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**Estimating profit shifting in South Africa using  
firm-level tax returns**

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**Abstract:** Using the universe of South African corporate tax returns for 2009–14, we estimate profit- and debt-shifting responses in South Africa. We find evidence that South African subsidiaries engage in profit shifting and that profit-shifting responses to tax incentives across all channels are systematically higher compared to developed countries.

**Keywords:** developing countries, international taxation, multinational firms, profit shifting, tax  
**JEL classification:** H25, H26, H87, O23

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The views expressed in this paper are those of the authors and do not necessarily reflect the views of the South African National Treasury.

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## 1 Introduction

The question of how to increase tax revenue lies at the centre of development policies.<sup>1</sup> Historically, a substantial portion of tax revenue in developing countries has been collected from corporations, particularly large corporations.<sup>2</sup> This is not surprising, as developing countries face capacity constraints on their ability to audit and focus their efforts on larger taxpayers. However, across the world politicians, development organizations, and the general public fear that this source of tax revenue is being eroded through international tax avoidance.<sup>3</sup> Multinational enterprises (MNEs) can lower their tax bills by shifting profits from high-tax to low-tax countries—a concept coined as ‘profit shifting’. This behaviour is well documented in high-income countries through decades of systematic empirical research.<sup>4</sup> On the contrary, little is known about the scale of the issue in developing countries, as data limitations have not previously allowed state-of-the-art econometric analysis.<sup>5</sup>

Despite the data limitations, leading international organizations and fora such as the G20, International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), and United Nations Conference on Trade and Development (UNCTAD) all express concern that profit shifting may be a particular problem in developing countries.<sup>6</sup> First, as noted by the OECD in their G20-mandated report on base erosion and profit shifting, ‘developing countries face difficulties in building the capacity needed to implement highly complex rules and to challenge well-advised and experienced MNEs’ (OECD 2014: 4). Second, MNE activities constitute a large and rapidly growing share of economic activity in developing countries (UNCTAD 2015). Third, much of the increase in MNE investments in developing countries originates from low-tax offshore centres (UNCTAD 2015). Recently the Independent Commission for Aid Impact (ICAI) criticized United Kingdom (UK) aid programmes for failing to tackle profit shifting in poorer countries: ‘DfID [Department for International Development] has failed in its efforts to fully include developing countries so that they benefit from OECD and G20 reforms on international tax.’ The ICAI went on to question the current effect of anti-profit-shifting assistance in developing countries, which is led by the OECD and backed by several nations and institutions: ‘the benefits ... of implementing the new standards may have been oversold’ (*economia* 2016).

The stark opinions on the importance of profit shifting in developing countries have not yet been fully supported by empirical evidence. In this paper we gain full access to the universe of

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<sup>1</sup> This relates to the broad literature on fiscal/state capacity. See e.g., Besley and Persson (2013), Kleven et al. (2016), and Mascagni et al. (2014) for a discussion of tax collection constraints in developing countries.

<sup>2</sup> Currently, corporate income tax constitutes 21 per cent of the total tax income in developing countries, compared to 11 per cent in developed countries (UNCTAD 2015).

<sup>3</sup> In the final declaration of the G20 meeting in June 2012, the G20 leaders attested ‘the need to prevent base erosion and profit shifting’. More recently, in 2015 and 2016, the EU Commission took legal action against the perceived profit-shifting strategies of Starbucks, Fiat, and Apple.

<sup>4</sup> Riedel (2014), Johannesen and Pirttilä (2016), and Heckemeyer and Overesch (2013) give an overview of the literature.

<sup>5</sup> See Forstater (2015) and Fuest and Riedel (2010) for an overview of the (lack) of systematic evidence.

<sup>6</sup> See e.g. UNCTAD (2015); [www.imf.org/en/News/Articles/2015/09/28/04/53/sp022216](http://www.imf.org/en/News/Articles/2015/09/28/04/53/sp022216) and [www.oecd.org/g20/topics/taxation/g20-finance-ministers-endorse-reforms-to-the-international-tax-system-for-curbing-avoidance-by-multinational-enterprises.htm](http://www.oecd.org/g20/topics/taxation/g20-finance-ministers-endorse-reforms-to-the-international-tax-system-for-curbing-avoidance-by-multinational-enterprises.htm).

corporate tax returns at the firm level in South Africa. While using tax administrative micro-data to estimate profit-shifting responses can be seen as best practice, only Germany, Norway, Sweden, and the United States have granted researchers access to tax return information on MNEs.<sup>8</sup> Profit-shifting estimates outside of these countries predominantly rely on proprietary data-sets with issues of sample selection and missing information on tax credits (OECD 2015a). This is the first time a micro-tax administrative data-set has been used to estimate profit shifting in a developing-country setting. South Africa is an important case for expanding the scope of previous profit-shifting studies for three main reasons. First, previous studies that have sought to expand the scope from OECD countries have—due to data constraints—focused on Eastern European and Asian countries. Second, South Africa is, like most emerging economies, heavily reliant on the corporate tax base, and in particular taxes paid by MNEs.<sup>9</sup> Third, South Africa has introduced legislation on par with that of developed countries over a number of years that seeks to counter profit-shifting strategies, and participated actively in the OECD–G20 Base Erosion and Profit Shifting (BEPS) Project. The South African Revenue Service (SARS) has built strong expertise and auditing capacity, enabling it to provide capacity-building assistance on how to curb profit shifting to some African countries (OECD 2014). This final point makes South Africa a good example of what other developing countries may realistically achieve when adopting OECD anti-profit-shifting policies and assistance, and could feed into the discussion of whether current protocols are sufficient and suitable for a developing-country setting.

The South African tax administrative data-set includes detailed accounts on taxable income, total value added, leverage, and net financial income covering all firms operating in the 2009–14 period. Based on these data, we are—for the first time—able to estimate profit-shifting responses in an African context using the same methods and state-of-the-art data as previous research used in some OECD countries. Our main contribution is to accurately benchmark the profit-shifting responses in a developing country to the responses observed in developed countries.

Common to all the identification methods used in this paper, we exploit firm and time variation in the incentive to shift profits. *Firm behaviour that responds systematically to variation in the profit-shifting incentives is taken as proof of profit shifting.* The incentive to shift profits is driven by cross-country differences in the treatment of taxable profits. For instance, a corporation in South Africa, where the corporate tax rate is 28 per cent, has an incentive to shift profits to affiliates in Mauritius, where the tax rate is 15 per cent, but to receive profits from affiliates in France, where the tax rate is 33.33 per cent. Variation in the profit-shifting incentive is driven by the difference between the domestic tax rate in South Africa and the tax rate facing foreign affiliates of South African firms. However, as domestic variation may be correlated with other domestic effects influencing the firm, we rely only on variation in the tax rate faced by foreign affiliates. Specifically, we model the profit-shifting incentive as the corporate tax rate in the country where the parent firm resides;

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<sup>8</sup> OECD (2015a: 32–37) discusses the lack of tax return usage and identifies the databases in the United States, Germany, and Sweden. In addition, a recent working paper by Hopland et al. (2014) gains (partial) access to Norwegian MNE tax returns.

<sup>9</sup> On average, the corporate tax base generated 20 per cent of total tax revenue for the 2009–14 period, while taxable income attributable to subsidiaries of foreign parents constituted 20 per cent of the total corporate tax base for the same period.

that is, a higher tax rate in the parent country is interpreted as a lower incentive to shift profits out of South Africa to the parent firm.<sup>10</sup>

As an overall benchmark, we start by applying the most widely used method of profit-shifting detection, which relates the taxable profits of each subsidiary to its inputs of labour and capital and the tax incentive to shift profits. If South African subsidiaries with parents in low-tax countries report lower profits (after controlling for production inputs), this is taken as evidence of profit shifting.<sup>11</sup> As we use the total profits, this method should hypothetically capture the full tax-motivated profit-shifting response through all the different strategies. Using this approach, we predict that a 10 percentage point lower parent tax rate will imply that the South African subsidiary shifts 17 per cent of its taxable profits to the parent. This profit-shifting response is roughly twice as large as the response measured for OECD countries in comparable studies<sup>12</sup> and on par with the response measured in the transitional economies of Eastern Europe (Johannesen et al. 2016). Based on this predicted response and the actual tax differentials of subsidiaries, we estimate that 7 per cent of subsidiary profits are shifted out of South Africa to foreign parent firms in low-tax countries. This result should be interpreted with caution as the estimate does not capture profit shifting to other low-tax affiliates of South African subsidiaries, or foreign subsidiaries of South African MNE parents, and will therefore be a lower bound estimate.

By subtracting financial net income and expenditure from subsidiaries' income, and focusing on gross profits, we can zoom in on the aspect of profit shifting not driven by debt shifting and interest manipulation. Again, we find that non-financial profits are roughly twice as sensitive to foreign tax incentives compared to the responses measured in developed countries.

Firms have an incentive to shift debt from affiliates located in low-tax countries to affiliates located in high-tax countries. This will increase interest payments for affiliates in high-tax countries (thereby reducing taxable income) and correspondingly increase interest income in affiliates in low-tax countries (thereby increasing taxable income). Tax deductions can thus be shifted to high-tax countries where the value of tax deductions is higher. This profit-shifting technique is known as 'debt shifting' and predicts that leverage (debt over assets) in the domestic country should increase as foreign affiliate tax rates fall. We find that a 10 percentage point higher parent tax rate is associated with a 2 percentage point higher leverage of the South African subsidiary, which is an effect that is roughly twice as large as has been found in the European Union (EU) (Huizinga et al. 2008). We further have information on connected and external net financial income that supports the finding of debt shifting and indicates that debt shifting primarily occurs through loans to connected parties.

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<sup>10</sup> The parent company tax rate is often used as the proxy for the profit-shifting incentive (see e.g., Dischinger et al. 2013; Johannesen et al. 2016), as the parent firm is typically large relative to the size of the group and has been shown to play a prominent role in the profit-shifting strategies of multinational firms (Dischinger et al. 2013).

<sup>11</sup> Influential studies pioneering this methodology are Hines and Rice (1994) and Huizinga and Laeven (2008). Heckemeyer and Overesch (2013) give an overview of 26 academic papers using this methodology.

<sup>12</sup> Heckemeyer and Overesch (2013) conduct a meta-study of 26 academic papers using this methodology on OECD data and find a consensus estimate implying that a 10 percentage point higher tax differential leads to 8 per cent lower profits. It should be noted that the Heckemeyer and Overesch review is based on a tax differential approach not comparable to ours and likely to overestimate profit shifting as the estimate incorporates domestic tax effects. For a discussion of this, see Johannesen et al. (2016).

This paper contributes to a small existing literature that estimates profit shifting in developing countries. Most of these studies have relied on alternative estimation methods due to data limitations. For example, Crivelli et al. (2015) use macro-data and find that developing countries' tax bases are more sensitive to offshore exposure, which is suggestive of profit shifting. Fuest et al. (2011) is one of very few studies using micro-data to estimate profit shifting in non-OECD countries. Using the capital structure of multinational subsidiaries with German parents, they find that debt shifting is more pervasive in developing countries. Johannesen et al. (2016) is, to our knowledge, the only other paper that has studied the responsiveness of reported profits to tax incentives using micro-data from developing countries. However, the data are sourced from a proprietary database and the majority of their sample is located on the European continent.<sup>13</sup>

## 2 Overview of profit-shifting techniques and incentives

MNEs have multiple means of shifting profits. This section briefly introduces some of the most commonly used profit-shifting channels and the incentives driving this behaviour. We build our conjectures upon the extensive theoretical and empirical literature on profit shifting.

Profit shifting occurs whenever the distribution of profits across an MNE's subsidiaries does not reflect the true value added in each subsidiary; that is, profits may be reported in a country where the associated economic activity and value addition did not take place.<sup>14</sup> The tax incentive to shift profits is essentially driven by differences in the corporate tax rates across tax jurisdictions.<sup>15</sup> An MNE operating in a high-tax country with a corporate tax rate  $\tau_h$  and a low-tax country with a corporate tax rate  $\tau_L$  can increase its global after-tax profits by  $\tau_h - \tau_L$  for each dollar shifted from the high-tax country to the low-tax country. That is, profit-shifting incentives are driven by the tax differential between affiliates. This incentive to shift profits from the high-tax affiliate to the low-tax affiliate exists until the point at which there are no profits left in the high-tax affiliate (as losses are not taxed).

How do MNEs shift profits? There are several different techniques that can be exploited. However, they all have one thing in common: *they simulate that the economic activity and associated value addition of the MNE takes place in a different location to where it actually takes place*. One way of doing this is by using *transfer mispricing*. To understand transfer mispricing, it is important to understand that the economic (non-tax, non-monopoly) justification of an MNE is that they can exploit internal synergies. This naturally involves trading services (administration, know-how, finance, etc.) and goods internally. These services and goods should, according to the OECD Model Tax Convention, be traded at arms-length prices. That is, an MNE should price them 'as if' they were

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<sup>13</sup> The data used are the ORBIS database collected by BvD. Data coverage decreases rapidly outside of the EU and partly relies on self-reported financial accounts (see OECD 2015a: 30).

<sup>14</sup> This definition may be too clear-cut compared to the current debate on profit shifting, discussed here: <http://taxfoundation.org/blog/making-sense-profit-shifting-scott-dyreng>. Some argue that in modern MNEs it is impossible to accurately calculate where the value added takes place (Devereux and Vella 2014).

<sup>15</sup> In practice, the tax incentive also depends on whether a territorial tax system and withholding taxes are in place (see Huizinga et al. 2008 for an in-depth description). The tax rate facing MNE subsidiaries in multiple countries can also be difficult to identify, given the potential for lower rates on certain income (e.g. patent box regimes) or arrangements with governments. There can also be non-tax incentives to shift profits, such as the fear of expropriation.

trading with an unrelated party. In practice, it may be difficult for tax authorities to establish the arms-length price as there may not be any comparable services traded outside a particular MNE, and goods may differ in quality. This leaves room for MNEs to price goods and services at a price that is different from the ‘true’ arms-length price. To minimize global tax payments, the MNE can set the price high when a high-tax subsidiary is importing from a related low-tax subsidiary, and vice versa. Profits will thus be shifted from the high-tax subsidiary to the low-tax subsidiary without any change in activity. Empirical studies looking at the actual unit prices of goods strongly suggest that systematic transfer mispricing of goods does occur in Western countries (see e.g. Cristea and Nguyen 2015). Likewise, there is also evidence of transfer mispricing of services (Hebous and Johannesen 2015).

Another profit-shifting strategy is the *strategic shifting of income-generating assets and expense-generating liabilities*, in particular debt and intellectual property. *Debt shifting* occurs when MNEs use corporate finance structuring strategies to shift profits from high-tax affiliates to low-tax affiliates. If a subsidiary in a high-tax country takes on debt from an affiliate in a low-tax country, the MNE is able to shift income from the high-tax country to the low-tax country. Debt shifting can also result from high-tax affiliates taking on external debt that is guaranteed by low-tax affiliates (Huizinga et al. 2008). If this behaviour is motivated by common ownership, it will differ from that of separate enterprises and, in principle, be in conflict with the arms-length approach. There is extensive evidence of debt shifting occurring in European multinationals (see e.g., Buettner et al. 2012; Huizinga et al. 2008).

Similar to debt shifting, *intellectual property right shifting* is the strategic shifting of intellectual property rights from high-tax to low-tax subsidiaries, such that royalty payments (external and connected) are paid to the low-tax subsidiaries in the MNE. The intellectual property rights can be shifted by falsifying the origin of the property right or by transferring the property right at a price that does not correspond to the actual value. Both techniques are hard for tax authorities to prove. Again, there is systematic empirical evidence of such behaviour within European MNEs (see e.g., Huizinga et al. 2008; Karkinsky and Riedel 2012).

An important question when understanding MNEs’ profit-shifting responses is: *why don’t MNEs always shift all taxable profits to the lowest taxed subsidiary?*<sup>16</sup> The likely answer to this question is that it is costly to shift profits. These costs can be roughly divided into three categories: legal costs, efficiency costs, and reputational costs.

First, with respect to the legal costs of profit shifting, the vast majority of countries have anti-profit-shifting legislation in place. This implies that a company engaging in profit shifting is likely to pay for legal advice and face the probability of legal consequences (which may require legal defence costs). These legal costs are, to a large degree, country-specific; that is, tax authorities and governments are able to increase the legal costs of profit shifting by enacting effective anti-profit-shifting legislation and by distributing resources to enforce this legislation. Second, internal efficiency costs are a relevant factor. These costs theoretically occur as an MNE loses sight of the efficient internal allocation of resources because they are busy sending the impression to tax authorities that value addition occurs in low-tax jurisdictions. Nielsen and Raimondos-Moller (2008) describe how transfer mispricing strategies imply that low-level managers within the MNEs lose the ability to evaluate what the true cost and value of internal transactions is. Huizinga et al. (2008) describe how using increased cash flows to subsidiaries may create moral

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<sup>16</sup> See Hines Jr (2014) for a discussion.

hazard implications at the subsidiary level. Finally, there are profit-shifting costs that can be seen as reputational and social. These costs can be related to the brand damage MNEs may experience when perceived as ‘tax dodgers’. A reduced brand value is likely to lower consumers’ willingness-to-pay and may also impact labour recruitment and motivation. How significant these costs are has not yet been quantified. However, anecdotal interviews with managers indicate that these costs are significant enough for managers to include them in their decision making.<sup>17</sup>

Theoretically, an MNE will shift profits to the point where the marginal cost of shifting one more dollar equals the marginal gain (i.e. the tax differential  $\tau_h - \tau_L$ ). It is normally assumed that the marginal cost of profit shifting increases with the amount shifted.<sup>18</sup> An increase in the tax differential will thus increase the gain from profit shifting and imply more profit shifting. From the viewpoint of a high-tax country, an increase in the domestic tax rate *or* a decrease in the foreign affiliate tax rate will imply more profits are shifted out of the country to the low-tax affiliate. That is, a lower foreign affiliate tax rate implies that fewer profits are reported in the domestic country. As legal costs increase the marginal cost of profit shifting, governments can effectively reduce profit-shifting responses by making it costly. This notion is supported by empirical evidence from the EU (Riedel et al. 2015).

### 3 The South African context

South Africa is an upper middle-income emerging economy with a gross domestic product (GDP) per capita of US\$5,692 in 2015.<sup>19</sup> In comparison to other African countries, and developing countries in general, it has a sound macroeconomic policy framework, strong financial and legal institutions, and well-developed and liquid capital markets.<sup>20</sup> South Africa’s tax–GDP ratio of 26.3 per cent in 2015–16 falls below the OECD average of 34 per cent (in 2013), but is relatively higher in comparison to many developing economies (National Treasury 2016).<sup>21</sup> One of the biggest challenges facing the South African government is the high levels of inequality and unemployment.

The statutory tax rate on business has been 28 per cent since 2008. This is on par with most developed countries, but significantly higher than that of nearby tax havens such as Mauritius, which has large foreign direct investment (FDI) flows to and from South Africa.<sup>22</sup> Corporate

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<sup>17</sup> See e.g., ‘Making Sense of Profit Shifting: Kevin Markle’ blog text by Eric Cederwall (<http://taxfoundation.org/blog/making-sense-profit-shifting-kevin-markle>) or ‘The merry enablers’ (*The Economist* <http://www.economist.com/news/special-report/21571556-accounting-firms-will-do-nicely-under-any-set-rules-merry-enablers>).

<sup>18</sup> Johannesen et al. (2016) discuss the dynamics when there are fixed costs of profit shifting.

<sup>19</sup> World Bank 2016 data from <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>.

<sup>20</sup> Speech by deputy governor of the South African Reserve Bank, Daniel Mminile ([www.resbank.co.za/Lists/Speeches/Attachments/381/Address%20by%20Deputy%20Governor%20Daniel%20Mminele%20\(2\).pdf](http://www.resbank.co.za/Lists/Speeches/Attachments/381/Address%20by%20Deputy%20Governor%20Daniel%20Mminele%20(2).pdf)); see also OECD (2015c).

<sup>21</sup> 2016 OECD data available at: <https://data.oecd.org/tax/tax-revenue.htm>.

<sup>22</sup> With respect to outward FDI from South Africa, as of 31 December 2014 Mauritius accounts for 37 per cent of the total stock of FDI (foreign assets) to all African countries. In terms of inward investment into South Africa, Mauritius accounts for 23 per cent of the total stock of FDI (foreign liabilities) from all African countries, second to only Namibia (34 per cent) (South African Reserve Bank 2016).

income tax revenue has constituted roughly 5 per cent of GDP and 20 per cent of total tax revenue since 2009.<sup>23</sup>

South Africa has been aware of corporate tax avoidance activities for a number of years, and has implemented a suite of measures in an attempt to curtail such behaviour. For example, thin capitalization and transfer pricing rules were introduced in 1995, and merged in 2012 based on the OECD Transfer Pricing Guidelines. Controlled foreign company (CFC) rules were initially enacted in 1997 to complement the shift from source to residence (or worldwide) based taxation. The current CFC rules were considered as one of the best-practice approaches in the OECD–G20 BEPS Project (see OECD 2015b: 53–54). Legislation is only effective if adequately enforced. In this regard, the administration of the tax system by the SARS is seen as being comparable to that in many OECD countries (OECD 2015c).

South Africa has participated actively (and continues to do so during the implementation phase) in the OECD–G20 BEPS Project, contributing to the final reports, recommendations, and minimum standards. Some of the recommendations are already in place in South Africa, while others, such as the country-by-country reporting minimum standard, are in the process of being introduced.<sup>24</sup>

#### 4 Data

We use tax administrative data from the SARS.<sup>25</sup> Specifically, we have access to the (non-public) universe of firm tax returns in South Africa from 2009 to 2014. These data are collected by the SARS annually. All firms are required to report key items used in previous profit-shifting studies, including labour costs, fixed capital, leverage, and accounting profits. In contrast to previous literature, we also have access to taxable profits. Almost all reporting items are compulsory, although firms are allowed to submit a zero where a specific field is not applicable to them. The incentive to comply is the threat of audits and fines for non-compliance. Where previous studies on profit shifting in developing countries have relied on incomplete and somewhat unreliable data, the level of detail and (full) coverage of these data are better than what has been available for previous research on profit shifting in some developed countries. To limit outlier issues, we censor item observations in the bottom and top one percentile. Furthermore, we exclude micro-firms with sales of less than R1 million.

In May 2013, the tax return requirements changed such that larger and/or multinational firms were required to produce more extensive reporting. In particular, firms have since been required to indicate whether they are owned by a foreign parent firm (defined as a majority stake above 70 per cent), and, if so, where this parent is located. Hence, this analysis focuses on South African

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<sup>23</sup> This masks a decline from 26 per cent of total tax in the 2008–09 fiscal year (running from 1 April to 31 March) to just below 19 per cent in the 2014–15 fiscal year.

<sup>24</sup> South Africa has introduced country-by-country reporting by including a definition for ‘international tax standard’ in the Tax Administration Act No. 28 of 2011. Draft regulations were released by SARS for public comment in April 2016 ([www.sars.gov.za/AllDocs/LegalDoclib/Drafts/LAPD-LPrep-Draft-2016-29%20-%20Draft%20Regulations%20specifying%20CbC%20reporting%20standard%20for%20multinational%20enterprises.pdf](http://www.sars.gov.za/AllDocs/LegalDoclib/Drafts/LAPD-LPrep-Draft-2016-29%20-%20Draft%20Regulations%20specifying%20CbC%20reporting%20standard%20for%20multinational%20enterprises.pdf)).

<sup>25</sup> For an in-depth description of the data-set, see Kreuser and Newman (2016).

subsidiaries that are at least 70 per cent owned by a foreign parent. The available data do not allow us to identify subsidiaries with a foreign parent that owns less than 70 per cent of the equity, other affiliates of such subsidiaries, or foreign subsidiaries of South African MNE parents.<sup>26</sup> We are thus only able to estimate profit-shifting responses to the parent tax rate. Even so, much of the previous literature on this topic also relied on the parent tax rate as it has both theoretically and empirically been proven to be a key factor in the profit-shifting decisions of MNEs (see e.g. Dischinger et al. 2013).

In line with previous literature, we apply the assumption that ownership structures did not change from 2009 to 2013, and assume that the parent country is unaltered throughout the period. This creates an attenuation bias that should lead us to underestimate profit shifting. We link the parent country information to KPMG data on corporate statutory tax rates to construct the tax incentive to shift profits to the parent. Previous literature has also relied on statutory tax rates based on the argument that this is the marginal effective corporate tax rate and thus the incentive to shift one more dollar (Devereux and Maffini 2007). However, this argument does not hold true in countries where total taxable profits are left tax-free due to tax holidays or other arrangements. Again, failing to measure the tax incentive to shift profits correctly will lead to an underestimation of profit shifting.

In Table 1 we see the descriptive statistics of subsidiaries in South Africa in 2013<sup>27</sup> with sales over R1 million (which are the ones used in the analysis). There are just over 2,000 subsidiaries, which is a small number compared to the nearly one million firms in South Africa. However, the subsidiaries are markedly larger than the average South African firm and constitute roughly 30 per cent of the total activity in South Africa in terms of sales. The average parent tax rate is on par with the South African corporate tax rate. Roughly 40 per cent of subsidiaries face a lower tax rate than their parent. For these firms, the average parent tax rate is just under 20 per cent—that is, 8 percentage points lower than the South African corporate tax rate. Roughly 30 per cent of subsidiaries report zero or negative taxable profits.

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<sup>26</sup> Discussion with tax advisers does suggest that some companies may fill this information in if at least a 50 per cent ownership stake is met.

<sup>27</sup> Descriptions of the subsidiaries across all years are presented in the Appendix.

Table 1: Descriptive statistics on subsidiaries, 2013

Variable	Obs.	Mean	Std dev.	Min.	Max.
Sales	2,195	331,000,000	685,000,000	1,023,991	5,390,000,000
Value added	1,865	166,000,000	802,000,000	-1,020,000,000	20,000,000,000
Gross profits	1,843	108,000,000	542,000,000	-1,020,000,000	12,300,000,000
Gross margin	1,843	0.19	0.20	-0.94	0.98
Net profits (EBT)	2,234	42,900,000	613,000,000	-6,140,000,000	21,700,000,000
Taxable profits	2,233	42,700,000	440,000,000	-891,000,000	14,600,000,000
Zero profit or loss dummy	2,315	0.28	0.45	0.00	1.00
Total assets	2,201	400,000,000	1,460,000,000	256,398	18,400,000,000
Fixed capital	2,189	41,000,000	139,000,000	0.00	1,680,000,000
Labour costs	2,234	66,800,000	333,000,000	894	10,400,000,000
Long-term debt/assets	2,091	0.07	0.21	0.00	1.67
Net financial income/sales	2,126	-0.01	0.03	-0.25	0.07
Net financial income/sales (connected)	177	0.00	0.01	-0.08	0.02
Parent tax rate lower than South Africa dummy	2,315	0.37	0.48	0.00	1.00
Parent tax rate	2,177	0.29	0.10	0.00	0.55

Note: the table only includes information on South African subsidiaries with sales over R1 million.

Source: authors' calculations based on data from the SARS and KPMG.

## 5 Estimating overall profit-shifting responses

To estimate overall profit-shifting responses we apply the most commonly used method, introduced by Hines and Rice (1994). That is, we relate the profitability of MNE subsidiaries to their tax incentive to shift profits. Systematic deviations from the predicted profitability of a subsidiary that is correlated with the incentive to shift profits is taken as evidence of profit shifting. This method can be seen as a top-down approach to estimate profit shifting and should theoretically capture the full profit-shifting response via all channels.

We recognize that estimating profit-shifting responses and the magnitude of profit shifting in a particular country is a difficult exercise, given the complex nature of cross-border business operations, MNE structures, tax legislation, tax treaty networks, and imperfect data. As such, no methodology is perfect.<sup>28</sup> However, the value of using this approach in the South African context

<sup>28</sup> See a discussion on the pros and cons of different methods used to estimate the scale of BEPS in OCED (2015a: 99–101).

is that, for the first time, it allows us to benchmark against similar studies for developed countries.

As discussed in the theoretical section, the incentive to shift profits is essentially driven by the tax *differential* to foreign affiliates. However, there may be several effects of the domestic corporate tax rate on profitability that are not related to profit shifting. These domestic effects include all types of domestic tax evasion and avoidance strategies such as tax debt shielding (Modigliani and Miller 1958) and informal operations (Gordon and Li 2009), which would exist absent of MNE tax avoidance. To prevent these factors confounding the profit-shifting estimate, we rely solely on *foreign* variation in corporate tax rates. That is, we control for the domestic tax rate and estimate the impact of differing parent tax rates (this identification strategy has previously been recommended by Dharmapala and Riedel 2013 and Johannesen et al. 2016).

If profit shifting occurs, we would expect to see that a *lower* parent tax rate leads to *lower* reported profitability in the South African subsidiary as this implies a higher incentive to shift profits to the parent firm, and vice versa. We estimate five specifications using the top-down approach:

$$\begin{aligned} \log(\text{taxable income}_{it}) = & \\ \alpha_{Ind,t} + \beta_1 \log(\text{fixed capital}_{it}) + \beta_2 \log(\text{labour expenses}_{it}) + \beta_3 \cdot & \\ \text{parent tax rate}_{it} + \varepsilon_i & \end{aligned} \quad (1)$$

$$\begin{aligned} \log(\text{net profits}_{it}) = & \\ \alpha_{Ind,t} + \beta_1 \log(\text{fixed capital}_{it}) + \beta_2 \log(\text{labour expenses}_{it}) + \beta_3 \cdot & \\ \text{parent tax rate}_{it} + \varepsilon_i & \end{aligned} \quad (2)$$

$$\begin{aligned} \log(\text{gross profits}_{it}) = & \\ \alpha_{Ind,t} + \beta_1 \log(\text{fixed capital}_{it}) + \beta_2 \log(\text{labour expenses}_{it}) + \beta_3 \cdot & \\ \text{parent tax rate}_{it} + \varepsilon_i & \end{aligned} \quad (3)$$

$$\begin{aligned} \log(\text{value Added}_{it}) = & \\ \alpha_{Ind,t} + \beta_1 \log(\text{fixed capital}_{it}) + \beta_2 \log(\text{labour expenses}_{it}) + \beta_3 \cdot & \\ \text{parent tax rate}_{it} + \varepsilon_i & \end{aligned} \quad (4)$$

$$\begin{aligned} \text{zero income or loss}_i = & \\ \alpha_{Ind,t} + \beta_1 \log(\text{fixed capital}_{it}) + \beta_2 \log(\text{labour expenses}_{it}) + \beta_3 \cdot & \\ \text{parent tax rate}_{it} + \varepsilon_i & \end{aligned} \quad (5)$$

Common to all the specifications is an implicit assumption that value added/profits can be predicted using a Cobb–Douglas production function. This assumption is common across the literature and was also used in the original article by Hines and Rice (1994). Cost of labour is used to incorporate both the quantity and quality of labour. Fixed capital is used as this is less prone to being part of a profit-shifting strategy (Huizinga and Laeven 2008). All specifications include industry-year fixed effects (nesting country-year fixed effects). We do not use subsidiary fixed effects as we essentially have no time variation in the parent tax rate due to the very short time panel. Common across all four specifications,  $\beta_3 > 0$  indicates profit shifting. Equation (1) is ultimately the regression of interest as it investigates how profit shifting impacts the subsidiary taxable income through all possible channels. Equation (2) is included for the sake of comparability, as previous literature has not gained access to the actual taxable income of

subsidiaries, only the accounting profits (see Dharmapala and Riedel 2013 for a discussion of this). Equations (3) and (4) estimate the profit-shifting response through non-financial profit-shifting channels as financial income is excluded. An issue with Equations (1) to (4) is that subsidiaries with zero or negative profits are censored from the regression sample (due to the logarithmic transformation). Using Equation (5) we thus estimate whether the likelihood of reporting zero or negative profits increases when the parent tax rate decreases (a specification suggested by Johannesen et al. 2016).

## 5.1 Results: overall profit-shifting responses

In Table 2 we see the overall estimated profit-shifting responses using the top-down approach. Across all specifications we find that the coefficient on the parent tax rate is economically and statistically significant and positive. This supports the hypothesis that South African subsidiaries of foreign MNEs are engaged in profit shifting. Further, as expected, we see that the relative response decreases throughout columns (2) to (4) as the profit definition is narrowed in the sense that fewer profit-shifting channels are included. We find that the coefficient on the parent tax rate is constant, whether using the accounting net profits in column (2) or actual taxable income in column (1), which is to some degree reassuring for many previous studies that have relied on accounting information.

Table 2: Measuring overall profit-shifting responses

	(1)	(2)	(3)	(4)	(5)
	Log( <i>taxable profits</i> )	Log( <i>net profits</i> )	Log( <i>gross profits</i> )	Log( <i>value added</i> )	Zero profits or loss
Parent tax rate	1.688*** (0.348)	1.609*** (0.327)	0.848*** (0.274)	0.517** (0.238)	-0.265*** (0.0686)
Log( <i>labour costs</i> )	0.480*** (0.0314)	0.465*** (0.0314)	0.630*** (0.0349)	0.738*** (0.0285)	
Log( <i>fixed capital</i> )	0.221*** (0.0198)	0.228*** (0.0197)	0.170*** (0.0197)	0.119*** (0.0157)	
Two-digit industry-year fixed effects	✓	✓	✓	✓	
Observations	6,218	6,147	6,197	6,617	11,353
R-squared	0.463	0.469	0.621	0.739	0.080

Note: the table shows the results of an OLS regression with the observational unit at the subsidiary-year level for the period 2009–14. Column headings indicate the dependent variable. Zero profits or loss is a dummy variable that takes the value 1 if the subsidiary had a taxable income of zero or less. Only subsidiaries with sales over R1 million are included in the regression. Industry codes are based on the International Standard Industrial Classification of All Economic Activities (ISIC4). Robust standard errors are shown in parentheses clustered at the industry level. Significance levels are noted as \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Source: authors' calculations, based on data from the SARS and KPMG.

The full profit-shifting response is estimated in column (1), where we find a semi-elasticity of taxable income with respect to the parent tax rate of 1.7. That is, a 10 percentage points lower parent tax rate is associated with a 17 per cent lower taxable income in the subsidiary. This semi-elasticity is very much on par with the measured response in the transitional economies of

Eastern Europe in Johannesen et al. (2016), which uses a very similar specification and finds a semi-elasticity with respect to the parent tax rate of 1.8. The same study finds roughly half as large a semi-elasticity of 1.0 in developed Western European countries. Another frequently used benchmark for profit-shifting response is based on a meta-study conducted by Heckemeyer and Overesch (2013). Based on 26 profit-shifting studies from developed countries, they estimate a ‘consensus’ semi-elasticity of 0.8.

In column (3) we estimate the impact of the parent tax rate on gross profits, which only leaves profit-shifting responses via non-financial channels. We find an estimated semi-elasticity of 0.8. Heckemeyer and Overesch (2013) estimate a consensus semi-elasticity of 0.5 for studies focusing on how earnings before interest and taxes responds to tax differentials in developed countries. No previous profit-shifting studies have had access to data on the value added of subsidiaries and there are thus no comparable estimates to the estimate in column (4).

In column (5) we include all subsidiaries with zero taxable income or less. We see that a lower parent tax rate decreases the likelihood that subsidiaries are profitable, which is again an indication of profit shifting.

Based on the CIT data and the estimated semi-elasticity in specification (1), we can estimate the loss of tax revenue due to profit shifting in South Africa using the simple formula:

$$\frac{\sum_{i=1}^N I(\Delta\tau_i > 0) \cdot \Delta\tau_i \cdot \widehat{\beta}_3 \cdot \text{taxable income}_i}{\sum_{i=1}^N \text{taxable income}_i} \quad (6)$$

where  $\widehat{\beta}_3$  is the semi-elasticity of 1.7 from column (1),  $N$  is the number of South African subsidiaries and  $\Delta\tau_i$  is the South African tax rate minus the parent tax rate.

This estimate hinges on the assumption that MNE activity in South Africa would be unaltered in absence of profit shifting. That is, that no subsidiaries in South Africa would reduce investments when faced with a higher effective tax rate, which is a crude assumption. Another reason to be wary of this estimate is that the semi-elasticity  $\beta_3$  is estimated purely based on variation in the parent tax rate, which will not capture the full incentive to shift profits and is thus likely underestimated. Finally, this estimate will not include the loss of tax revenue from South African parents shifting profits out of South Africa.

Nevertheless, it can be instructive to calculate this heroically estimated tax loss as a ball park figure to give an idea of the relevance of profit shifting in South Africa. In Table 3 we see that the estimated loss of subsidiary profits due to profit shifting amounts to 7 per cent of subsidiary income and 1 per cent of the total corporate tax base. This, in turn, implies that profit shifting removes 0.2 per cent of the total tax base in South Africa or lowers the tax–GDP ratio by 0.05 percentage points. While there is no doubt that an increase in the tax–GDP ratio of 0.05 percentage points could do tremendous good in South Africa, this estimate implies that profit shifting may only be a moderate problem in South Africa.

Table 3: Quantifying the loss of tax revenue due to profit shifting, 2009–14 (in %)

Tax revenue as a share of GDP	25
Corporate tax revenue as a share of total tax revenue	20
Subsidiary tax income as a share of corporate tax revenue	20
Tax income shifted to low-tax parents as a share of total subsidiary taxable income	7
Hypothetical subsidiary taxable income as a share of corporate tax revenue if no profit shifting to parents	21
Estimated loss of corporate tax base due to profit shifting to low-tax parents	1
Estimated loss of total tax revenue due to profit shifting to low-tax parents	0.2
Estimated loss of total tax revenue due to profit shifting to low-tax parents as a share of GDP	0.05

Note: the scope of the table is the years 2009–14. The table is based on tax data and the estimated profit-shifting response in column (1) of Table 2.

Source: authors' calculations, based on data from the SARS and KPMG.

## 6 Profit shifting via debt shifting and interest mispricing

The CIT data include information on long-term debt and assets. This allows us to dig a bit deeper and estimate the debt-shifting response to profit-shifting incentives. Firms may shift profits from high-tax to low-tax affiliates either by taking on internal debt in high-tax affiliates (Buettner et al. 2012) or shifting external debt obligations to high-tax affiliates (Huizinga et al. 2008). We would expect a subsidiary's financial leverage to increase as the parent tax rate decreases. Most previous studies on debt shifting have either relied on average foreign affiliate tax rates or the minimum foreign affiliate tax rate as the tax incentive to shift debt. However, Huizinga et al. (2008) estimate the impact of the parent tax rate on subsidiary leverage in the EU. We use a specification very similar to theirs:

$$\frac{\text{Long term debt}_{it}}{\text{Assets}_{it}} = \alpha_{ind,t} + \beta_1 \cdot \text{parent tax rate}_{it} + X'_{it}B + \epsilon_{it} \quad (7)$$

The results of this regression specification are shown in Table 4. We estimate a coefficient of the parent tax rate on subsidiary leverage of  $-0.2$ . The coefficient remains constant when including other relevant determinants of leverage such as sales, gross margin (i.e. gross profits/sales), and tangibility (tangible assets/total assets). This estimate implies that a 10 percentage points lower parent tax rate is associated with a 2 percentage points higher leverage. This effect is roughly twice as large as the one estimated by Huizinga et al. (2008), who found that a 10 percentage points lower parent tax rate implies a 1 percentage point higher leverage.

We do not have information on whether loans are internal (i.e. granted by an affiliate) or external. However, we do have information on internal and external net financial income (financial income minus financial expenditures). The impact of the parent tax rate on net financial income will include both the effect of debt shifting and transfer mispricing of interest. We scale the net financial income by sales, which is a second-best solution. In column (5) we find that a higher parent tax rate is associated with higher net financial income of the subsidiary. In column (6) we see that this effect seems to be fully driven by connected interest payments.

Table 4: Measuring debt-shifting responses

	(1)	(2)	(3)	(4)	(5)	(6)
	Long-term debt divided by total assets				Net financial income divided by sales	
Parent tax rate	-0.223*** (0.0766)	-0.194** (0.0762)	-0.155* (0.0778)	-0.214** (0.0816)	0.0177*** (0.00479)	0.0192** (0.00896)
Log( <i>sales</i> )		-0.0152*** (0.00240)	-0.0151*** (0.00234)	-0.0160*** (0.00302)	-0.000340 (0.000378)	-7.16e-05 (0.000494)
Tangibility			0.253*** (0.0332)	0.271*** (0.0355)	-0.0323*** (0.00321)	-0.0203*** (0.00562)
Gross margin				-0.0324 (0.0304)	0.0115*** (0.00287)	-0.00220 (0.00413)
Two-digit industry-year fixed effects	✓	✓	✓	✓	✓	✓
Connected						✓
Observations	5,999	5,976	3,878	5,044	3,345	2,361
R-squared	0.171	0.176	0.204	0.221	0.248	0.166

Note: the table shows the results of an OLS regression with the observational unit at the subsidiary-year level for the period 2009–14. Column headings indicate the dependent variable. Only subsidiaries with sales over R1 million are included in the regression. Industry codes are based on the International Standard Industrial Classification of All Economic Activities (ISIC4). Robust standard errors are shown in parentheses clustered at the industry level. Significance levels are noted as \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Source: authors' calculations, based on data from the SARS and KPMG.

## 7 Concluding remarks

We have access to the universe of tax returns in South Africa and are thus able to replicate profit-shifting estimation techniques previously not used in an African setting. Given that the level of detail and coverage of the data is second to none for a developing country setting, we consider the results to be more reliable compared to previous estimates for developing countries. Across a wide range of specifications we find evidence that profit shifting does occur in South Africa and that profit shifting responses are systematically higher compared to developed countries.

We also find that profit shifting in South Africa as a share of total taxable income may only be a moderate problem (although we are limited to analysing South African subsidiaries of foreign parents). This could be seen as support for recent academic work arguing that the issue of profit shifting in developing countries may be overrated (see e.g., Forstater 2015; Johannesen and Pirttilä 2016). Another interpretation could be that South Africa has benefited from introducing anti-avoidance measures over a number of years (as early as 1995), including the adoption of OECD Transfer Pricing Guidelines. The country may have reached a point at which profit shifting is a lesser problem. These important questions can only be answered as we gain access to more years of data, enabling more analysis in the South African context, and obtain more data-points on profit shifting in other developing countries.

Appendix table A1: Descriptive statistics on subsidiaries, all years

Variable	Obs.	Mean	Std dev.	Min.	Max.
Sales	10,970	293,000,000	745,000,000	1,005,613	44,400,000,000
Value added	8,745	166,000,000	1,010,000,000	-9,700,000,000	54,900,000,000
Gross profits	8,611	117,000,000	852,000,000	-6,190,000,000	54,800,000,000
Gross margin	8,611	0.20	0.20	-0.99	0.98
Net profits (EBT)	11,433	37,100,000	478,000,000	-6,140,000,000	28,700,000,000
Taxable profits	11,430	36,900,000	398,000,000	-2,800,000,000	21,700,000,000
Zero profit or loss dummy	18,509	0.17	0.38	0.00	1.00
Total assets	11,336	330,000,000	1,180,000,000	0.00	21,300,000,000
Fixed capital	11,031	37,800,000	138,000,000	0.00	2,560,000,000
Labour costs	11,270	52,200,000	246,000,000	14	11,400,000,000
Long-term debt/assets	7,416	0.10	0.28	0.00	7.61
Net financial income/sales	3,515	-0.01	0.03	-0.56	0.43
Net financial income/sales (connected)	10,136	-0.01	0.04	-0.83	0.70
Parent tax rate lower than South Africa dummy	18,509	0.46	0.50	0.00	1.00
Parent tax rate	13,443	0.29	0.10	0.00	0.55

Note: the table only includes information on South African subsidiaries with sales over R1 million.

Source: authors' calculations, based on data from the SARS and KPMG.

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