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TAX JUSTICE NETWORK

Profit shifting by multinational corporations: Evidence from transaction-level data in Nigeria*

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Abstract

We study profit shifting using a novel source of administrative data on transactions of multinational corporations in Nigeria with related parties abroad. The data categorizes intra-group transactions into seven types: tangible goods, service and fees, royalties, interest, dividends, reimbursements, and other. We identify transactions most used for profit shifting and their relative importance. Profits reported in Nigeria are highly sensitive to hypothetical tax paid in partner jurisdictions: a 1% increase in hypothetical tax on outgoing transactions is associated with a 0.71% increase in reported profits in Nigeria. Payments for interest and service and fees emerge as key profit-shifting channels.

Keywords — tax havens; multinational corporations; profit shifting; offshore financial centers; transfer pricing
JEL — F36, F65, G28, H26, H87

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1 Introduction

Multinational corporations (MNCs) engage in illicit financial flows through profit shifting to tax havens, exploiting the existing regulatory arbitrage opportunities. The channels that are used by MNCs to lower their global effective tax rates are relatively well-understood. There is compelling, firm-level empirical evidence on MNCs' strategic location of related companies (Clifford, 2019; Huizinga and Voget, 2009; Reurink and Garcia-Bernardo, 2020; Voget, 2011), assets (Dischinger and Riedel, 2011; Karkinsky and Riedel, 2012), liabilities (Buettner and Wamser, 2013; Desai et al., 2004; Huizinga and Laeven, 2008; Ruf and Weichenrieder, 2012), and risk (Becker et al., 2020) in low-tax jurisdictions; as well as on the strategic mispricing of goods (Cristea and Nguyen, 2016; Davies et al., 2018; Wier, 2020) and services (Hebous and Johannesen, 2015) transferred between related parties that face different tax rates. This literature, most of which builds in its empirical strategy on the seminal contribution by Hines and Rice (1994), suggests that reported profits are highly sensitive to differences in tax rates: a meta-analysis by Heckemeyer and Overesch (2017) and a review by Dharmapala (2014) report a consensus of the existing evidence on tax semi-elasticity of subsidiary pre-tax profits of about 0.8.

The overall scale of profit shifting and the resulting tax revenue loss is economically significant; a range of recent studies, despite using different data sources and methodologies, consistently estimates annual global tax revenue losses of around US$300 billion (Garcia-Bernardo and Janský, 2021; Janský and Palanský, 2019; Tax Justice Network, 2021b; Tørsløv et al., 2022). Recent evidence also suggests that low-income countries are likely to be affected more as a result of their lower capacity to protect their tax base (Besley and Persson, 2013; Johannesen et al., 2020). At this scale, profit shifting has an important negative effect on economic growth, and it undermines countries' capacity to mobilize their revenue resources Reuters (2018).

These recent advances in our understanding of profit shifting by MNCs have been made possible by improved data sources at both the macro- and micro-level. However, these data sources, and thus also our understanding of the issue, still suffer from low and, importantly, selective coverage. Most micro-level studies rely on Orbis, a private company-level database of financial results which has a low coverage of companies in low-income countries and in tax

havens (Garcia-Bernardo, Janský and Tørsløv, 2020; Tørsløv et al., 2022). While macro-level data has better coverage and enables comprehensive global estimates of the scale of profit shifting, the aggregate nature of the data does not allow for understanding the specific behaviour of individual firms.

In this paper we use a new source of administrative data: transfer pricing disclosure forms (TPDFs), which we obtain from the Federal Inland Revenue Service in Nigeria. We use the TPDFs to estimate the relative importance (with respect to profit shifting) of seven transaction categories: (1) tangible goods, (2) services and fees, (3) royalties, (4) interest, (5) dividends, (6) reimbursements, and (7) other. For each transaction, we calculate the hypothetical tax payment of a firm had it not made that transaction and instead reported the transacted amount as profit in Nigeria. We thereby use a variation of the approach pioneered by Hines and Rice (1994) which we adjust to intra-group transaction data by using the hypothetical tax payments as explanatory variables.

We find that profit shifting can be detected in the transaction-level data focusing on Nigerian companies. Hypothetical tax payments on outgoing transactions are strong predictors of reported profits, controlling for the value of the transactions and the companies' revenues: a 1 per cent increase in the hypothetical tax on outgoing transactions is associated with a 0.71% increase in reported profits in Nigeria. Payments for interest and service and fees going from Nigerian companies to affiliates in low-tax jurisdictions emerge as the most important channels of profit shifting, which is consistent with the main channels of profit shifting identified in prior literature: strategic location of intangibles (services and fees) and debt shifting (interest payments). A simple back-of-the-envelope calculation of the overall scale of profit shifting based on this transaction-level data leads to an estimate of US$3.09 billion lost in tax revenue over 2018-2022 from the 451 companies in our sample alone.

Our paper contributes to several strands of literature. First, it provides the first evaluation of the TPDFs and uses it to estimate the scale of profit shifting in an important developing country, adding to the relatively scarce available evidence on this behavior. Johannesen et al. (2020) use Orbis data and find that developing countries are more vulnerable to corporate tax avoidance; their sample, however, has a very limited coverage of low- and lower-middle-income countries. Using comprehensive micro-level data from annual tax re-

turns from the South African National Treasury, Reynolds and Wier (2016) find evidence of aggressive profit shifting by MNCs operating in South Africa to lower-tax jurisdictions. Koivisto et al. (2021) use tax administrative data to show that domestic firms in Uganda pay higher effective tax rates than multinational corporations, with lower rates for multinationals linked to profit shifting practices.

Second, our paper sheds light on the different strategies used for profit shifting and represents one of the first approaches that is able to estimate their relative importance. Beer et al. (2020) indicates that information on the relative importance of the profit shifting channels is limited. Prior research examines these channels individually, with only a few studies, such as Saunders-Scott (2015) and Nicolay et al. (2017) investigating whether firms use debt shifting and transfer pricing as alternative profit shifting channels or in combination. Both studies find that firms are likely to shift their profit using alternative methods when one method becomes less attractive due to changes in tax avoidance regulations. Using transaction-level data, which is detailed and covers different transaction categories, allows us to estimate the relative importance (with respect to profit shifting) of various transaction categories, providing a better understanding of profit shifting than prior literature.

The remainder of this paper is structured as follows. Section 2 describes the institutional background in Nigeria and the context of the study. Section 3 presents the data sources and describes how we employ the transaction-level data from TPDFs to analyze the profit-shifting behaviour of MNCs. In Section 4 we present the results and Section 5 concludes.

2 Institutional background

Nigeria is a lower-middle-income country situated in the Western coast of Africa. With a population of over 200 million people and a GDP amounting to US$432.3 billion in 2020 (PricewaterhouseCoopers, 2022; World Bank, 2021), it is the largest economy in Africa. Home to the largest oil reserves in Africa, Nigeria's economy is highly dependent on oil which contributes 80 per cent to export earnings and more than 50 per cent to government revenues (World Bank, 2021). The country's vast natural resources have attracted a considerable number of MNCs over the years which dominate the oil and other extractive sectors. Similar to other developing economies, corporate tax revenues in Nigeria contribute 46 per cent to

total tax revenues and significantly to government revenues: the OECD (2014b) highlights that tax from MNCs accounts for 88 per cent of all corporate income tax revenue.

Although countries around the world compete to attract foreign direct investment by lowering corporate income tax rates, Nigeria has not changed its statutory corporate income tax rate of 30 per cent for the past decade (KPMG, 2022). This tax rate applies to large companies and MNCs with a turnover exceeding 100 million Nigerian Naira (around US$240,000). The rate of 30 per cent is slightly higher than that of other large developing countries in Africa, such as Ghana (25 per cent) and South Africa (28 per cent). The high corporate income tax rate incentivizes MNCs operating in Nigeria to shift their profits to low-tax countries to reduce their global tax obligations, making Nigeria a good case study.

Developing countries including Nigeria are significantly impacted by profit shifting. The tax revenue losses that result from profit shifting by MNCs are likely to be economically significant: based on country-by-country reporting data from 2017, the Tax Justice Network (2021a) estimates that Nigeria loses US$1.77 billion in tax revenue annually due to profit shifting by large MNCs alone. This loss is a significant portion of the US$12.1 billion of total tax revenue collected in the same year (OECD, 2021b).

Even though Nigeria's economy is among the fastest growing economies in the region, it faces numerous challenges including high unemployment, poverty rates, and corruption levels. Nigeria is one of the countries with the highest corruption ranking, placed 154th out of 180 countries by Sodiq, Omolaoye and Ernest, Nzor (2022). While such survey-based measures of corruption do not represent estimates of profit shifting, they generally serve as a good indicator of the tendency of the economy to engage in more illicit practices such as tax evasion. Butnaru et al. (2018) argues that when both the corporate income tax rate and corruption level are higher, MNCs are more likely to engage in aggressive tax planning and profit shifting. This is because the effect of corruption on tax avoidance becomes more significant when profit shifting activities are factored in, exacerbating the already negative impact of high tax rates.

Similar to other developing countries, Nigeria has a relatively low administrative capacity of tax authorities and also loopholes in the tax system which make it susceptible to the risk of base erosion in the form of transfer mispricing and debt shifting (OECD, 2014a; Tax Justice

Network, 2020a). Multinationals operating in Nigeria take advantage of the lack of clear definitions and ambiguities in the country's tax rules. For instance, the current Companies Income Tax Act (CITA) has no explicit provision of cost treatment, specifically where no double taxation agreements are in place. Due to this impreciseness, most multinationals tend to overstate their costs to reduce their reported profits and ultimately pay less tax. Moreover, despite standard transfer pricing regulations in place, it is still challenging to determine the actual value of the sale of the intangible assets transferred to other affiliates due to the lack of a local database that FIRS could use for benchmarking price analysis (Okanga, 2020). Unlike comparable economies in the region (such as Ghana), Nigeria has no clear rules addressing thin capitalisation (KPMG, 2021), potentially making debt shifting an attractive channel used by multinationals to avoid paying corporate income tax in Nigeria.

In a quest to enhance transparency in the tax system and to reduce tax avoidance by MNCs, the OECD launched the base erosion and profit shifting (BEPS) project in 2013. This project ensures that profits generated from economic activities carried out by MNCs are taxed. Since then, the OECD has been extending membership to include as many countries as possible; and as of November 2021, the OECD has collaborated with 141 countries to implement policies across 15 areas of the G20-OECD inclusive framework on BEPS (OECD, 2021a).

Nigeria became one of the OECD BEPS signatories in 2017, committing itself to the implementation of the action plans (OECD, 2017). KPMG (2020) reports that Nigeria focuses on implementing 8 action plans from within BEPS, namely: addressing the tax challenges of the digital economy (Action 1); limiting base erosion involving interest deductions and other financial payments (Action 4); preventing allowance for treaty abuse (Action 6); aligning transfer pricing outcomes to value creation (Action 8-10); evaluation of transfer pricing and country by country reporting (Action 13); and making dispute resolutions more effective (Action 14). It has reached significant milestones in terms of implementing these actions particularly Actions 1, 8, 9, 10 and 13. Under Action 1, the 2019 Finance Act introduced the Significant Economic Presence (SEP) rule targeting MNCs in the digital space that derive income of up to 25 million Nigerian Naira in Nigeria. For Actions 8-10, transfer pricing regulation was introduced in 2012 and subsequently revised in 2018 to align it with the

outcome of the BEPS projects.

Importantly for the purposes of this paper, under Action 13 of the BEPS programme, in 2019, the Federal Inland Revenue Service (FIRS) of Nigeria began the collection of data on intra-group transactions by MNCs operating in Nigeria. In the following section we describe how we collected and digitalized this data and analyzed its features, before using it in the empirical part of the paper to improve our understanding of the behaviour of MNCs operating in Nigeria.

3 Empirical strategy

Our primary data is sourced from transfer pricing disclosure forms obtained from the FIRS. In this section, we outline the coverage of the data, explain the method employed to estimate profit shifting by MNCs in Nigeria, the channels used to shift profits, and the revenue losses incurred by the Nigerian government.

3.1 Transfer pricing disclosure forms

TPDFs are reports on intra-group transactions that are submitted by all MNCs active in Nigeria to the FIRS. The forms contain data on intra-group controlled transactions—transactions between the company operating in Nigeria and other companies sharing the same parent company. The data contains information on the values of each intra-group transaction, direction and subject of the transaction, and the country in which the partner affiliate is located. For example, one observation could be an incoming transaction of US$5 million from the sale of tangible goods to an affiliate located in Singapore, or US$2 million of royalty expenses to an affiliate located in the Netherlands.

Companies describe the purpose of their transactions in free form and we manually classify the observed descriptions into the following seven categories: (1) tangible goods, (2) services and fees, (3) royalties, (4) interest, (5) dividends, (6) reimbursements, and (7) other. The last category, other transactions, constitutes 9 per cent of all transactions, and we use it for transactions that do not fall into any of the six defined transaction categories. They are also reported as other related expenses in the TPDFs forms. Income and costs are re-

ported separately for each of the seven transaction categories. The TPDFs also provide the company's basic financial information (such as assets, revenues, profits, etc.) and information on the location of all parent, sister, and subsidiary companies. To the best of the authors' knowledge, similar data has not been used in academic research before and provides unprecedented detail and coverage in the context of a lower-income country.

As part of a collaboration between FIRS and the Tax Justice Network, which started in 2019, we have obtained a sample of the TPDFs submitted in financial years 2018 and 2019 as anonymized scanned documents, which we digitalized by hand. In addition, for financial years 2020 to 2022, we use TPDFs that have been submitted electronically. In total, we obtained anonymized data on 725 transactions with an aggregate volume of US$16.37 billion made by 451 individual companies operating in Nigeria. For each transaction, we have information on the value and currency, the jurisdiction of the partner affiliated company, and the category of the transaction as described above. Table 1 shows descriptive statistics of the data at the transaction level. Table 1 also includes summary statistics on the hypothetical taxes paid on these transactions, a key variable in our analysis whose construction we describe in the following section.

Table 1: Summary statistics of transaction-level data from a sample on Nigerian MNCs, in million USD

	N	Mean	SD	Min	Max
Value of income transactions	133	12.65	107.90	0	1,242
Hypothetical tax (ETR) on income transactions	126	2.16	16.54	0	185
Hypothetical tax (LACIT) on income transactions	133	2.10	15.81	0	180
Value of cost transactions	592	32.41	469.80	0	11,278
Hypothetical tax (ETR) on cost transactions	551	5.99	73.54	0	1,678
Hypothetical tax (LACIT) on cost transactions	592	5.73	69.54	0	1,635

Source: Authors.

3.2 Incentives for profit shifting

To understand the motivation of MNCs to shift profits to other jurisdictions, we combine transaction-level and firm-level data from the TPDFs with country-level data in two areas: corporate income tax rates and withholding tax rates. First, for corporate income tax rates, we source data on effective tax rates (of foreign operations of MNCs) from the OECD country-by-country dataset. This data is the most relevant source of information on the activities

and backward-looking effective tax rates faced by large MNCs. We use the adjustments for double counting of reported profits developed by Garcia-Bernardo and Janský (2021) and calculate effective corporate income tax rates as the ratio of actual taxes paid to reported profit. In addition to effective rates, we collect data on lowest available corporate income tax (LACIT) rates and baseline statutory corporate income tax rates and use them in auxiliary specifications. We source the data on LACIT rates from the Corporate Tax Haven Index (Ates et al., 2021; Tax Justice Network, 2021a) and on statutory rates from KPMG (2022). In our preferred specifications we use the effective rates as those that are the most likely relevant predictors of the profit-shifting behaviour of MNCs, rather than statutory rates or LACIT rates.

Second, we use data on applicable withholding tax rates for transactions with third countries, as collected by the International Center for Tax and Development (ICTD; (ICTD, 2021)). This data contains information on the withholding tax rates applicable on dividends, interest, royalties, and service and management fees, taking into account bilateral tax treaties. Transactions related to the sale of tangible goods and reimbursements are generally not subject to withholding tax, although in relatively rare cases, they may be subject to additional tariffs.

We define the total tax rate τ for transaction x to country c as:

$$\tau_{x,c} = 1 - (1 - ETR_c) \cdot (1 - WHT_{x,c}), \tag{1}$$

where ETR is the effective tax rate and WHT the withholding tax rate. We run an alternative specification that uses, instead of ETRs, the forward-looking LACIT rates complemented by statutory corporate income tax rates where LACIT rates are not available. The tax rate $\tau_{x,c}$ thus represents a measure of the motivation of companies to use transactions of category x vis-a-vis partner jurisdiction c. This distinction of tax rates applicable to different categories of transactions allows us to assess the motivation for profit shifting for each category separately.

3.3 Estimating profit shifting

Our empirical strategy to estimate the relative importance of individual profit shifting channels based on transaction-level data consists of two steps. First, for each transaction category x (e.g. royalties) between two affiliates of company i, we calculate the hypothetical total tax paid on the transaction's value, $T_{i,x}$, defined as the sum across x and c of the products of the applicable tax rate on the particular transaction category, $\tau_{x,c}$, and the value of the transactions in that category, $X_{i,x,c}$:

$$T_{i,x} = \sum_{x,c} \tau_{x,c} \cdot X_{i,x,c} \tag{2}$$

The hypothetical tax thus represents the value of tax that would have been paid had the transaction not taken place and, instead, the full amount entailed in the transaction would have been reported as profit in the origin country of that transaction. By design, this approach thus assumes that the full sum of the transaction constitutes profit shifting, i.e. that the transaction was implemented for the sole purpose of lowering profits reported in Nigeria.

In reality, there are two channels that companies can use to shift profit and this distinction impacts the interpretation of the effects of the hypothetical tax paid on reported profits. First, companies may carry out transactions that, had it not been for the difference in tax rates, would not have been carried out. As an example, a Nigerian affiliate may take out an unnecessary loan from its sister company located in a low-tax jurisdiction and pay interest on that loan, effectively shifting profit out of Nigeria equal to the value of that transaction. Second, the company may artificially inflate or deflate the prices of transactions that are taking place for legitimate purposes, with the aim of lowering the profit reported in Nigeria and increasing the profit reported in the partner jurisdiction. As an example, a Nigerian affiliate may pay a higher interest rate on a loan than would be the market, arm's-length rate.

As a consequence, the motivation represented by the hypothetical tax maps onto the decision-making process of the affiliate as follows. For outgoing transactions (i.e. costs), both channels work in the same direction: following the example with an intra-company loan, a lower hypothetical tax in a low-tax jurisdiction would increase both the motivation

to implement unnecessary loans and the motivation to inflate the interest rates on existing legitimate loans. Another example would be a transaction involving the sale of tangible goods or charging rent which might have deflated prices, decreasing Nigerian affiliate's income and thereby the MNCs profit reported in Nigeria. Therefore, the effect of these motivations on the outgoing transactions is unambiguously positive—a lower hypothetical tax on cost transactions motivates companies to shift more profit to the partner jurisdiction, lowering the reported profit in the home country.

For incoming transactions (i.e. income), the situation differs across transaction categories. For the first channel, if a company aims to shift profit out of Nigeria, for example, it might decide to implement an unnecessary loan, receiving interest (even though the interest rate is likely to be set relatively low because of the second channel being employed simultaneously, the effect should still be positive, albeit small). Within the second channel, we might expect at least some categories of incoming transactions to be positively correlated with the hypothetical tax, increasing the profits reported in the home country. Overall, in practice, the mechanism for an association between incoming transactions and the hypothetical tax paid on these transactions can be considered relatively weak, and we thus do not expect a strong effect of the hypothetical tax on incoming transactions on reported profits.

In the second step of our approach, to test for which of these effects prevail, we move from transaction-level data to the affiliate-level and we use $T_{i,x}$ in a variation of the standard Hines-Rice model (Hines and Rice, 1994) of profits of affiliate i reported in its home country as:

$$\log(\pi_i) = \beta_0 + \beta_x \cdot \log(1 + \mathbf{T}_{i,x}) + \gamma_x \cdot \mathbf{V}_{i,x} + \delta_\chi \cdot \chi_i + \epsilon, \tag{3}$$

where $\mathbf{T}_{i,x}$ is a vector of hypothetical taxes applicable to transaction x; $\mathbf{V}_{i,x}$ is the value of transaction x; χ_i company's revenue; and ϵ is the error term.

The coefficients of interest, $\beta_x, x \in (1, ..., 10)$, express the increase of profits booked in the country as the total tax cost increases, while controlling for the actual value of the transaction, $V_{i,x}$, which is not adjusted by the tax rate of the partner country, and the company's revenue. We hypothesize that β_x will be positive and statistically significant for cost transaction categories x that most often facilitate corporate profit shifting, and that β_x

will be negative and statistically significant for such income transactions.

Identifying which transaction categories are associated with lower reported profits (and how important they are relative to each other) is one of the key contributions of this paper. Lastly, we use the coefficients obtained from these regression models to estimate the scale of corporate profit shifting and the resulting tax losses by calculating the hypothetical profits in the case that all transactions were carried out with jurisdictions with tax rates similar to the domestic ones.

4 Results

Our baseline hypothesis in this paper is that profits reported by MNC affiliates that operate in Nigeria are sensitive to the hypothetical tax paid on incoming and outgoing intra-group transactions. We test this hypothesis in two stages: for total outgoing and total incoming transactions, and then for each transaction category separately.

In Table 2 we report the results of the estimation of the model specified in Eq. (3). Most of the previous literature on profit shifting has estimated the effect of faced tax rates on reported profits using a log-linear specification, with a few using the log-log specification. Garcia-Bernardo and Janský (2021) states that the elasticity estimates reveal highly irregular behaviour that linear or quadratic models cannot adequately capture. Failure to account for these pronounced non-linearities could lead to the misrepresentation of the scale of profit shifting. Therefore, we estimate hypothetical tax on costs using both log-linear specifications (in columns (2) and (4)) as well as log-log specifications (in columns (3) and (5)). The results support the hypothesis that the hypothetical taxes on costs in both models are positively associated with reported profits. The impact is more pronounced in column (3) where we use the log of hypothetical taxes. This model exhibits a better fit of the data compared to the log-linear model in column (2). The coefficient in column (3) suggests that a 1 per cent increase in the hypothetical tax on outgoing transactions (i.e., costs) is associated with a 0.71 per cent increase in reported profits in Nigeria. In a robustness check, using the LACIT rate in columns (4) and (5), we observe similar positive and statistically significant coefficients.

In Table 3, we assess the individual cost transaction categories. Controlling for the total value of the transactions, the value of transactions in each category and the size of the

Table 2: Results of the regression of cost transactions and the hypothetical tax on these transactions on reported profits

	(1)	(2) ETR	(3) ETR	(4) LACIT	(5) LACIT
Total costs	0.000**	-0.006***	-0.000***	-0.006***	-0.000***
	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)
Hypothetical tax on costs		0.039***		0.044***	
		(0.012)		(0.013)	
Log of hypothetical tax on costs			0.705***		0.831***
			(0.113)		(0.106)
Revenue	0.002***	0.002***	0.001***	0.002***	0.001***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Constant	1.107***	1.088***	0.780***	1.083***	0.690***
	(0.067)	(0.065)	(0.066)	(0.062)	(0.065)
Observations	414	414	414	414	414
R^2	0.296	0.319	0.422	0.337	0.470

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The dependent variable is the log of reported profits in Nigeria.

company, our results show a positive and statistically significant effect of hypothetical taxes on reported profits for service and fees and for interest payments. These categories thus emerge as the drivers of the relationship between the hypothetical taxes paid on outgoing transactions and reported profits in Nigeria. The dominance of these transaction categories is consistent with the profit-shifting channels recognized in the literature, mainly those of strategic location of intangible assets (for service and fees) and debt shifting (for interest).

Tables A1 and A2 in the Appendix show the results for income transactions, again using both effective tax rates and LACIT rates. The coefficients for the hypothetical taxes on incoming transactions (as well as their logs) are positive, but not statistically significant at the 5% level. Regarding the individual categories of income transactions, we find a positive and statistically significant effect only for the service and fees category. As discussed, the results for income transactions should be interpreted with caution as there may be conflicting incentives for increased or decreased overall value of transactions within the same category. Also, the number of observations for income transactions is relatively small and is not representative of a specific trend in the behaviour of MNCs. Hence, we focus on the interpretation of results for cost transactions where the mechanism for profit shifting is much more straightforward.

Table 3: Results of the regression of cost transactions and the hypothetical tax on these transactions on reported profits, by type of cost transactions

	(1) Tangible goods	(2) Service and fees	(3) Royalties	(4) Interest	(5) Dividends	(6) Reimburse-ments	(7) Other
Total costs	-0.066	0.002***	-0.020	0.003***	0.308	-0.000	0.008
	(0.096)	(0.000)	(0.032)	(0.001)	(0.278)	(0.000)	(0.018)
Costs in category	0.076	-0.003***	-0.128	-0.114**	-0.333	-0.001	-0.025*
	(0.105)	(0.000)	(0.096)	(0.046)	(0.289)	(0.003)	(0.013)
Log of hypothetical tax on costs in category	0.147	0.793**	0.445	2.480***	0.696	0.305	2.224*
	(0.217)	(0.306)	(0.862)	(0.556)	(0.386)	(0.320)	(1.237)
Revenue	0.001***	0.002***	0.012***	0.002***	0.015**	0.005***	0.001**
	(0.000)	(0.000)	(0.002)	(0.000)	(0.004)	(0.000)	(0.000)
Constant	1.285***	0.726***	1.278**	0.591***	-0.253	0.904***	0.938***
	(0.163)	(0.105)	(0.367)	(0.153)	(0.322)	(0.127)	(0.290)
Observations	110	137	10	86	11	84	40
R^2	0.278	0.513	0.876	0.624	0.940	0.662	0.599

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The dependent variable is the log of reported profits in Nigeria.

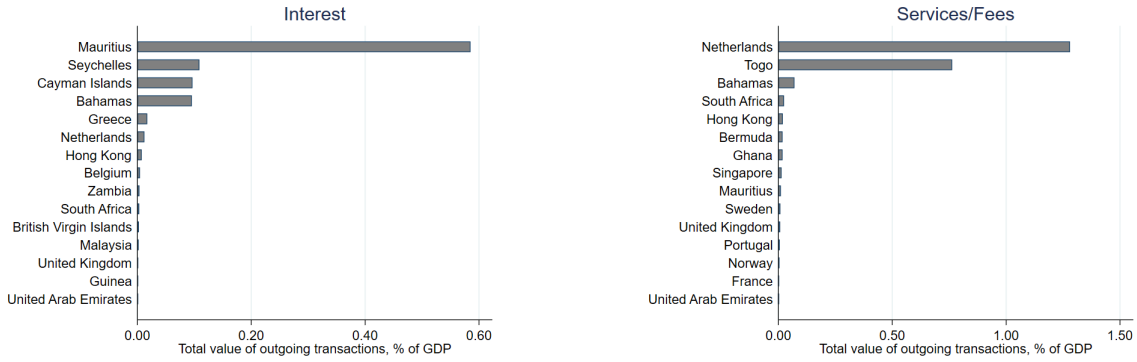
Overall, our results show that profit shifting can indeed be observed in transaction-level data of MNCs, and that the elasticity of their outgoing transactions to the tax rate of the partner jurisdiction is high. In a back-of-the-envelope estimation, we can use these results to derive the total amount of profit shifting out of Nigeria. The 451 Nigerian affiliates of MNCs in our sample reported a profit of US$16.37 billion with total outgoing transactions worth US$14.69 billion, on which they (in theory, based on country-level estimates of effective tax rates) paid a weighted average of 15 per cent in corporate income tax in the partner jurisdictions. Assuming that the difference between the tax rate paid elsewhere and the tax rate hypothetically paid in Nigeria (considering the statutory corporate income tax rate of 30 per cent [1]) can be attributed to profit shifting, these estimates suggest that the profits reported in Nigeria, had it not been for profit shifting, would actually be $e^{0.705 \log (0.3/0.15)} = 1.63$ times higher than the observed reported profits.

Therefore, the US$16.37 billion reported in profits should actually be 1.63 higher if it were not for profit shifting, potentially yielding 16.37 * 0.630 * 0.3 = 3.09 USD billion in additional tax revenue. The US$3.09 billion applies to only the 451 company-years in our sample, which is likely to constitute a significant part of the overall estimates of tax revenue

[1] Estimated effective tax rates in Nigeria are even larger, at 57.83 per cent (Tax Justice Network, 2020b), so using the statutory rate is a rather conservative approach.

losses due to profit shifting of all large MNCs, which were reported in prior literature to amount to US$1.77 billion per year using 2017 aggregate country-by-country reporting data (Tax Justice Network, 2021b).

Figure 1: Destinations of Nigerian affiliates' outgoing transactions classified as interest and, services and fees



(a) (b)

Figure 1 shows the breakdown of the partner countries in outgoing transactions whose hypothetical tax payments are positively associated with higher reported profits. We observe that different countries play a crucial role across various transaction categories. The interest category is concentrated in several low-tax jurisdictions such as Mauritius, Seychelles, Cayman Islands and the Bahamas. These countries serve as destinations for outsized value transactions in highly risky categories, which are closely connected to some of the most commonly used profit-shifting strategies. The Netherlands and the Bahamas stand out as primary destinations for transactions categories under the service and fees category. These results underscore the pivotal role of aggressive corporate tax havens in profit shifting. Our results coincide with previously documented patterns of profit shifting out of developing countries, in which debt shifting plays an outsized role (Dischinger and Riedel, 2008; Fuest et al., 2011; Huizinga and Laeven, 2008; Reynolds and Wier, 2019). They also corroborate insights from Langerock and Rodríguez (2019), highlighting the imperative role of Mauritius for MNCs operating in African countries, particularly in leveraging subsidiary loans.

5 Conclusion

This paper uses, for the first time, administrative data on intra-group transactions of multinational corporations operating in Nigeria to identify channels that they use to shift profits to tax havens and to estimate their relative importance. We have partnered with Nigeria's Federal Inland Revenue Service to digitalize data on 725 intra-group transactions worth US$16.37 billion made between 2018 and 2022 in 451 company-year combinations.

We use the transaction-level data in an approach that estimates the elasticity of reported profits to the hypothetical tax that would have been paid on the value of the transactions had these transactions not been made. We find that the hypothetical tax on the outgoing transactions in the categories of interest and service and fees are positively associated with reported profits in the home jurisdiction, suggesting the relative importance of the strategic location of intangible assets (for service and fees) and debt shifting (for interest) as channels of profit shifting from Nigerian affiliates to low-tax jurisdictions. We find that a 1 per cent increase in the hypothetical tax on outgoing transactions is associated with a 0.71% increase in reported profits in Nigeria. The jurisdictions most prominently implicated in these transactions are Mauritius, the Netherlands, and the British Virgin Islands, all countries that act as aggressive corporate tax havens.

We estimate the overall scale of profit shifting based on this transaction-level data to have amounted to US$3.09 billion lost in tax revenue from the 451 company-years in our sample. When MNCs shift their profits to countries with low corporate income tax rates, they deprive the countries in which the profit was generated of significant tax revenues. In the case of less developed countries, in which corporate income tax rates generally play a very important role, corporate profit shifting has significant negative impacts on economic development.

Given that most multinational corporations operating in Nigeria use the debt shifting channel and a significant portion of revenue losses stems from this channel, the revenue authority should intensify its efforts in implementing the BEPS action plans, particularly Action 4, which ensures that multinationals pay a reasonable interest for within-MNC loans. Stringent enforcement of such rules could potentially limit tax avoidance and increase the tax base. The government should also amend, where necessary, the loopholes in the tax law

to deter multinationals in Nigeria from abusing them.

We establish that profit shifting is detectable in transaction-level data. This data used, coupled with the methodology carried out in this paper, can assist tax authorities, particularly in developing countries with limited resources, to decrease profit shifting and increase domestic corporate tax revenue. Future studies can replicate this methodology and expand the sample to include several countries to draw more general conclusions about the profit shifting behaviour of MNCs in developing countries.

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A Appendix

Table A1: Results of the regression of income transactions and the hypothetical tax on these transactions on reported profits

	(1)	(2) ETR	(3) ETR	(4) LACIT	(5) LACIT
Total income	0.024***	-0.013	0.001	-0.008	-0.003
	(0.009)	(0.028)	(0.015)	(0.018)	(0.013)
Hypothetical tax on income		0.293		0.281	
		(0.256)		(0.169)	
Log of hypothetical tax on income			0.639		0.797*
			(0.500)		(0.429)
Revenue	0.012***	0.011***	0.011***	0.011***	0.011***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.825***	0.780***	0.683***	0.784***	0.655***
	(0.142)	(0.154)	(0.195)	(0.149)	(0.183)
Observations	62	62	62	62	62
R^2	0.591	0.600	0.603	0.607	0.611

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The dependent variable is the log of reported profits in Nigeria.

Table A2: Results of the regression of income transactions and the hypothetical tax on these transactions on reported profits, by type of income transactions

	(1) Service and fees	(2) Interest	(3) Reimbursements	(4) Other
Total income	0.022***	0.045	0.127***	0.528
	(0.005)	(0.160)	(0.026)	(0.370)
Income in category	-0.196**	0.092	-0.123**	-14.650
	(0.091)	(0.262)	(0.046)	(13.809)
Log of hypothetical tax	3.360***	-2.280	0.122	37.690
on income in category	(0.748)	(1.631)	(0.900)	(26.301)
Revenue	0.011*	0.014***	0.014***	0.008
	(0.005)	(0.003)	(0.002)	(0.004)
Constant	0.224*	1.005**	0.688**	1.446
	(0.127)	(0.473)	(0.318)	(0.849)
Observations	30	23	26	6
R^2	0.806	0.694	0.637	0.947

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The dependent variable is the log of reported profits in Nigeria. Transaction categories with less than 5 transactions are not used (these are tangible goods, royalties, and dividends.