Detecting profit shifting in Indonesia using the Hines and Rice approach

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Abstract

Prior studies suggest that profit shifting by multinational enterprises (MNEs) occurs not only in developed countries but also in developing ones. However, the knowledge of profit shifting in developing countries is very limited, because the findings of most of the prior studies are difficult to interpret due to problems about reliability of data and method used to measure profit shifting (Fuest & Riedel, 2012).

This article investigates whether foreign-owned Indonesian companies (FOICs) shift profits out of Indonesia by following an approach introduced by Hines and Rice (1994) (hereafter HRA) with some modifications. HRA has been widely cited in the literature of international tax avoidance. We examine both the accounting profit and taxable income reported by FOICs in their Indonesian tax returns using confidential data supplied by the Indonesian tax authority.

After analysing a final sample of over 3,000 observations from 2009 to 2015, we find that on average a one percentage point lower statutory tax rate in the residence country of an FOIC's parent is associated with a reduction of 2.6% and 2.9%, respectively, in the pre-tax accounting profit and taxable income reported by the FOIC in its Indonesian tax return.

Keywords: profit shifting; Indonesia; tax return data; Hines and Rice approach

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1. INTRODUCTION

Business enterprises view tax as an expense and may try to avoid it. Multinational enterprises (MNEs) are in a better position to avoid tax because different countries have different tax rates and tax rules that MNEs can exploit. The most widely known method of international tax avoidance involves shifting profits to low tax jurisdictions, causing erosion of the tax base of high tax jurisdictions.

Although most base erosion and profit shifting (BEPS) strategies are legal, according to the Organisation for Economic Co-operation and Development (OECD) (2015a), the process generates several undesirable consequences. First, BEPS distorts competition because MNEs may gain competitive advantages from BEPS opportunities that domestic companies do not have. Second, it may cause the inefficient allocation of resources by distorting investment decisions towards activities that have lower pre-tax rates of return, but higher after-tax returns. Finally, it discourages voluntary compliance of most taxpayers because they observe that MNEs legally avoid income tax. The three potential distortions, compounded by the fact that most developing countries heavily rely on corporate income tax (CIT) revenue, have positioned studies on BEPS – particularly studies that focus on developing countries – as highly important.

The incidence of profit shifting by MNEs in developed countries has been confirmed by many empirical studies over several decades (e.g., Hines & Rice, 1994; Huizinga & Laeven, 2008; Dowd, Landefeld & Moore, 2017). By contrast, similar studies that focus on developing countries have only emerged in the past few years (e.g., Janský & Prats, 2015; Salihu, Annuar & Obid, 2015). Fuest and Riedel (2012) argue that the reason why knowledge on profit shifting in developing countries is limited is because the data and method used to measure profit shifting are not reliable.

This article investigates whether foreign-owned Indonesian companies (FOICs) shift profits out of Indonesia using a research method introduced by Hines and Rice (1994) with some modifications. Hines and Rice's pioneering (1994) study on profit shifting by MNEs 'established a conceptual framework that continues to be highly influential' (Dharmapala, 2014a, p. 424).[1] Dowd, Landefeld and Moore (2017) suggest that the Hines and Rice approach (hereafter HRA) has become a standard in the literature.[2]

Despite the fact that the results in studies that adopt the HRA vary, they are consistent with the hypothesis that there is a negative relation between the level of CIT rates in the host countries and the magnitude of profits reported by MNEs in different host countries. However, few studies have adopted the HRA to measure the extent to which the tax rate of the parent's country of a foreign-owned company operating in a developing country influences the profits reported by the foreign-owned company. This article is one of the early studies that uses the HRA to examine the existence of profit shifting by MNEs in a developing country using tax return data that cover a relatively long period of study.

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[1] Grubert and Mutti (1991) also published a widely cited study.

[2] According to Dowd, Landefeld and Moore (2017, p. 2), 'Hines and Rice estimated the semi-elasticity of profits with respect to marginal tax rates, and their semi-log specification has become a standard in the literature and is one that we adopt here. Derived from a standard production function, this specification controls for the real economic activities of a firm using measures of capital and labor. The tax rate captures the profit shifting incentive for firms'.

This study uses tax return data supplied by the Directorate General of Taxes (DGT) – the Indonesian tax authority – under a data non-disclosure agreement. The DGT removes all identifying particulars from the data because of privacy protection requirements, i.e., firms are anonymised. The dataset only includes the country where the immediate parent of an FOIC is located. Therefore, in this study, we define 'parent's country' as the country where the immediate parent of an FOIC is located, not the country where the ultimate parent is located. We also define 'parent's tax rate' as the statutory tax rate (STR) of the country in which the immediate parent is located. To take Google as an example, PT Google Indonesia is an FOIC. It is a subsidiary of Google Asia Pacific Pte Ltd, located in Singapore. Google Asia Pacific is ultimately owned by Alphabet Inc. in the United States (US). Here, Google Asia Pacific is the immediate parent. Therefore, in this article we use the Singaporean tax rate, not the US tax rate, to examine whether PT Google Indonesia shift profits out of Indonesia.

This article measures profit in two ways: (1) taxable income (TI) based on tax law, and (2) accounting profit before tax (AP) based on financial reporting rules. This article reports the results for AP first because this study adopts the HRA which uses AP as the dependent variable. However, both AP and TI will be discussed equally given that TI is the key feature in this article, because it directly reflects the loss of tax revenue given that CIT is based on TI.

After analysing a final sample of more than 3,000 firm-year observations from 2009 to 2015, this study finds that a parent's tax rate that is one percentage point lower is associated with a reduction of 2.56% and 2.89% in the AP and TI, respectively, reported by FOICs to the Indonesian tax authority, suggesting the existence of profit shifting by FOICs. This article provides additional empirical evidence of cross-border profit shifting by MNEs in developing countries.

The rest of this article is organised as follows. The next section briefly describes the HRA, reviews some prior studies that use the HRA and develops the hypothesis to be tested in this study. Section 3 describes the research design of the study. Section 4 reports the empirical results. Section 5 concludes the article. A brief description of the company income tax system in Indonesia can be found in Appendix 1.

2.   THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1   The Hines and Rice approach in detecting cross-border profit shifting

According to the basic tax competition model, governments commit to a tax system and capital owners choose where to invest their capital (Wilson, 1999). However, once location decisions are made, firms or capital become partially immobile. Some firms may leave a region after an initial tax break has expired and choose to seek tax breaks in other regions (Wilson, 1999). From an international tax avoidance perspective, moving to other regions may not be necessary if MNEs have an opportunity to reallocate TI from countries with high tax rates to countries with low tax rates (Hines, 1999). This international tax avoidance strategy is known as profit shifting.

In their seminal paper, Hines and Rice (1994) develop an economic approach to investigate the effect of tax rate variation on profits reported by MNEs. As Dharmapala (2014a) explains, the basic premise of the HRA is that pre-tax income consists of two components: (1) 'true' income, i.e., income produced using capital and labour inputs; and (2) 'shifted' income, i.e., income shifted across borders because of a tax incentive

in the form of a tax rate difference between countries. Equation (1) represents the original HRA:

$$\log\pi_i = \beta_0 + \beta_1\tau_i + \beta_2\log K_i + \beta_3\log L_i + \beta_4\log A + \varepsilon_i \qquad (1)$$

where:

$\log\pi_i$ the dependent variable, is the logarithm of the pre-tax income of all US MNEs' foreign affiliates in host country i calculated based on confidential US Department of Commerce survey data;

τ_i the independent variable, is the average tax rate in host country i; the HRA bases the average tax rate on the effective tax rate (ETR) or the statutory tax rate (STR) whichever is lower. The ETR is CIT paid by all US affiliates in the local country i divided by their total net income before tax;

K_i is the capital input in host country i;

L_i is the labour input in host country i;

A   is the level of productivity in host country i (proxied by income per capita);

ε_i is the error term.

Using country-level aggregate data on US-owned MNE affiliates operating in 59 countries in 1982, Hines and Rice (1994) use Equation (1) to estimate the effect of tax rate variation in the host countries on the profits reported by MNEs in those countries. In calculating K_i, the HRA includes real/economic capital and excludes financial capital. For π_i, the HRA removes financial earnings (i.e., interest received and interest paid) from reported profits because available financial data are not as reliable or as comprehensive as the data used to estimate K_i (Hines & Rice, 1994, p. 161). Hines and Rice (1994) find a negative effect of tax rates of host countries on measures of the profitability of US MNEs' affiliates. The effect is noticeably large – that is, a tax rate in a host country that is one percentage point higher is associated with a 2.83% reduction in the before-tax profitability reported in that host country.

The HRA has been widely adopted by numerous subsequent studies that examine the existence of profit shifting activities by MNEs. Despite the results showing some deviations from the original study, the subsequent studies prove that the HRA is a robust method for investigating how tax rate disparities can influence MNEs' behaviour in reporting profits in different countries. Three studies that adopt the HRA are reviewed below.

Swenson (2001) studies how import tariff variations across products provide other countries' MNEs operating in the US an incentive to shift profits by means of transfer pricing (i.e., by deliberately underpricing or overpricing affiliated firm transactions) over the period 1981-1988. The source countries of the investments are Canada, France, Germany, Japan and the UK. Swenson (2001) adopts some existing approaches – one of which is the HRA – to build a model of transfer pricing incentives with some modifications. While the author finds significant evidence that the tariff variation creates incentives for underpricing or overpricing affiliated firm transactions, she concludes that the manipulation of product transfer prices is not the main channel used to shift profits.

Using micro-level data relating to the operations of Europe-based MNEs in many European countries, Huizinga and Laeven (2008) adopt the HRA to investigate the opportunities and incentives created by cross-border profit shifting. They find that the effect of a tax rate variation of one percentage point higher on pre-tax profit is 1.08%, which is much lower than the 2.83% obtained by Hines and Rice (1994). They argue that the much higher percentage found by Hines and Rice (1994) is because Hines and Rice included many tax havens outside Europe that presumably do not have effective cross-border profit shifting regulations.

A recent study by Dowd, Landefeld and Moore (2017) not only adopts the HRA, but also states that the semi-log specification introduced by Hines and Rice (1994) has become a standard in the literature. Using a panel dataset of US tax returns, Dowd, Landefeld and Moore (2017) scrutinise the profit shifting behaviour of US MNEs over the period 2002-2012 and suggest consideration of a non-linear relation between the tax rate and reported profits.

2.2   Profit shifting in developing countries

The studies discussed in the previous section focus on developed countries and confirm that MNEs shift profits. However, MNEs operate not only in developed countries, but also in developing countries. As a result, when MNEs commit profit shifting strategies, both developed and developing countries are likely to be affected. This makes BEPS a global issue, and developed countries alone cannot sufficiently address it. Unfortunately, while empirical studies on developed countries are abundant, few studies have focused on developing countries. This section discusses some studies that have developing countries as their focus. It also examines why there are limited empirical studies in developing countries.

Profit shifting within MNEs has been an issue in developed countries for decades. However, it has only recently come to the attention of policy-makers in developing countries (Janský & Kokeš, 2015). Reports of some international institutions and empirical studies that suggest and argue that developing countries may suffer from BEPS strategies by MNEs have substantially contributed to this attention. For example, the OECD (2013a) argues that MNEs are being accused of avoiding taxes worldwide – particularly in developing countries, where tax revenue is critical to promote sustainable development.

In line with the OECD's report, Dharmapala (2014b) claims that developed countries do not rely on corporate tax revenues and therefore do not consider BEPS activity by MNEs a major determining factor to their overall level of tax revenue. In contrast, developing countries rely on corporate tax revenue because it contributes a significant proportion of their total tax revenue, and they may find it difficult to switch to other forms of taxation (Dharmapala, 2014b). As a result, 'developing countries are especially vulnerable to BEPS activity' (Dharmapala, 2014b, p. 10). This statement is consistent with the OECD's (2014b) view that some of the lowest-income countries rely on income tax from the operations of foreign MNEs.

Indonesia is not an exception. From economic surveys on Indonesia, the OECD (2012, 2015b) finds that the nation's budget relies heavily on revenue from corporate tax. Another international institution that finds that developing countries rely on corporate tax revenue is the International Monetary Fund (IMF), which estimates that the global annual corporate tax revenue loss caused by BEPS is approximately 5% of the total CIT

revenue (IMF, 2014). Moreover, the IMF estimates that the loss is as high as 13% in developing countries, confirming the high vulnerability of developing countries to profit shifting.

In 2012, the G20 initiated a global project to tackle profit shifting by MNEs and asked the OECD to undertake the project. The OECD agreed and launched the project, called *Base Erosion and Profit Shifting*, in February 2013. The G20 countries which are not OECD members (e.g., Indonesia) became associates that have equal footing with OECD members in the project and agreed to adopt an Action Plan[3] to address BEPS in September 2013 (OECD, 2013b). Since its launch, the project has received consistent support from the G20 and is known as the OECD/G20 BEPS Project or the BEPS Project. The OECD continues to encourage developing countries to be involved in the project. For example, in its *Economics Surveys: Indonesia 2015* report (OECD, 2015b, p. 15), the OECD recommends that Indonesia 'continue to be actively engaged in the OECD's Base Erosion and Profit Shifting (BEPS) Project' because the OECD believes that the project is an efficient tool to 'facilitate and improve corporate taxation for multinationals which should benefit Indonesia's tax collection' (OECD, 2016, p. 100).

2.3 Empirical evidence of profit shifting in developing countries and hypothesis development

In contrast to the considerable empirical evidence available from developed countries, there is a dearth of empirical evidence from developing countries regarding the extent to which multinational tax evasion and tax avoidance cause tax revenue losses (Fuest & Riedel, 2009; Crivelli, De Mooij & Keen, 2016). The limited empirical evidence of profit shifting strategies used by MNEs in developing countries is extensively discussed by Fuest and Riedel (2012), who review the literature on income shifting in developing countries and conclude that, while developing countries suffer from profit shifting strategies, there is inadequate knowledge regarding the extent of the revenue losses. The outcomes of most of the existing studies are difficult to interpret, mainly because of problems regarding the reliability of the data and method used to measure income shifting (Fuest & Riedel, 2012). This argument is reasonable given that the extant literature on developing countries mostly consists of unrefereed reports that have not been exposed to critical peer review (e.g., Christian Aid, 2009; Oxfam, 2000; Baker, 2005).[4] In addition, poor data availability – both in terms of quality and quantity – has led to limited empirical research into profit shifting in developing countries (OECD, 2015c).

In the past few years, the number of empirical studies that focus on finding evidence of profit shifting by MNEs in developing countries has increased. However, none of these studies have adopted the HRA, despite the fact that the HRA has been identified as a

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[3] See the OECD's report entitled *Action Plan on Base Erosion and Profit Shifting* for details of the 15-point Action Plan proposed by the OECD (2013b).

[4] For example, Cobham (2005) estimates that developing countries lose USD 50 billion per year because the corporate sector shifts profits to lower-tax jurisdictions. However, as Fuest and Riedel (2009) suggest, this claim is not based on rigorous empirical analysis. Cobham (2005) based his estimation on an Oxfam (2000) report that contains several issues. A major drawback is that its estimation is based on an average corporate tax rate of 30%, while in fact many developing countries offer low or zero tax rates as incentives for corporate investment (Fuest & Riedel, 2009). As Oxfam's (2000) estimation ignores the incentives, its claim on the magnitude of the tax losses due to profit shifting in developing countries is likely to be overestimated (Fuest & Riedel, 2009).

primary approach to the empirical estimation of cross-border profit shifting (Dharmapala, 2014a).

A study that includes developing countries in its analysis is that of Crivelli, De Mooij and Keen (2016), who use panel data for 173 developed and developing countries to determine whether profit shifting is an important issue for developing countries. The results of the study suggest that profit shifting disadvantages developing countries at least as much as it disadvantages developed countries. However, the authors acknowledge that the conclusion may not be robust to some extent because there is scarce firm-level data for developing countries. This suggests that recent research that focuses on developing countries still encounters data-related issues.

Johannesen, Tørsløv and Wier (2020) use a global dataset of 102 countries and find that less developed economies are more sensitive to profit shifting by MNEs than more developed economies. A brief summary is presented below of two recent studies that attempt to find evidence of profit shifting by MNEs in a particular developing country.

Janský and Prats (2015) examine whether more than 1,500 MNEs operating in India shifted profits in 2010 and find that MNEs associated with tax havens reported lower profits and paid less Indian income taxes than MNEs with no such association. The authors conclude that MNEs have incentives to shift profits to tax havens because of lower tax rates and the secrecy provisions offered by those countries.

Using financial data for 100 Malaysian-listed corporations for 2009-2011, Salihu, Annuar and Obid (2015) examine the relationships between foreign investors' interests and tax avoidance by means of profit shifting in Malaysia. Using a generalised method of moment estimator, they demonstrate that the relationship between foreign investors' interests and tax avoidance is significantly positive among large Malaysian corporations.

Despite differences in the quantity and quality of the evidence, the four studies discussed above demonstrate that MNE affiliates operating in developing countries that have a parent or affiliate located in a country with a lower tax rate tend to shift profits to the lower tax country. Applying the findings of the prior studies to the case of Indonesia, given that the confidential dataset used by this study only contains the location of the immediate parent of each FOIC, it is hypothesised that FOICs with parents located in countries with higher tax rates will report higher profits in their Indonesian tax returns than FOICs that have parents located in countries with lower tax rates. Profit in this study is represented by both TI and AP reported by FOICs in their Indonesian tax returns. Profit shifting is a book-tax conforming tax avoidance strategy: outward profit shifting lowers AP as well as TI. This leads to the following two hypotheses stated in the alternative form:

H$_1$:   *The parent's tax rate of an FOIC is positively associated with the FOIC's AP reported in its Indonesian tax returns after controlling for capital and labour inputs.*

H$_2$:   *The parent's tax rate of an FOIC is positively associated with the FOIC's TI reported in its Indonesian tax returns after controlling for capital and labour inputs.*

3.   RESEARCH DESIGN

3.1   Sample selection and period of study

This study uses a sample that includes all foreign-owned Indonesian companies with tax return data supplied by the DGT under a data non-disclosure agreement. For privacy protection, firms are anonymised. The dataset only shows the country where the immediate parent of an FOIC is located.

The study period covers the seven years from 2009 to 2015. The reason for starting the study from 2009 is due to the completion of a thorough tax administration reform in Indonesia in 2008 (DGT, 2009). The tax administration reform had equipped DGT's tax office units nationwide with 'more efficient, simplified and transparent business process, more advanced system and information technology, better human resources, improved good governance and more efficient structure of organisation' (DGT, 2009, p. 38). In turn, since 2009, the DGT has been providing a more reliable database for research purposes, regardless of the tax office units with which the firms are registered. The reason for ending the period of study in 2015 is simply because 2015 is the latest year for which data are available from the DGT when this study is conducted. The final sample consists of 3,390 (3,188) observations for the regression model using AP (TI) as the dependent variable – most of which (about 73% for both models) are registered in tax offices located on the island of Java.[5]

Table 1 presents the final sample derivation for both dependent variables. The distribution of countries in which the parents of FOICs are located can be found in Appendix 2.

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[5] Java (where the capital of Indonesia, Jakarta, is located) accounts for about 60% of the total population, even though it is only the fifth largest island of the nation. About 60% of the nation's GDP comes from Java. The business sector finds it easier to run business in Java due to better infrastructure, abundance of labour supply, better education and labour quality, etc. Therefore, it is not surprising that 73% of the FOICs are registered in the Java tax offices.

Table 1: Derivation of the Final Sample of Firm-Year Observations

	AP	TI
Number of firm-years between 2009–2015 for which the dependent variable is available	11,281	11,281
Less:		
Number of firm-years that report loss (AP < 0 or TI < 0)	4,514	3,351
Number of firm-years of which the natural log of capital cannot be calculated (i.e., zero or missing)	2,193	2,596
Number of firm-years of which the natural log of labour cannot be calculated	1,175	1,285
Number of firm-years of which the natural log of AP or TI cannot be calculated	9	861
Final sample of firm-year observations	3,390	3,188

This study excludes FOICs that reported a loss in their tax returns. It is a common practice in the literature to exclude loss-making firms from the sample (Dharmapala, 2014a). Although losses reported in tax returns may have resulted from profit shifting activities, it is impossible to distinguish a genuine business loss from a loss caused by profit shifting. Moreover, a natural logarithm cannot be computed for a negative AP or TI. There is a significant number of missing data (or zero) for the calculations of the natural logarithm of capital and labour and, to a lesser extent, for the calculations of the natural logarithm of the two profit measurements.

3.2   Measurement of variables and regression model

This study investigates whether FOICs shift profits out of Indonesia in response to variations in their parents' tax rates (see Appendix 3 for STRs of the countries in which the parents of FOICs are located over the study period). Specifically, this study examines whether MNEs from various countries operating in Indonesia shift profits out of Indonesia to low-tax jurisdictions. It differs from the study of Hines and Rice (1994) which examines whether US MNEs operating in various host countries shift profits to low-tax jurisdictions. The HRA is suitable for this study for the following reasons.[6] First, the model of Hines and Rice (1994) is based on the Cobb–Douglas production function, which represents the relationship between output (in terms of income or profit) and input (mainly in terms of capital and labour). Therefore, the HRA is suitable for both firm- and country-level studies. Second, the basic premise of the HRA is that the observed profit consists of two components: the 'true' profit and the 'shifted' profit.

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[6] In fact, the HRA is likely to be more suitable for examining profit shifting by MNEs based in different countries that have affiliates operating in a single country because a single-country study does not need to consider the real price of capital and labour, which may differ between countries. This is one focus of the HRA (Hines & Rice, 1994).

This premise is applicable to all MNE affiliates, either in many countries or in a single country.

However, this study modifies the original HRA in Equation (1) in several ways. The first modification is related to the dependent variable. This study uses pre-tax profit (both AP and TI)[7] rather than pre-tax non-financial income (i.e., earnings before interest and taxes (EBIT)) as the dependent variable because it focuses on finding indirect evidence of cross-border profit shifting in Indonesia by investigating the effect of the parents' tax rate variation on the profits reported by FOICs in their Indonesian tax returns. The estimated effect is expected to capture potential cross-border profit shifting activities through all possible channels, including transfer pricing and high debt financing. Employing earnings before interest and taxes is likely to be necessary when one tries to disentangle the transfer pricing and debt shifting channels (Dharmapala & Riedel, 2013).[8] Therefore, as in prior studies (e.g., Markle, 2015; Huizinga & Laeven, 2008; Dharmapala & Riedel, 2013), this study uses pre-tax profit as the dependent variable to detect the existence of cross-border profit shifting in Indonesia.

The second modification is related to the independent variable. This study uses the parent's tax rate (*PTR*) rather than the average tax rate in the host country (τ in Equation (1)) as the independent variable because this study focuses on incoming investment as opposed to Hines and Rice's study, which focuses on outgoing investment. Using *PTR* as the independent variable is expected to provide evidence of the effect of the parent's tax rate on the AP and TI reported by FOICs in their Indonesian tax returns. This study predicts that the coefficient of *PTR* is positive – that is, the higher (lower) the tax rate of the parent's country, the higher (lower) the AP and TI reported in Indonesia. This study uses STR instead of ETR as the *PTR*. While there has been a debate regarding which of these is a better proxy for tax incentives to shift profits, STR may act as a better proxy for an incentive to shift profits because it is set by the government and is therefore exogenous to firms' choice (Dharmapala, 2014a).

The third modification concerns the control variables for the level of productivity in the local country (*A*), which is excluded from this study. This variable is excluded because the data used in this study are about MNE affiliates in only one host country, i.e., Indonesia, as opposed to multiple host countries as in the study by Hines and Rice (1994).

These modifications lead to the two regression models represented by Equations (2) and (3), which this study uses to examine the effect of the parent's tax rate variation on the AP and TI, respectively, reported by the FOICs in their Indonesian tax returns.

$$\ln AP_{it} = \beta_0 + \beta_1 PTR_{it} + \beta_2 \ln K_{it} + \beta_3 \ln L_{it} + \beta_{4-9} Year_t + \varepsilon_{it} \qquad (2)$$

$$\ln TI_{it} = \beta_0 + \beta_1 PTR_{it} + \beta_2 \ln K_{it} + \beta_3 \ln L_{it} + \beta_{4-9} Year_t + \varepsilon_{it} \qquad (3)$$

where:

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[7] In their seminal paper, Hines and Rice (1994) use reported EBIT (i.e., an accounting profit measure) as the dependent variable. Therefore, in the current study, AP comes before TI, and both AP and TI are discussed equally. Nevertheless, the current study considers TI as the most important measure of profit because, as mentioned in section 1, any reduction in TI is a direct measurement of income tax base erosion.
[8] As mentioned in section 2.1, Hines and Rice (1994) exclude interest because they do not have reliable data.

AP_{it} is the pre-tax AP reported by FOIC i for year t;

TI_{it} is the TI reported by FOIC i for year t;

PTR_{it} is the parent's STR of FOIC i for year t;

K_{it} is the capital input of FOIC i in year t, proxied by fixed tangible assets;

L_{it} is the labour input of FOIC i in year t, proxied by employment compensation;

$Year_t$ is a set of six dummy variables that is expected to account for annual fluctuations in lnAP or lnTI (the dependent variable) that were not caused by PTR (the independent variable) and K and L (the control variables);

ε_i is the error term.

Pooled OLS regressions may contain a bias because of the heterogeneity issue. Unfortunately, the panel data are highly unbalanced.[9] For example, only 61 firms of the 1,229 firms in the AP sample (about 5%) have data for all seven years and the missing years may not be random. More importantly, the key independent variable, PTR, tends to be constant over the study period. Therefore, panel data analysis may not be appropriate.

Regressions of pooled cross-sectional data should be run by clustering the errors by firm to allow the regression errors to have heteroscedasticity across firms and correlation within a firm. Therefore, this study reports regressions that include adjustments for errors clustered by firms.[10] *Year* dummies are included to control for changes in profitability reported by FOICs across years due to factors such as general macroeconomic conditions that are not covered by other explanatory variables.

4.   EMPIRICAL RESULTS

4.1   Summary statistics

Table 2 presents descriptive statistics for the sample used in this study. The mean value of lnAP (lnTI) is 22.073 (22.095), suggesting that the sample of FOICs reported AP (TI) of almost IDR 4 billion, which is equivalent to approximately USD 300,000 using 2015 exchange rates for tax purposes. The *PTR* ranges from zero to 55%. Examples of countries in the sample that have zero STR are the British Virgin Islands, Cayman Islands, Channel Islands and Marshall Islands. A country in the sample that has STR of 55% is the United Arab Emirates.

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[9] See Appendix 4 for a summary of the distribution of the unbalanced panel data.
[10] In STATA software, using the option 'cluster ()' will generate standard error estimates that are robust to disturbances being heteroscedastic and autocorrelated (Hoechle, 2007).

Table 2: Descriptive Statistics

A. Accounting Profit

Variable	No.	Mean	Median	Standard Deviation	Minimum	Maximum
lnAP	3,390	22.073	22.123	2.566	11.967	29.948
PTR	3,390	0.267	0.25	0.092	0	0.55
ln$K$	3,390	23.498	23.807	2.651	9.821	30.359
ln$L$	3,390	22.669	22.885	2.008	13.160	28.438

Notes: lnAP is the natural log of AP reported by FOICs in Indonesian tax returns (total of commercial net income in the Indonesian tax return 1771-I Section 3 plus Income tax in the Indonesian tax return 1771-I Section 5f). PTR is the parent's STR. ln$K$ is the natural log of tangible fixed assets reported in Indonesian tax returns (Indonesian tax return 1771, Special attachment, Transcript of elements citation of financial statement Sections I13—land and buildings and I14—other fixed assets). ln$L$ is the natural log of compensation reported in Indonesian tax returns (Indonesian tax return 1771 Section II2.6—total salaries, wages, bonuses, gratifications, honorariums and other compensations).

B. Taxable Income

Variable	No.	Mean	Median	Standard Deviation	Minimum	Maximum
lnTI	3,188	22.095	22.132	2.620	0	33.170
PTR	3,188	0.267	0.25	0.092	0	0.55
ln$K$	3,188	23.599	23.868	2.551	9.821	30.359
ln$L$	3,188	22.750	22.960	1.947	13.160	28.438

Notes: lnTI is the natural log of TI reported in Indonesian tax returns (Indonesian tax return 1771 Section A1—fiscal net income. Fiscal net income is TI before loss carried forward). See Panel A for definitions of other variables.

Table 3 shows the Pearson correlation between variables. Parent's tax rate (PTR) is positively correlated with both the natural log of AP (lnAP) and the natural log of TI (lnTI) and is significant at the 1% level, consistent with the prediction.

Table 3: Pearson Correlation Matrix

A. Accounting Profit

	lnAP		PTR		ln$K$		ln$L$
lnAP	1						
PTR	0.192	***	1				
ln$K$	0.726	***	0.098	***	1		
ln$L$	0.761	***	0.134	***	0.773	***	1

B. Taxable Income

	lnTI		PTR		ln$K$		ln$L$
lnTI	1						
PTR	0.211	***	1				
ln$K$	0.709	***	0.121	***	1		
ln$L$	0.746	***	0.138	***	0.777	***	1

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels in a two-tailed test, respectively.

A test of collinearity is conducted by regressing both dependent variables on all of the independent variables and calculating the variance inflation factors (VIFs) for each variable. Appendix 5 shows the VIFs when using both AP and TI as the dependent variables. The result shows that VIFs are in the range of 1.02–2.59, which is much lower than the general tolerance value of 10, suggesting the absence of the multicollinearity issue, i.e., no variable is considered a linear combination of other variables.

4.2 Regression results

After controlling for capital and labour inputs as proxies for true profit, the regressions display a positive relationship between the parent's tax rate and both AP and TI, indicating profit shifting in response to parent's tax rate consistent with the hypotheses H_1 and H_2. The regression results are presented in Table 4.

Table 4: Regression Results – Effect of Parent's Tax Rate on Reported AP and TI

$$\ln AP_{it} / \ln TI_{it} = \beta_0 + \beta_1 PTR_{it} + \beta_2 \ln K_{it} + \beta_3 \ln L_{it} + \beta_{4-9} Year_t + \varepsilon_{it}$$

	Expected sign	Dependent variable: Natural log of AP	Dependent variable: Natural log of TI
PTR (parent's tax rate)	+	2.555 ***	2.894 ***
		(4.97)	(5.80)
ln*K* (nat. log of capital)	+	0.329 ***	0.326 ***
		(11.00)	(10.11)
ln*L* (nat. log of labour)	+	0.615 ***	0.651 ***
		(14.76)	(14.30)
Year			
2010	?	−0.158 **	−0.104
		(−2.14)	(−1.47)
2011	?	−0.214 ***	−0.153 **
		(−2.79)	(−2.16)
2012	?	−0.281 ***	−0.234 ***
		(−3.33)	(−2.94)
2013	?	−0.062	−0.102
		(−0.60)	(−1.00)
2014	?	−0.110	−0.092
		(−1.16)	(−0.97)
2015	?	−0.345 ***	−0.471 ***
		(−3.77)	(−3.74)
Constant		−0.090	−1.005
		(−0.17)	(−1.70)
R²		0.637	0.612
n		3,390	3,188

Notes: *t*-statistics appear in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels in a two-tailed test, respectively. See notes to Table 2 for definitions of variables.

The coefficients of *PTR* are positive and significant at the 1% level in both regressions, suggesting that the parent's tax rate is a significant incentive for FOICs to report a higher or lower profit in their Indonesian tax returns. The estimated coefficients indicate that a one percentage point lower tax rate of the parent's country is associated with a 2.56% (2.89%) decrease in the AP (TI) reported by FOICs in their Indonesian tax returns. This figure is similar to Hines and Rice's finding that the tax rate of the host country that is one percentage point higher is associated with a 2.83% decrease in profits reported by US MNEs in that host country.

The results are consistent with the hypotheses H₁ and H₂ which predict that the parent's tax rate of an FOIC is positively associated with the profit reported by the FOIC in its

Indonesian tax return. The empirical results are consistent with the proposition that Indonesia suffers from profit shifting by FOICs.

The coefficients of ln$K$ and ln$L$ are both positive and significant at the 1% level. Moreover, the regression model represented by Equations (2) and (3) have an adjusted R-squared of 63.7% and 61.2%, respectively. The high explanatory power of the regression models is consistent with the notion that capital and labour are the inputs to generate the 'true' profits, and tax incentives determine the direction and magnitude of 'shifted' profits.

All coefficients for the *Year* dummy variables are negative, but only the coefficients for the years 2010 (for AP model only), 2011, 2012 and 2015 are significantly different from zero at the 1% or 5% level, suggesting that FOICs report significantly lower AP and TI in the said years compared with 2009 which is the base year.

5. CONCLUSION

Profit shifting by MNEs is a global concern because many large MNEs are accused of using profit shifting strategies to avoid taxes worldwide. This article examines the existence of profit shifting by foreign MNEs in Indonesia. In particular, it uses the HRA with some modifications to examine the effect of the parent's tax rate variation on the AP and TI reported by FOICs in tax returns from 2009 to 2015. The HRA is adopted because it is one of the most widely recognised approaches for detecting the presence of tax-motivated profit shifting. This study uses the AP and TI reported by FOICs in their confidential Indonesian tax returns rather than the financial statement data.

The regression results indicate that a one percentage point lower tax rate of the parent's country reduces the AP and TI reported by FOICs in their Indonesian tax returns by 2.56% and 2.89%, respectively. The findings are similar to those of Hines and Rice (1994). The coefficients for the *Year* dummies seem to suggest that before the OECD introduced the BEPS Project in 2013, FOICs demonstrated an increasing trend of shifting profits out of the country. However, once Indonesia joined the BEPS Project, the magnitude of profit shifting was held back for two years, 2013 and 2014. In 2015, the size of profit shifting resumed its upward trajectory. This phenomenon might be due to the lack of effective actions taken by the Indonesian government up to 2015 to fight profit shifting by foreign MNEs after joining the BEPS project.

Overall, the results of this study provide evidence to show that FOICs use profit shifting strategies to avoid Indonesian CIT, i.e., profit shifting is occurring in Indonesia. This is consistent with the suggestion in prior studies that developing countries also suffer from profit shifting by MNEs.

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7.   APPENDICES

Appendix 1: company income tax system in Indonesia

In Indonesia, income taxes are imposed under *Income Tax Law No. 7/1983* as last amended by *Law No. 36/2008* (hereafter ITL). The Indonesian CIT rate was 30% between the enactment of ITL in 1984 until 2008. It then decreased to 28% in 2009 and 25% in 2010.

According to ITL Article 2, whether an entity or an individual is a resident taxpayer is determined based on residency; thus, a resident company taxpayer is a company established or domiciled in Indonesia. Given that foreign-owned Indonesian companies (FOICs) domicile in Indonesia, they are considered resident taxpayers, similar to domestic-owned Indonesian companies (DOICs). FOICs and DOICs are therefore treated equally for tax purposes. In contrast, a non-resident company taxpayer is a company not established or domiciled in Indonesia, but that conducts business activity or receives income other than from business activity, either via or not via a permanent establishment such as a place of management, a branch or a representative office. If the business activity is run through a permanent establishment, ITL requires that the permanent establishment be treated as a resident company taxpayer for tax purposes.

ITL Article 4 (1) states that all income from Indonesia and outside Indonesia is subject to Indonesian income tax, suggesting that the country has adopted the worldwide income system. To avoid double taxation of foreign income, ITL Article 24 allows tax already paid offshore by resident taxpayers to be credited in the same year against tax payable in Indonesia as long as it does not exceed a certain level.[11]

No ITL articles allow the CIT paid on company profit to be attached to the dividends and claimed by shareholders as a tax credit. This implies that Indonesia adopts the classical system of company taxation (as in the United States) rather than the dividend imputation system (as in Australia). In the classical system of company taxation, income tax paid by a company cannot be passed on to its shareholders, whereas the dividend imputation system allows this to occur. As Indonesia adopts a classical system that taxes company profit and shareholders' dividend income separately, Indonesian companies have an incentive to avoid CIT to maximise shareholders' wealth. Further, tax avoidance literature suggests that foreign-owned companies avoid paying taxes in the countries where they run their business by shifting profits to associates in lower-tax jurisdictions. This reasoning applies to FOICs.

In Indonesia, consolidation only applies to financial reporting and is not adopted for tax purposes. As a result, all intra-group transactions, including transfer pricing and debt financing, are eliminated only in consolidated financial reports, but remain reflected in corporate tax returns.

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[11] Indonesian Finance Minister Decree No. 165/2002 specifies that the limit is calculated as follows: $\frac{\text{income from overseas}}{\text{global TI}}$ X total tax payable.

Appendix 2: final sample by country of parent, 2009–2015

A. Accounting Profit Model

Country	Year							
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
Japan	98	108	116	125	80	144	116	787
Korea, Republic of	77	91	114	112	44	92	186	716
Singapore	55	59	70	63	37	60	65	409
Malaysia	22	22	29	22	18	27	45	185
China	11	13	19	13	5	14	50	125
Taiwan	18	22	21	21	5	11	25	123
United States	10	17	15	16	17	20	19	114
Netherlands	19	19	14	12	9	15	15	103
Australia	14	11	14	11	15	16	16	97
Germany	10	13	15	15	13	14	17	97
British Virgin Islands	14	16	19	13	8	10	12	92
United Kingdom	12	13	16	13	8	10	10	82
Hong Kong, SAR	11	11	10	9	6	7	14	68
France	10	10	11	10	7	4	13	65
India	6	6	11	6	4	5	14	52
Switzerland	8	7	7	6	7	6	3	44
Thailand	3	3	4	2	7	6	2	27
Mauritius	4	4	4	3	2	4	5	26
Luxembourg	1	2	4	4	3	4	3	21
Spain	0	1	0	4	3	3	3	14
Italy	2	1	2	3	1	1	2	12

Country	Year							
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
Belgium	1	1	2	2	1	2	2	11
Canada	1	2	3	4	0	0	1	11
Sweden	0	2	1	2	2	1	3	11
Austria	1	2	2	1	1	1	2	10
Samoa	1	1	1	0	2	2	3	10
Denmark	1	1	1	1	0	3	2	9
Marshall Islands	1	1	1	1	1	1	1	7
Pakistan	2	2	0	0	0	1	1	6
Cayman Islands	0	0	1	1	1	1	1	5
Liberia	1	1	0	1	1	1	0	5
Philippines	1	1	1	0	0	0	2	5
Channel Islands	1	0	1	1	1	0	0	4
Panama	0	0	1	1	1	0	1	4
Poland	0	1	1	1	0	1	0	4
Brunei	0	0	0	1	1	1	0	3
Finland	0	0	1	0	1	1	0	3
Jordan	0	0	1	0	1	0	1	3
Argentina	0	0	0	1	0	0	1	2
Liechtenstein	0	0	0	0	1	1	0	2
Norway	1	0	0	0	0	0	1	2
Seychelles	1	0	0	0	0	1	0	2
United Arab Emirates	1	0	1	0	0	0	0	2
Bahrain	0	0	0	0	0	0	1	1

Country	Year							
	2009	2010	2011	2012	2013	2014	2015	Total
Czech Republic	0	0	0	0	0	0	1	1
Egypt	0	0	0	0	0	0	1	1
Estonia	0	0	0	0	0	0	1	1
Guinea	0	1	0	0	0	0	0	1
Iran	1	0	0	0	0	0	0	1
Iraq	0	0	0	0	0	0	1	1
Lebanon	0	0	0	0	0	0	1	1
New Zealand	0	0	0	1	0	0	0	1
Vietnam	0	0	0	0	0	0	1	1
Total	420	465	534	502	314	491	664	3,390

B. Taxable Income Model

Country	Year							
	2009	2010	2011	2012	2013	2014	2015	Total
Japan	99	108	120	126	73	129	76	731
Korea, Republic of	89	97	127	118	44	83	150	708
Singapore	62	64	74	69	42	53	41	405
Malaysia	24	22	30	22	16	27	26	167
Taiwan	17	21	22	20	6	10	15	111
United States	12	17	18	18	17	19	10	111
Netherlands	20	18	14	11	10	11	10	94
China	9	11	16	14	7	12	21	90
Australia	15	11	16	12	12	9	12	87
Germany	10	12	14	15	12	12	12	87

Country	Year							
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
United Kingdom	14	16	17	15	9	6	8	85
British Virgin Islands	15	12	17	12	8	10	10	84
Hong Kong, SAR	11	11	13	10	7	7	11	70
France	9	9	10	9	8	3	5	53
Switzerland	8	6	8	7	10	6	3	48
India	6	7	11	6	5	4	6	45
Thailand	3	3	4	3	6	6	2	27
Mauritius	4	4	4	3	2	3	2	22
Luxembourg	2	2	4	4	3	3	2	20
Sweden	1	3	2	3	2	2	2	15
Italy	2	1	3	3	2	1	2	14
Canada	2	2	3	4	0	0	1	12
Belgium	1	1	2	2	1	2	2	11
Samoa	1	1	1	1	2	2	3	11
Spain	0	1	0	3	2	2	3	11
Austria	1	2	2	1	1	1	1	9
Marshall Islands	1	1	1	1	1	1	1	7
Denmark	1	1	1	1	0	2	0	6
Pakistan	2	2	1	1	0	0	0	6
Liberia	1	1	0	1	1	1	0	5
Channel Islands	1	0	1	1	1	0	0	4
Panama	0	0	1	1	1	0	1	4
Brunei	0	0	0	1	1	1	0	3

Country	Year							
	2009	2010	2011	2012	2013	2014	2015	Total
Liechtenstein	0	1	0	0	1	1	0	3
Philippines	1	0	1	0	0	0	1	3
Poland	0	1	1	1	0	0	0	3
Jordan	0	0	1	0	1	0	0	2
Norway	1	0	0	0	0	0	1	2
Seychelles	0	0	0	0	0	1	1	2
United Arab Emirates	1	0	1	0	0	0	0	2
Argentina	0	0	0	1	0	0	0	1
Cayman Islands	0	0	0	0	0	0	1	1
Guinea	0	1	0	0	0	0	0	1
Iran	1	0	0	0	0	0	0	1
Iraq	0	0	0	0	0	0	1	1
Kenya	0	0	1	0	0	0	0	1
Lebanon	0	0	0	0	0	0	1	1
New Zealand	0	0	0	1	0	0	0	1
Total	447	470	562	521	314	430	444	3,188

Appendix 3: statutory tax rates, 2009–2015

Location	Tax Rate %						
	2009	2010	2011	2012	2013	2014	2015
Argentina	35	35	35	35	35	35	35
Australia	30	30	30	30	30	30	30
Austria	25	25	25	25	25	25	25
Belgium	33.99	33.99	33.99	33.99	33.99	33.99	33.99
British Virgin Islands	0	0	0	0	0	0	0
Brunei		23.5	22	21	20	20	18.5
Canada	33	31	28	26	26	26.5	26.5
Cayman Islands	0	0	0	0	0	0	0
Channel Islands	0	0	0	0	0	0	0
China	25	25	25	25	25	25	25
Congo				40	35	35	35
Cyprus	10	10	10	10	12.5	12.5	12.5
Czech Republic	20	19	19	19	19	19	19
Denmark	25	25	25	25	25	24.5	23.5
Egypt	20	20	20	25	25	25	25
Estonia	21	21	21	21	21	21	20
Finland	26	26	26	24.5	24.5	20	20
France	33.33	33.33	33.33	33.33	33.33	33.33	33.33
Germany	29.44	29.41	29.37	29.48	29.55	29.58	29.65
Guinea	35	35	35	35	35	35	35
Hong Kong, SAR	16.5	16.5	16.5	16.5	16.5	16.5	16.5

Location	Tax Rate %						
	2009	2010	2011	2012	2013	2014	2015
India	33.99	33.99	32.44	32.45	33.99	33.99	34.61
Indonesia	28	25	25	25	25	25	25
Iran	25	25	25	25	25	25	25
Iraq	15	15	15	15	15	15	15
Italy	31.4	31.4	31.4	31.4	31.4	31.4	31.4
Japan	40.69	40.69	40.69	38.01	38.01	35.64	33.06
Jordan	25	14	14	14	14	14	20
Kenya				30	30	30	30
Korea, Republic of	24.2	24.2	22	24.2	24.2	24.2	24.2
Lebanon	15	15	15	15	15	15	15
Liberia	25	25	25	25	25	25	25
Liechtenstein			12.5	12.5	12.5	12.5	12.5
Luxembourg	28.59	28.59	28.8	28.8	29.22	29.22	29.22
Malaysia	25	25	25	25	25	25	25
Maldives	0	0	0	0	0	0	0
Mali							30
Marshall Islands	0	0	0	0	0	0	0
Mauritius	15	15	15	15	15	15	15
Netherlands	25.5	25.5	25	25	25	25	25
New Zealand	30	30	28	28	28	28	28
Nigeria	30	30	30	30	30	30	30
Norway	28	28	28	28	28	27	27
Pakistan	35	35	35	35	35	34	33

Location	Tax Rate %						
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Panama	30	27.5	25	25	25	25	25
Philippines	30	30	30	30	30	30	30
Poland	19	19	19	19	19	19	19
Portugal	25	25	25	25	25	23	21
Samoa	27	27	27	27	27	27	27
Saudi Arabia	20	20	20	20	20	20	20
Seychelles	40	33	33	33	33	33	33
Singapore	18	17	17	17	17	17	17
Spain	30	30	30	30	30	30	28
Sweden	26.3	26.3	26.3	26.3	22	22	22
Switzerland	18.96	18.75	18.31	18.06	18.01	17.92	17.92
Taiwan	25	17	17	17	17	17	17
Thailand	30	30	30	23	20	20	20
Turkey	20	20	20	20	20	20	20
United Arab Emirates	55	55	55	55	55	55	55
United Kingdom	28	28	26	24	23	21	20
United States	40	40	40	40	40	40	40
Vietnam	25	25	25	25	25	22	22

Sources: British Virgin Islands: http://www.ey.com/Publication/vwLUAssets/Worldwide_corporate_tax_guide_2015/$FILE/Worldwide%20Corporate%20Tax%20Guide%202015.pdf; Brunei (2010–2011): http://www.rd.go.th/publish/fileadmin/user_upload/AEC/AseanTax-Brunei.pdf, (2012–2015): https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-corporate-tax-rates-2012-2016.pdf; Channel Islands: http://taxsummaries.pwc.com/uk/taxsummaries/wwts.nsf/ID/Jersey-Corporate-Taxes-on-corporate-income; Guinea: http://www.tradingeconomics.com/guinea/corporate-tax-rate; Iran: http://www.doingbusiness.org/data/exploreeconomies/iran/paying-taxes/; Iraq (2009–2012): http://www.tradingeconomics.com/iraq/corporate-tax-rate; Lebanon (2009–2012): http://www.tradingeconomics.com/lebanon/corporate-tax-rate; Liberia: http://www.doingbusiness.org/data/exploreeconomies/liberia/paying-taxes/; Maldives: http://www.tradingeconomics.com/maldives/corporate-tax-rate; Mali: http://www.doingbusiness.org/data/exploreeconomies/guinea/paying-taxes/; Marshall Islands: http://www.doingbusiness.org/data/exploreeconomies/marshall-islands/paying-taxes; Seychelles:

Appendix 4: unbalanced panel data

A. Accounting Profit Model

Frequency	%	Cumulated	Pattern
299	24.33	24.33	 1
86	7	31.33	. . . . . 1 .
61	4.96	36.29	1111111
52	4.23	40.52	 11
50	4.07	44.59	1111 . . .
34	2.77	47.36	. . 1 . . . .
33	2.69	50.04	111111 .
32	2.6	52.64	. . . 1 . . .
28	2.28	54.92	11111 . .
554	45.08	100	(other patterns)
1,229	100		XXXXXXX

Notes: The panel is unbalanced: there are 1,229 firms with 3,390 firm-year observations. On average, a firm has 2.8 yearly observations. Some firms have data for only one year (e.g., 299 firms have data for 2015 only; 86 firms have data for 2014 only). Only 61 firms out of 1,229 (about 5%) have data for all seven years.

B. Taxable Income Model

Frequency	%	Cumulated	Pattern
170	15.81	15.81	 1
75	6.98	22.79	. . . . . 1 .

Frequency	%	Cumulated	Pattern
64	5.95	28.74	1111 . . .
51	4.74	33.49	1111111
49	4.56	38.05	111111 .
35	3.26	41.3	. . 1 . . . .
35	3.26	44.56	11111 . .
33	3.07	47.63	. . . 1 . . .
31	2.88	50.51	 11
532	49.49	100	(other patterns)
1,075	100		XXXXXXX

Notes: The panel is unbalanced: there are 1,075 firms with 3,188 firm-year observations. On average, a firm has three yearly observations. Some firms have data for only one year (e.g., 170 firms have data for 2015 only; 75 firms have data for 2014 only). Only 51 firms out of 1,075 (less than 5%) have data for all seven years.

Appendix 5: variance inflation factor

Variable	VIF	
	AP	TI
Parent's tax rate	1.02	1.03
Natural log of capital	2.54	2.56
Natural log of labour	2.53	2.59