-0.01814
	(0.002)	(0.395)	(0.010)	(0.013)	(0.499)	(0.058)	(0.282)	(0.375)	(0.361)
IND5	0.01192	-0.05811	-0.03217	0.02974	-0.07321	0.02763	-0.00821	-0.05242	-0.01242
	(0.772)	(0.352)	(0.057)	(0.336)	(0.025)	(0.515)	(0.850)	(0.419)	(0.516)
IND6	0.09175	-0.06741	-0.03626	-0.00661	-0.07341	-0.01783	-0.03305	-0.06120	-0.01816
	(0.012)	(0.272)	(0.034)	(0.812)	(0.013)	(0.650)	(0.436)	(0.339)	(0.335)
IND7	0.20861	-0.07103	-0.04353	-0.03993	-0.10490	-0.02358	-0.01714	-0.06081	-0.01824
	(0.000)	(0.250)	(0.009)	(0.143)	(0.001)	(0.553)	(0.703)	(0.346)	(0.337)
IND8	0.50151	0.02615	-0.03211	0.01084	-0.11027	0.01139	-0.15811	0.02807	0.00854
	(0.000)	(0.706)	(0.093)	(0.823)	(0.051)	(0.837)	(0.032)	(0.691)	(0.681)
IND9	0.03572	-0.04335	-0.04068	0.02187	-0.07737	0.03023	-0.03255	-0.04063	-0.01323
	(0.501)	(0.495)	(0.017)	(0.478)	(0.022)	(0.466)	(0.499)	(0.539)	(0.492)
IND10	0.26946	-0.02276	-0.02425	0.02569	-0.06518	0.03373	-0.02050	-0.01542	-0.00539
	(0.000)	(0.718)	(0.154)	(0.409)	(0.052)	(0.412)	(0.648)	(0.814)	(0.779)
IND12	0.15025	0.04301	0.01020	0.09413	0.07583	0.08242	0.03642	0.03578	-0.00540
	(0.029)	(0.590)	(0.709)	(0.010)	(0.146)	(0.063)	(0.460)	(0.637)	(0.784)
IND13	0.16415	-0.03991	-0.02665	0.01607	-0.08980	0.03707	-0.00847	-0.02992	-0.00884
	(0.001)	(0.518)	(0.124)	(0.566)	(0.002)	(0.352)	(0.837)	(0.637)	(0.641)
IND14	-0.01313	-0.02965	-0.03320	-0.00735	-0.06110	-0.00542	-0.00852	-0.01159	-0.01018
	(0.719)	(0.659)	(0.054)	(0.820)	(0.169)	(0.901)	(0.860)	(0.869)	(0.616)
IND15	0.22747	-0.03683	-0.04465	-0.06080	-0.20917	-0.03072	-0.14132	-0.01989	-0.00669
	(0.270)	(0.562)	(0.008)	(0.030)	(0.000)	(0.605)	(0.239)	(0.765)	(0.730)
IND16		-0.03915	-0.01127	0.09468	-0.03142	0.09602	0.14910	-0.01136	0.00897
		(0.529)	(0.664)	(0.131)	(0.621)	(0.173)	(0.003)	(0.860)	(0.639)
IND17	0.19451	-0.02784	-0.01623	0.09975	0.08367	0.10438	-0.00703	-0.03501	-0.00805
	(0.000)	(0.663)	(0.388)	(0.029)	(0.038)	(0.061)	(0.869)	(0.593)	(0.676)
IND18	0.21491	0.03817	-0.01290	0.01957	-0.05753	0.01842	-0.19590	0.03340	-0.00380
	(0.034)	(0.548)	(0.546)	(0.653)	(0.455)	(0.719)	(0.015)	(0.614)	(0.846)
IND19	0.20740	-0.05593	-0.03700	0.04206	-0.07512	0.06117	0.05775	-0.05350	-0.01620
	(0.022)	(0.376)	(0.037)	(0.306)	(0.136)	(0.387)	(0.491)	(0.411)	(0.398)
Constant	0.55567	0.19545	0.12454	-0.25078	-0.06007	-0.25779	0.09991	0.21008	0.04816
	(0.000)	(0.013)	(0.000)	(0.000)	(0.370)	(0.000)	(0.228)	(0.010)	(0.055)
Adjusted R^2	0.173	0.207	0.109	0.166	0.129	0.194	0.149	0.189	0.133
No. of Obs	6,111	6,553	5,520	8,185	8,153	8,167	7,889	6,353	6,812

This table reports the regression results of the unmatched pooled OLS models with unmatched sample. Dependent variables are *GrosProfR*, *EBITR*, *NFinExpR*, *Lev1*, *Lev2*, *Lev3*, *Lev4*, *ProfBTaxR* and *TaxRxpR* respectively. *GrosProfR* is measured by gross profit divided by operating revenue; *EBITR* is measured by EBIT divided by operating revenue; *NFinExpR* is measured by interest expense minus interest revenue and divided by operating revenue; Leverage ratio is measured by non-current debts divided by total assets (*Lev1*), or by the sum of non-current debts and current loans divided by total asset (*Lev2*), or by non-current liabilities divided by total assets (*Lev3*), or by the sum of non-current and current liabilities divided by total asset (*Lev4*); *ProfBTaxR* is measured by profit before tax divided by operating revenue; *TaxExpR* is measured by tax expense divided by operating revenue; *FOAC* takes value of "1" if the company is a FOAC and "0" otherwise; *PostBEPS* takes value of "1" if the year falls in the post-BEPS period and "0" otherwise; *FOAC×PostBEPS* is the interaction term between *FOAC* and *PostBEPS; Size* is measured by the natural logarithm of sales revenue; *CapInt* is measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets. Standard errors are clustered by firms.

Table A4.2 shows the results of models after the propensity score matching with standard errors clustered by firms.

Table A4.2
PSM Regression Results
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	***EBITR***	***NFinExpR***	***Lev1***	***Lev2***	***Lev3***	***Lev4***	***ProfBTaxR***	***TaxEXPR***
FOAC	-0.05294	-0.04091	0.00480	-0.02562	-0.00469	-0.01095	0.09911	-0.03253	-0.00707
	(0.005)	(0.000)	(0.233)	(0.035)	(0.755)	(0.441)	(0.000)	(0.002)	(0.036)
PostBEPS	-0.01217	-0.00316	-0.00387	-0.01313	-0.02403	0.00079	-0.01039	-0.00564	-0.00264
	(0.345)	(0.684)	(0.117)	(0.111)	(0.008)	(0.929)	(0.411)	(0.518)	(0.232)
FOAC×PostBEPS	-0.00214	-0.01502	0.00372	0.02693	0.02909	0.01954	0.01679	-0.01082	0.00083
	(0.909)	(0.121)	(0.357)	(0.051)	(0.065)	(0.228)	(0.409)	(0.313)	(0.816)
Size	-0.01601	-0.00051	-0.00415	0.01746	0.01239	0.01504	0.02395	-0.00292	0.00009
	(0.007)	(0.886)	(0.004)	(0.000)	(0.002)	(0.000)	(0.000)	(0.405)	(0.926)
CapInt			0.03463	0.19614	0.22902	0.28155	0.00998		
			(0.021)	(0.000)	(0.000)	(0.000)	(0.852)		
IND2	0.15717	0.06073	-0.04170	-0.02834	-0.15973	-0.10647	-0.12487	0.16527	0.00763
	(0.000)	(0.412)	(0.127)	(0.400)	(0.000)	(0.009)	(0.041)	(0.000)	(0.793)
IND3	0.15119	-0.06305	-0.05898	0.05301	-0.07886	-0.08281	-0.03520	0.02899	-0.02988
	(0.000)	(0.382)	(0.019)	(0.103)	(0.006)	(0.027)	(0.534)	(0.338)	(0.293)
IND4	0.25732	0.00638	-0.07004		-0.06332	-0.07972	0.02945	0.00044	-0.02975
	(0.000)	(0.935)	(0.006)		(0.371)	(0.372)	(0.604)	(0.988)	(0.303)
IND5	0.03178	-0.08146	-0.06431	0.04374	-0.12385	-0.06838	-0.00279	0.02840	-0.02929
	(0.436)	(0.263)	(0.011)	(0.224)	(0.000)	(0.001)	(0.965)	(0.384)	(0.304)
IND6	0.19522		-0.06620	0.00490	-0.10362	-0.12192	0.02149		
	(0.001)		(0.008)	(0.878)	(0.000)	(0.001)	(0.720)		
IND7	0.22881	-0.08500	-0.07028	-0.02040	-0.12038	-0.12415	-0.03160	0.01275	-0.03737
	(0.000)	(0.241)	(0.005)	(0.541)	(0.001)	(0.001)	(0.614)	(0.679)	(0.188)
IND8	0.48982	0.05368	-0.04845	-0.00688	-0.19668	-0.13404	-0.06889	0.16485	0.00045
	(0.000)	(0.577)	(0.097)	(0.906)	(0.011)	(0.105)	(0.520)	(0.001)	(0.988)
IND9		-0.05514	-0.06849	0.06115	-0.09041	-0.05092	-0.02959	0.03186	-0.03075
		(0.464)	(0.007)	(0.093)	(0.013)	(0.271)	(0.684)	(0.373)	(0.280)
IND10	0.30287	-0.04293	-0.05609	0.03184	-0.10223	-0.07574	0.02233	0.04292	-0.02173
	(0.000)	(0.557)	(0.025)	(0.371)	(0.003)	(0.044)	(0.720)	(0.183)	(0.451)
IND12	0.11926	0.07677	0.02616	0.10041	0.03603	-0.02224	0.04328	0.11749	-0.02095
	(0.054)	(0.503)	(0.511)	(0.012)	(0.557)	(0.697)	(0.572)	(0.028)	(0.467)
IND13	0.17515	-0.05638	-0.05918	0.02629	-0.13560	-0.06893	0.02743	0.04535	-0.02305
	(0.000)	(0.434)	(0.018)	(0.404)	(0.000)	(0.056)	(0.641)	(0.139)	(0.417)
IND14	0.01680	-0.06392	-0.06514	0.06052	-0.08347	-0.10338	-0.02398	0.05777	-0.03014
	(0.654)	(0.392)	(0.009)	(0.243)	(0.059)	(0.014)	(0.767)	(0.191)	(0.300)
IND15									
IND16		-0.04027			-0.05401	0.07701			0.00431
		(0.583)			(0.383)	(0.593)			(0.890)
IND17		0.00416	-0.04372	0.01570	0.09438	-0.09488	-0.01515	0.02485	-0.03002
		(0.955)	(0.190)	(0.812)	(0.040)	(0.268)	(0.869)	(0.574)	(0.311)
IND18	0.21323	0.01284	0.02064	0.07598	-0.05835	-0.05369		0.10261	-0.01655
	(0.173)	(0.860)	(0.726)	(0.200)	(0.535)	(0.476)		(0.001)	(0.561)
IND19			-0.06983	0.08110	-0.03948		0.01509	0.06961	-0.01662
			(0.010)	(0.033)	(0.463)		(0.792)	(0.026)	(0.570)
Constant	0.53976	0.19290	0.15284	-0.28478	-0.00531	-0.10931	0.01854	0.14013	0.05750
	(0.000)	(0.057)	(0.000)	(0.000)	(0.946)	(0.172)	(0.858)	(0.078)	(0.106)
Adjusted R^2	0.144	0.190	0.122	0.135	0.141	0.156	0.137	0.183	0.120
No. of Obs	1,930	2,486	2,714	3,860	4,334	3,064	2,404	2,292	2,802

This table reports the regression results of models after the propensity score matching. Dependent variables are *GrosProfR*, *EBITR*, *NFinExpR*, *Lev1*, *Lev2*, *Lev3*, *Lev4*, *ProfBTaxR* and *TaxRxpR* respectively. *GrosProfR* is measured by gross profit divided by operating revenue; *EBITR* is measured by EBIT divided by operating revenue; *NFinExpR* is measured by interest expense minus interest revenue and divided by operating revenue; Leverage ratio is measured by non-current debts divided by total assets (*Lev1*), or by the sum of non-current debts and current loans divided by total asset (*Lev2*), or by non-current liabilities divided by total assets (*Lev3*), or by the sum of non-current and current liabilities divided by total asset (*Lev4*); *ProfBTaxR* is measured by profit before tax divided by operating revenue; *TaxExpR* is measured by tax expense divided by operating revenue; *FOAC* takes value of "1" if the company is a FOAC and "0" otherwise; *PostBEPS* takes value of "1" if the year falls in the post-BEPS period and "0" otherwise; *FOAC×PostBEPS* is the interaction term between *FOAC* and *PostBEPS; Size* is measured by the natural logarithm of sales revenue; *CapInt* is measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets. Standard errors are clustered by firms.

Table A4.3 shows the results of models after the coarsened exact matching (k-to-k) with standard errors clustered by firms.

Table A4.3
CEM (k-to-k) Regression Results
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	***EBITR***	***NFinExpR***	***Lev1***	***Lev2***	***Lev3***	***Lev4***	***ProfBTaxR***	***TaxExpR***
FOAC	-0.04893	-0.02943	0.00906	-0.02734	-0.01108	-0.01648	0.10317	-0.02729	-0.00813
	(0.008)	(0.003)	(0.031)	(0.047)	(0.495)	(0.273)	(0.000)	(0.005)	(0.002)
PostBEPS	-0.01197	-0.00913	-0.00480	-0.02320	-0.04261	-0.01616	-0.03014	-0.01079	-0.00348
	(0.276)	(0.224)	(0.027)	(0.008)	(0.000)	(0.062)	(0.008)	(0.161)	(0.079)
FOAC×PostBEPS	-0.00441	-0.01391	0.00314	0.03127	0.05236	0.02127	0.01939	-0.00560	0.00122
	(0.766)	(0.164)	(0.437)	(0.024)	(0.002)	(0.145)	(0.264)	(0.565)	(0.655)
Size	-0.01515	0.00245	-0.00185	0.01927	0.01400	0.01874	0.01978	-0.00021	-0.00042
	(0.019)	(0.433)	(0.174)	(0.000)	(0.015)	(0.000)	(0.002)	(0.947)	(0.608)
CapInt			0.03332	0.20458	0.26401	0.29079	0.01562		
			(0.037)	(0.000)	(0.000)	(0.000)	(0.765)		
IND2	0.21951	0.03937	-0.09455	-0.14877	-0.12847	-0.05794	-0.05944	0.09728	0.01841
	(0.000)	(0.568)	(0.285)	(0.068)	(0.000)	(0.570)	(0.452)	(0.015)	(0.351)
IND3	0.19999	-0.10492	-0.11371	-0.07595	-0.05388	-0.01619	-0.00003	-0.04714	-0.02125
	(0.000)	(0.113)	(0.198)	(0.346)	(0.113)	(0.874)	(1.000)	(0.186)	(0.261)
IND4	0.47194	-0.12054						-0.07477	-0.02616
	(0.000)	(0.093)						(0.073)	(0.167)
IND5	0.07746	-0.12299	-0.11009	-0.06869	-0.06959	0.00787	0.05812	-0.05469	-0.02178
	(0.144)	(0.065)	(0.214)	(0.420)	(0.141)	(0.941)	(0.489)	(0.136)	(0.254)
IND6	0.15905	-0.13624	-0.11854	-0.12321	-0.08198	-0.04498	0.04727	-0.07026	-0.02721
	(0.001)	(0.040)	(0.180)	(0.132)	(0.034)	(0.663)	(0.565)	(0.052)	(0.150)
IND7	0.29488	-0.12174	-0.12494	-0.17613	-0.14937	-0.06788	0.03771	-0.05602	-0.02409
	(0.000)	(0.068)	(0.157)	(0.029)	(0.000)	(0.512)	(0.660)	(0.128)	(0.206)
IND8	0.55178	-0.02133	-0.11741	-0.10142	-0.15874	-0.09318	-0.14938	0.03489	0.00348
	(0.000)	(0.814)	(0.192)	(0.361)	(0.090)	(0.478)	(0.198)	(0.609)	(0.871)
IND9	0.35988	-0.09735	-0.13010	-0.06857	-0.0514**3**	0.00589	0.05904	-0.03630	-0.01891
	(0.023)	(0.159)	(0.140)	(0.400)	(0.224)	(0.954)	(0.492)	(0.400)	(0.343)
IND10	0.30974	-0.08668	-0.11485	-0.10429	-0.07753	-0.01455	0.05265	-0.02400	-0.01547
	(0.000)	(0.204)	(0.194)	(0.211)	(0.100)	(0.889)	(0.531)	(0.557)	(0.423)
IND12	0.17753	0.01399	-0.09955	-0.05012	0.08638	0.01626	0.05931	0.03610	-0.00884
	(0.020)	(0.890)	(0.261)	(0.580)	(0.256)	(0.884)	(0.545)	(0.540)	(0.670)
IND13	0.22329	-0.09684	-0.11149	-0.11504	-0.09989	-0.01571	0.05220	-0.03448	-0.01656
	(0.000)	(0.145)	(0.208)	(0.161)	(0.010)	(0.879)	(0.515)	(0.341)	(0.383)
IND14	0.04516	-0.09247	-0.11970	-0.12066	-0.07518	-0.03153	0.05099	-0.00778	-0.02001
	(0.342)	(0.232)	(0.177)	(0.159)	(0.177)	(0.768)	(0.557)	(0.892)	(0.320)
IND15									
IND16									
IND17		-0.06525		-0.10578	0.24356	-0.06780		-0.01571	-0.01922
		(0.343)		(0.277)	(0.193)	(0.569)		(0.672)	(0.319)
IND18	0.17517	-0.11210		-0.18192	-0.16657	-0.14196	-0.24898	-0.04869	0.00621
	(0.002)	(0.127)		(0.026)	(0.000)	(0.162)	(0.087)	(0.329)	(0.865)
IND19		-0.09895	-0.11572	-0.10449	-0.07366	-0.00329	0.06303	-0.04609	-0.02305
		(0.178)	(0.193)	(0.312)	(0.296)	(0.981)	(0.502)	(0.273)	(0.251)
Constant	0.47603	0.18126	0.15903	-0.17964	-0.05834	-0.22509	0.06955	0.15804	0.06047
	(0.000)	(0.040)	(0.082)	(0.117)	(0.581)	(0.086)	(0.604)	(0.021)	(0.013)
Adjusted R^2	0.147	0.208	0.157	0.135	0.136	0.142	0.130	0.183	0.122
No. of Obs	3,144	3,346	1,584	2,772	2,766	2,762	2,610	3,260	3,732

This table reports the regression results of models after the coarsened exact matching (k-to-k). Dependent variables are *GrosProfR*, *EBITR*, *NFinExpR*, *Lev1*, *Lev2*, *Lev3*, *Lev4*, *ProfBTaxR* and *TaxRxpR* respectively. *GrosProfR* is measured by gross profit divided by operating revenue; *EBITR* is measured by EBIT divided by operating revenue; *NFinExpR* is measured by interest expense minus interest revenue and divided by operating revenue; Leverage ratio is measured by non-current debts divided by total assets (*Lev1*), or by the sum of non-current debts and current loans divided by total asset (*Lev2*), or by non-current liabilities divided by total assets (*Lev3*), or by the sum of non-current and current liabilities divided by total asset (*Lev4*); *ProfBTaxR* is measured by profit before tax divided by operating revenue; *TaxExpR* is measured by tax expense divided by operating revenue; *FOAC* takes value of "1" if the company is a FOAC and "0" otherwise; *PostBEPS* takes value of "1" if the year falls in the post-BEPS period and "0" otherwise; *FOAC×PostBEPS* is the interaction term between *FOAC* and *PostBEPS; Size* is measured by the natural logarithm of sales revenue; *CapInt* is measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets. Standard errors are clustered by firms.

Table A4.4 shows the results of models after the coarsened exact matching (weighted) with standard errors clustered by firms.

Table A4.4
CEM (weighted) Regression Results
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	*EBITR*	*NFinExpR*	*Lev1*	*Lev2*	*Lev3*	*Lev4*	*ProfBTaxR*	*TaxExpR*
FOAC	-0.05133	-0.02549	0.00525	-0.03744	-0.03290	-0.03255	0.08878	-0.02185	-0.00742
	(0.002)	(0.011)	(0.173)	(0.004)	(0.132)	(0.032)	(0.000)	(0.021)	(0.006)
PostBEPS	-0.01857	-0.00988	-0.00639	-0.02799	-0.07471	-0.02529	-0.03233	-0.00906	-0.00365
	(0.150)	(0.250)	(0.008)	(0.007)	(0.000)	(0.038)	(0.072)	(0.281)	(0.084)
FOAC×PostBEPS	0.01225	-0.01076	0.00479	0.03618	0.07230	0.03388	0.01944	-0.00870	0.00176
	(0.401)	(0.265)	(0.197)	(0.008)	(0.001)	(0.027)	(0.347)	(0.350)	(0.493)
Size	-0.01591	0.00500	-0.00120	0.01375	0.01510	0.01529	0.01693	0.00308	0.00042
	(0.011)	(0.115)	(0.339)	(0.004)	(0.008)	(0.002)	(0.012)	(0.340)	(0.603)
CapInt			0.03702	0.24972	0.25650	0.31931	0.01864		
			(0.011)	(0.000)	(0.000)	(0.000)	(0.732)		
IND2	0.23333	0.05885	-0.10550	-0.13941	-0.10988	-0.06325	-0.02856	0.09120	0.03655
	(0.000)	(0.329)	(0.234)	(0.111)	(0.019)	(0.500)	(0.699)	(0.046)	(0.012)
IND3	0.19695	-0.08829	-0.12690	-0.07314	-0.05366	-0.03692	0.01892	-0.06296	-0.01132
	(0.000)	(0.123)	(0.151)	(0.398)	(0.218)	(0.692)	(0.792)	(0.123)	(0.378)
IND4	0.47046	-0.11001						-0.09489	-0.01769
	(0.000)	(0.084)						(0.042)	(0.174)
IND5	0.08397	-0.09728	-0.12126	-0.05645	-0.07234	-0.00284	0.07525	-0.07059	-0.01230
	(0.194)	(0.091)	(0.171)	(0.533)	(0.183)	(0.977)	(0.342)	(0.087)	(0.348)
IND6	0.15796	-0.11010	-0.13049	-0.11366	-0.07604	-0.07535	0.07223	-0.08143	-0.01641
	(0.003)	(0.054)	(0.140)	(0.193)	(0.109)	(0.424)	(0.339)	(0.046)	(0.201)
IND7	0.28868	-0.10651	-0.13737	-0.17186	-0.14593	-0.09414	0.06958	-0.07576	-0.01582
	(0.000)	(0.064)	(0.120)	(0.047)	(0.002)	(0.319)	(0.380)	(0.067)	(0.225)
IND8	0.59163	0.02037	-0.13346	-0.13571	-0.18149	-0.14659	-0.15522	0.04142	0.01134
	(0.000)	(0.815)	(0.137)	(0.244)	(0.060)	(0.730)	(0.167)	(0.573)	(0.513)
IND9	0.28215	-0.08304	-0.14425	-0.08429	-0.06539	-0.03257	0.07446	-0.05487	-0.01067
	(0.059)	(0.166)	(0.102)	(0.333)	(0.172)	(0.730)	(0.329)	(0.224)	(0.433)
IND10	0.29338	-0.07615	-0.12569	-0.10150	-0.08053	-0.04222	0.06272	-0.04661	-0.00458
	(0.000)	(0.204)	(0.155)	(0.252)	(0.125)	(0.657)	(0.444)	(0.299)	(0.745)
IND12	0.13149	-0.00101	-0.11227	-0.05446	0.06771	-0.01999	0.09793	-0.00901	-0.00037
	(0.052)	(0.989)	(0.205)	(0.563)	(0.399)	(0.844)	(0.300)	(0.856)	(0.979)
IND13	0.22401	-0.08534	-0.12275	-0.10384	-0.11333	-0.03529	0.08910	-0.05453	-0.00819
	(0.000)	(0.137)	(0.166)	(0.199)	(0.016)	(0.709)	(0.233)	(0.185)	(0.530)
IND14	0.04891	-0.10206	-0.13191	-0.11546	-0.06136	-0.06243	0.06250	-0.05601	-0.01338
	(0.374)	(0.094)	(0.136)	(0.199)	(0.322)	(0.519)	(0.435)	(0.229)	(0.354)
IND15									
IND16									
IND17		-0.05663		-0.12292	0.28016	-0.10953		-0.03630	-0.01022
		(0.351)		(0.212)	(0.139)	(0.306)		(0.391)	(0.437)
IND18	0.18867	-0.08065		-0.17891	-0.18714	-0.16384	-0.26304	-0.04857	0.01232
	(0.002)	(0.206)		(0.042)	(0.000)	(0.079)	(0.049)	(0.341)	(0.668)
IND19		-0.08351	-0.12943	-0.10076	-0.10528	-0.03925	0.07317	-0.06077	-0.01248
		(0.186)	(0.145)	(0.336)	(0.125)	(0.759)	(0.392)	(0.172)	(0.378)
Constant	0.49285	0.11150	0.15952	-0.08277	-0.05109	-0.13530	0.11029	0.11373	0.03420
	(0.002)	(0.176)	(0.080)	(0.486)	(0.641)	(0.277)	(0.411)	(0.119)	(0.085)
Adjusted R^2	0.125	0.220	0.164	0.147	0.128	0.181	0.098	0.213	0.171
No. of Obs	5,282	5,390	2,190	4,226	4,211	4,214	3,930	5,215	5,868

This table reports the regression results of models after the coarsened exact matching (weighted). Dependent variables are *GrosProfR*, *EBITR*, *NFinExpR*, *Lev1*, *Lev2*, *Lev3*, *Lev4*, *ProfBTaxR* and *TaxRxpR* respectively. *GrosProfR* is measured by gross profit divided by operating revenue; *EBITR* is measured by EBIT divided by operating revenue; *NFinExpR* is measured by interest expense minus interest revenue and divided by operating revenue; Leverage ratio is measured by non-current debts divided by total assets (*Lev1*), or by the sum of non-current debts and current loans divided by total asset (*Lev2*), or by non-current liabilities divided by total assets (*Lev3*), or by the sum of non-current and current liabilities divided by total asset (*Lev4*); *ProfBTaxR* is measured by profit before tax divided by operating revenue; *TaxExpR* is measured by tax expense divided by operating revenue; *FOAC* takes value of "1" if the company is a FOAC and "0" otherwise; *PostBEPS* takes value of "1" if the year falls in the post-BEPS period and "0" otherwise; *FOAC×PostBEPS* is the interaction term between *FOAC* and *PostBEPS; Size* is measured by the natural logarithm of sales revenue; *CapInt* is measured by the sum of tangible fixed assets and intangible fixed assets divided by total assets. Standard errors are clustered by firms.

Appendix 5

This appendix includes a table that reports the mean values of sales revenue (i.e. operating revenue) in models with different matching specifications and with different dependent variables.

Table A5

Mean Values of Sales Revenue

(In AUD)

	Matching specifications			
	Unmatched	**PSM**	**CEM (k-to-k)**	**CEM (weighted)**
GrosProfR	1,130,000,000	805,000,000	872,000,000	856,000,000
EBITR	1,190,000,000	888,000,000	686,000,000	656,000,000
NFinExpR	1,330,000,000	1,560,000,000	666,000,000	628,000,000
Lev1	1,070,000,000	1,140,000,000	699,000,000	632,000,000
Lev2	1,070,000,000	1,200,000,000	693,000,000	633,000,000
Lev3	1,070,000,000	1,020,000,000	696,000,000	632,000,000
Lev4	1,090,000,000	1.070,000,000	730,000,000	654,000,000
ProfBTaxR	1,200,000,000	953,000,000	671,000,000	647,000,000
TaxExpR	1,150,000,000	981,000,000	823,000,000	832,000,000

This table reports mean values of sales revenue in unmatched OLS (cluster) model, PSM model, CEM (k-to-k) model and CEM (weighted) model. Dependent variables are *GrosProfR*, *EBITR*, *NFinExpR*, *Lev1*, *Lev2*, *Lev3*, *Lev4*, *ProfBTaxR* and *TaxRxpR* respectively.

Appendix 6

This appendix includes tables reporting the coefficients of a set of industry indicators in the additional test. Table A6.1 shows the coefficients of industry indicators in the pooled OLS regression models with standard errors clustered by firms.

Table A6.1
Pooled Regression Results – Industry Indicators
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
IND2	0.17685	0.10519	-0.01185	-0.13599	0.10810	0.03484
	(0.000)	(0.101)	(0.528)	(0.002)	(0.107)	(0.081)
IND3	0.13552	-0.04571	-0.03158	-0.06700	-0.04187	-0.01285
	(0.000)	(0.457)	(0.062)	(0.090)	(0.515)	(0.494)
IND4	0.50178	-0.05366	-0.04374	-0.09256	-0.05815	-0.01839
	(0.002)	(0.396)	(0.011)	(0.282)	(0.377)	(0.353)
IND5	0.01174	-0.05803	-0.03222	-0.00919	-0.05229	-0.01249
	(0.775)	(0.353)	(0.058)	(0.832)	(0.422)	(0.513)
IND6	0.09175	-0.06744	-0.03634	-0.03425	-0.06134	-0.01832
	(0.012)	(0.273)	(0.034)	(0.417)	(0.339)	(0.329)
IND7	0.20842	-0.07109	-0.04371	-0.01816	-0.06100	-0.01837
	(0.000)	(0.250)	(0.009)	(0.685)	(0.345)	(0.332)
IND8	0.50150	0.02604	-0.03185	-0.15896	0.02783	0.00824
	(0.000)	(0.708)	(0.095)	(0.030)	(0.695)	(0.691)
IND9	0.03606	-0.04323	-0.04073	-0.03293	-0.04058	-0.01331
	(0.497)	(0.497)	(0.018)	(0.492)	(0.541)	(0.489)
IND10	0.26887	-0.02293	-0.02441	-0.02175	-0.01589	-0.00553
	(0.000)	(0.716)	(0.153)	(0.626)	(0.809)	(0.774)
IND12	0.15021	0.04301	0.01026	0.03549	0.03568	-0.00559
	(0.028)	(0.591)	(0.707)	(0.471)	(0.639)	(0.777)
IND13	0.16379	-0.03988	-0.02665	-0.00959	-0.02996	-0.00899
	(0.001)	(0.519)	(0.125)	(0.815)	(0.643)	(0.634)
IND14	-0.01281	-0.02959	-0.03311	-0.00997	-0.01155	-0.01032
	(0.725)	(0.660)	(0.055)	(0.837)	(0.870)	(0.611)
IND15	0.27761	-0.03694	-0.04479	-0.14211	-0.02003	-0.00692
	(0.271)	(0.561)	(0.008)	(0.236)	(0.764)	(0.721)
IND16		-0.03966	-0.01129	0.14949	-0.01173	0.00864
		(0.524)	(0.660)	(0.003)	(0.856)	(0.651)
IND17	0.19498	-0.02723	-0.01618	-0.00776	-0.03434	-0.00812
	(0.000)	(0.671)	(0.393)	(0.884)	(0.602)	(0.673)
IND18	0.21472	0.03805	-0.01327	-0.19653	0.03311	-0.00398
	(0.034)	(0.550)	(0.534)	(0.015)	(0.618)	(0.838)
IND19	0.20701	-0.05566	-0.03687	0.05719	-0.05321	-0.01634
	(0.023)	(0.379)	(0.039)	(0.495)	(0.415)	(0.394)

Table A6.2 shows the coefficients of industry indicators in models after the propensity score matching.

Table A6.2
PSM Regression results – Industry Indicators
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
IND2	0.16063	0.06718	-0.04216	-0.13358	0.17451	0.00807
	(0.000)	(0.338)	(0.124)	(0.049)	(0.000)	(0.781)
IND3	0.15098	-0.05673	-0.05954	-0.04602	0.03820	-0.02929
	(0.000)	(0.404)	(0.017)	(0.472)	(0.176)	(0.302)
IND4	0.26135	0.01271	-0.07010	0.01732	0.01161	-0.02936
	(0.000)	(0.864)	(0.006)	(0.793)	(0.678)	(0.310)
IND5	0.03238	-0.08273	-0.06445	-0.01304	0.03567	-0.02966
	(0.418)	(0.229)	(0.010)	(0.851)	(0.238)	(0.298)
IND6	0.19371		-0.06660	0.01055		
	(0.001)		(0.007)	(0.874)		
IND7	0.23449	-0.07952	-0.07074	-0.04211	0.02140	-0.03804
	(0.000)	(0.244)	(0.004)	(0.543)	(0.453)	(0.179)
IND8	0.49465	0.05635	-0.04623	-0.08798	0.17228	0.00084
	(0.000)	(0550)	(0.105)	(0.397)	(0.000)	(0.978)
IND9		-0.05187	-0.06926	-0.04003	0.03807	-0.03074
		(0.471)	(0.007)	(0.610)	(0.263)	(0.281)
IND10	0.30355	-0.03822	-0.05665	0.01265	0.05073	-0.02180
	(0.000)	(0.580)	(0.021)	(0.854)	(0.093)	(0.449)
IND12	0.11752	0.08158	-0.02672	0.01884	0.12514	-0.02070
	(0.043)	(0.469)	(0.502)	(0.801)	(0.014)	(0.472)
IND13	0.18298	-0.05198	-0.05986	0.01701	0.05342	-0.02259
	(0.000)	(0.444)	(0.015)	(0.795)	(0.061)	(0.427)
IND14	0.01716	-0.05873	-0.06555	-0.03313	0.06746	-0.02984
	(0.654)	(0.405)	(0.008)	(0.689)	(0.116)	(0.304)
IND15						
IND16		-0.03796				0.00689
		(0.587)				(0.829)
IND17		0.01249	-0.04200	-0.02638	0.02436	-0.03061
		(0.856)	(0.193)	(0.779)	(0.541)	(0.302)
IND18	0.21589	0.01113	0.02125		0.11653	-0.01666
	(0.167)	(0.872)	(0.723)		(0.000)	(0.558)
IND19			-0.07035	-0.01736	0.07860	-0.01615
			(0.009)	(0.7933)	(0.007)	(0.581)

Table A6.3 shows the coefficients of industry indicators in models after the coarsened exact matching (k-to-k).

Table A6.3
CEM (k-to-k) Regression results – Industry Indicators
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
IND2	0.22326	0.04018	-0.09427	-0.05670	0.09979	0.01794
	(0.000)	(0.561)	(0.284)	(0.494)	(0.015)	(0.364)
IND3	0.20093	-0.10428	-0.11349	0.00077	-0.04486	-0.02176
	(0.000)	(0.116)	(0.196)	(0.992)	(0.219)	(0.248)
IND4	0.49141	-0.11982			-0.07241	-0.02664
	(0.000)	(0.096)			(0.088)	(0.159)
IND5	0.07859	-0.12222	-0.11010	0.05709	-0.05217	-0.02228
	(0.119)	(0.067)	(0.211)	(0.517)	(0.164)	(0.243)
IND6	0.15966	-0.13591	-0.11836	0.04684	-0.06823	-0.02769
	(0.000)	(0.041)	(0.178)	(0.585)	(0.064)	(0.142)
IND7	0.29452	-0.12147	-0.12497	0.03742	-0.05406	-0.02481
	(0.000)	(0.069)	(0.154)	(0.676)	(0.150)	(0.192)
IND8	0.55103	-0.02099	-0.11688	-0.14402	0.03641	0.00245
	(0.000)	(0.817)	(0.192)	(0.226)	(0.596)	(0.909)
IND9	0.36605	-0.09873	-0.13012	0.05890	-0.03394	-0.01949
	(0.020)	(0.163)	(0.138)	(0.509)	(0.438)	(0.328)
IND10	0.30838	-0.08668	-0.11462	0.05292	-0.02232	-0.01612
	(0.000)	(0.205)	(0.191)	(0.547)	(0.591)	(0.403)
IND12	0.17786	0.01383	-0.09900	0.06157	0.03828	-0.00956
	(0.017)	(0.892)	(0.260)	(0.543)	(0.521)	(0.644)
IND13	0.22385	-0.09627	-0.11122	0.05170	-0.03222	-0.01702
	(0.000)	(0.149)	(0.206)	(0.539)	(0.384)	(0.368)
IND14	0.04670	-0.09192	-0.11868	0.05070	-0.00580	-0.02034
	(0.300)	(0.236)	(0.177)	(0.576)	(0.920)	(0.310)
IND15						
IND16						
IND17		-0.06217			-0.01571	-0.01946
		(0.368)			(0.676)	(0.313)
IND18	0.17641	-0.11125		-0.24874	-0.04622	0.00572
	(0.001)	(0.131)		(0.093)	(0.360)	(0.876)
IND19		-0.09653	-0.11642	0.06359	-0.04240	-0.02330
		(0.191)	(0.189)	(0.513)	(0.325)	(0.345)

Table A6.4 shows the coefficients of industry indicators in models after the coarsened exact matching (weighted).

Table A6.4
CEM (weighted) Regression results – Industry Indicators
(p-value is reported in the parentheses below the regression coefficient)

	GrosProfR	***EBITR***	***NFinExpR***	***Lev4***	***ProfBTaxR***	***TaxExpR***
IND2	0.23568	0.05953	-0.10551	-0.02969	0.09248	0.03651
	(0.000)	(0.327)	(0.235)	(0.697)	(0.045)	(0.012)
IND3	0.19866	-0.08764	-0.12707	0.01601	-0.06174	-0.01133
	(0.000)	(0.129)	(0.149)	(0.829)	(0.134)	(0.378)
IND4	0.48027	-0.10930			-0.09363	-0.01756
	(0.000)	(0.088)			(0.046)	(0.177)
IND5	0.08564	-0.09648	-0.12194	0.07094	-0.06930	-0.01228
	(0.174)	(0.097)	(0.167)	(0.384)	(0.097)	(0.350)
IND6	0.15963	-0.10935	-0.13098	0.06899	-0.08015	-0.01642
	(0.001)	(0.058)	(0.137)	(0.376)	(0.052)	(0.200)
IND7	0.29040	-0.10581	-0.13815	0.06618	-0.07448	-0.01578
	(0.000)	(0.068)	(0.116)	(0.418)	(0.074)	(0.226)
IND8	0.59140	0.02122	-0.13313	-0.15458	0.04262	0.01118
	(0.000)	(0.808)	(0.137)	(0.173)	(0.563)	(0.518)
IND9	0.28783	-0.08210	-0.14458	0.07063	-0.05351	-0.01064
	(0.049)	(0.174)	(0.100)	(0.367)	(0.240)	(0.435)
IND10	0.29462	-0.07548	-0.12629	0.05934	-0.04541	-0.00459
	(0.000)	(0.212)	(0.151)	(0.481)	(0.315)	(0.744)
IND12	0.13633	-0.00025	-0.11275	0.09541	-0.00750	-0.00030
	(0.040)	(0.997)	(0.201)	(0.324)	(0.881)	(0.983)
IND13	0.22544	-0.08463	-0.12315	0.08508	-0.05331	-0.00811
	(0.000)	(0.144)	(0.163)	(0.270)	(0.199)	(0.531)
IND14	0.05235	-0.10150	-0.13143	0.05819	-0.05527	-0.01332
	(0.326)	(0.098)	(0.136)	(0.480)	(0.238)	(0.356)
IND15						
IND16						
IND17		-0.05599			-0.03440	-0.01064
		(0.368)			(0.428)	(0.420)
IND18	0.19020	-0.07993		-0.26603	-0.04731	0.01229
	(0.002)	(0.214)		(0.049)	(0.357)	(0.669)
IND19		-0.08243	-0.12973	0.06801	-0.05918	-0.01241
		(0.195)	(0.144)	(0.436)	(0.189)	(0.381)