

A stylized illustration of a landscape with a city skyline, mountains, and wind turbines under a yellow sky. The text 'SA-TIED' is prominently displayed in white on a dark green background.

SA-TIED

Southern Africa – Towards Inclusive Economic Development

WORKING PAPER 230

On the effects of anti-profit shifting regulations

A developing country perspective

Sabine Laudage Teles,¹ Nadine Riedel,² * and Kristina Strohmaier³

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About the project

Southern Africa – Towards Inclusive Economic Development (SA-TIED)

SA-TIED is a unique collaboration between local and international research institutes and the government of South Africa. Its primary goal is to improve the interface between research and policy by producing cutting-edge research for inclusive growth and economic transformation in the southern African region. It is hoped that the SA-TIED programme will lead to greater institutional and individual capacities, improve database management and data analysis, and provide research outputs that assist in the formulation of evidence-based economic policy.

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¹ German Institute of Development and Sustainability (IDOS), Bonn, Germany; ² Institute for Public and Regional Economics, University of Münster, Germany; ³ University Duisburg-Essen, Essen Germany; * corresponding author, Nadine.Riedel@wiwi.uni-muenster.de

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Abstract: Multinational profit shifting is a major concern for low- and middle-income countries (LMICs). Many have enacted anti-profit shifting rules in order to constrain this type of tax avoidance behaviour. Yet not much is known on the rules' effects. We offer a first empirical assessment, providing two pieces of evidence. First, we draw on macro data for more than 120 LMICs for a 30-year period and show that the introduction of transfer pricing (TP) rules—provisions that constrain profit shifting from mispricing of intra-firm trade—significantly increased corporate tax revenue collection in LMICs. Second, we use rich tax administrative and trade data for South Africa to provide 'first-stage' evidence for firms' behavioural response to stricter TP provisions: we establish that a tightening of South African TP rules reduced intra-firm trade mispricing and increased taxable income reporting of affected multinational firms.

Key words: corporate taxation, international taxation, transfer pricing laws

JEL classification: H25, F23, O23

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1 Introduction

Multinational profit shifting to tax havens is high on policy-makers' agendas. Evidence suggests that it is a sizable phenomenon, causing non-negligible tax revenue losses in high-tax countries (see, e.g., Beer et al. 2020; and Tørsløv et al. 2023 for surveys). Low- and middle-income countries (LMICs) might be particularly vulnerable to multinational tax avoidance: their tax administrative capacity is smaller than in the developed world, which may render it difficult to constrain profit shifting (e.g., Crivelli et al. 2016; Johannesen et al. 2020; Wier 2020; and Tørsløv et al. 2023).¹

LMICs have, over recent years, tried to collect more revenues from multinational enterprises (MNEs) by augmenting their domestic tax law by regulations that constrain international tax avoidance. Among the most prominent rules are transfer pricing (TP) provisions that are designed to limit profit shifting from strategic distortion of intra-firm trade prices. The rules require MNEs to set intra-firm trade prices at 'arm's length,' that is the intra-firm trade prices must correspond to the prices set by independent parties. While hardly any lower-income nation had TP regulations in place in 1980, today, more than 100 LMICs have incorporated TP provisions into their corporate tax law.

Despite their high prevalence, little is known on the effects of TP regulations in LMICs. For high-income countries, a nascent literature documents that anti-profit shifting provisions shape firm behaviour and constrain income shifting (see, e.g., Büttner et al. 2012; Beer and Loeprick 2015; Clifford 2019; Bilicka et al. 2022). Most studies document sizable effects (see Section A.2 in the Online Appendix). Comparable analyses for the developing world are missing. This is an important gap in the literature, given that there are pronounced economic and institutional differences between LMICs and high-income countries, which may limit the external validity of existing findings for the developing world.

In this paper, we provide two pieces of evidence to help fill this gap. First, we draw on country-level information on corporate tax revenue collection for more than 120 LMICs over a 30-year-period to study the fiscal consequences of the introduction of TP legislation. We have linked corporate tax revenue information to newly compiled data on the rollout of TP rules in LMICs. More than 80 LMICs enacted TP regulations during our sample frame (1980-2019). Methodologically, we rely on dynamic difference-in-differences (DiD) estimators and compare changes in corporate tax revenue collection in countries that enacted TP regulations to countries without changes in TP policies. As the effects of TP provisions may well be dynamic in nature, we use estimators that are robust to heterogeneous and dynamic treatment effects.

The estimation results show that corporate income tax collection in both treated and non-treated nations followed a parallel trend prior to the introduction of TP laws. After treatment, corporate tax revenues in countries that enacted the rules increased significantly. Effect size positively correlates with the tightness of enacted TP provisions. Our results remain robust when controlling for potential economic, policy or institutional confounders. Our preferred estimate suggests an average corporate tax revenue increase of 5-8% when countries enact TP legislation, with indication for declining effect size over the post-treatment period.

In the second part of the paper, we assess the same research question using rich tax administrative and trade data for one particular less developed country, South Africa. The analysis allows us to shed light on the underlying mechanism and to show that TP rules govern intra-firm trade pricing. Testing ground is the enactment of TP documentation requirements into South African tax law in 2016, mandating that

¹ Multinational enterprises belong to the largest taxpayers in LMICs; their tax avoidance may hence shape aggregate revenue collection. This particularly holds true as many LMICs strongly rely on corporate taxes as a revenue source (see, e.g., Gordon and Li 2009).

treated firms submit detailed TP documentation along with their tax returns. The analysis draws on firm-level import trade data for 2012–20, which allows calculating unit prices for 6-digit product categories per firm and partner nation, distinguishing between intra-firm and extra-firm trade.

Our findings—consistent with prior evidence on profit shifting within multinational firms (e.g., Davies et al. 2018; Wier 2020)—show that treated firms sharply lower their import prices for intra-firm imports from tax havens after the introduction of the TP documentation rules, relative to control entities. The decline points to a reduction in profit shifting to havens and is quantitatively sizable, amounting to around 18%. We present various robustness checks and placebo tests, which support this finding. In additional specifications, we show that treated firms experience an increase in their taxable income reporting after the reform relative to control entities, consistent with reduced tax avoidance.

Our findings complement an emerging literature on the fiscal and economic effects of anti-profit shifting regulation, which is so far almost exclusively set in high-income countries. Most closely related to our work, Bartelsman and Beetsma (2003) and Beer and Loeprick (2015) present evidence that tighter TP rules and enforcement limit the tax-strategic mis-pricing of intra-firm trade. Büttner et al. (2012), Blouin et al. (2014) and Bilicka et al. (2022) document that limits on the tax deductibility of interest costs impact intra-firm capital structures in a way that is consistent with reduced income shifting behaviour. Egger and Wamser (2015) and Clifford (2019) provide evidence for the effectiveness of controlled foreign company (CFC) rules in limiting passive income holdings at low-tax locations. See Appendix A.2 for further details.

While all cited papers find sizable effects for high-income countries, our paper contributes to the literature by testing for related effects in LMICs. Our evidence suggests that LMICs benefit from TP provisions and collect additional revenue. The paper closest to our micro data analysis is Bustos et al. (2022), who do not find significant intra-firm price responses to tighter TP rules in Chile. There are various potential explanations for the difference in findings—ranging from the nature of the reforms to differences in the institutional setting and the empirical estimation strategy. Chile, at the time of the studied reform, had—by international comparison—a moderate corporate tax rate (17% in pre-reform years; 20% in the reform-year), significantly below the South African rate of 28%, potentially dampening pre-reform profit shifting incentives and, with it, responses to tighter TP provisions. Unlike the Chilean intervention, the South African reform, moreover, treated large firms only (which prior research identifies to be particularly prone to income shifting, see, e.g., Wier and Erasmus (2022)). Our micro data analysis, moreover, tests for price adjustment in tax haven trade (like Bustos et al. 2022, we find no systematic changes in non-haven trade prices when TP rules are tightened).² Last but not least, the South African reform fell in a period, in which anti-profit shifting rules were tightened in other domains as well, following multilateral efforts to fight base erosion and profit shifting in the OECD’s “BEPS”-process. While these changes are, as discussed in the paper, not expected to impact firms’ transfer pricing (in a differential way across the treatment and control group), the increased efforts and awareness may shape firms’ expectation on rule enforcement and may add to the sizable response.

The paper proceeds as follows. Section 2 presents the study using macro-level data, while Section 3 focuses on the micro-level analysis for South Africa. Each section begins with an overview of the relevant institutional background and data, followed by the empirical identification and the results. Section 4 provides an overall conclusion.

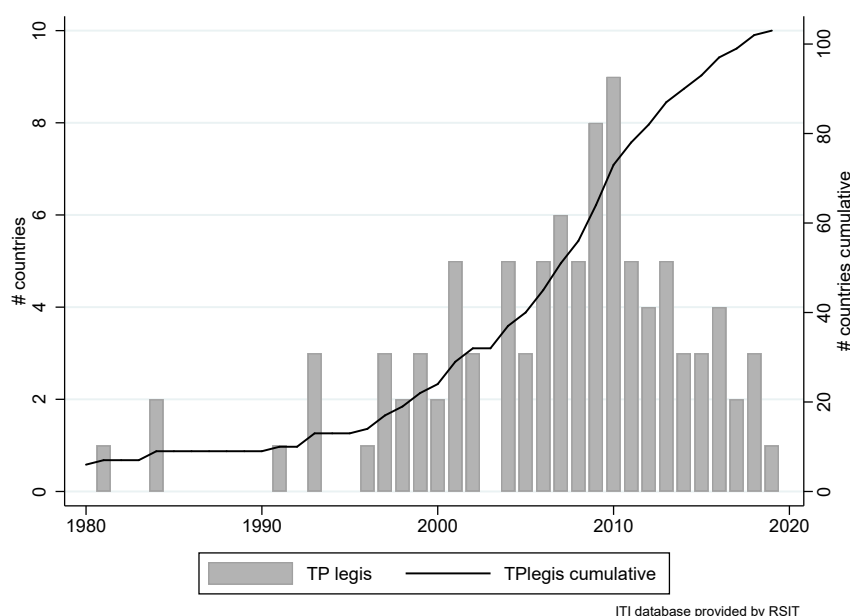
² Wier (2020) offers correlational evidence for an earlier TP reform in South Africa, suggesting that mis-pricing activities are temporarily reduced by around 50% (albeit effects not being statistically different from each other).

2 Macro data analysis

2.1 Transfer pricing regulations

To prevent profit outflows from their borders, governments worldwide have augmented their tax laws by TP regulations. Their overarching principle is to require MNEs to set intra-firm prices at arm's length: that is, intra-firm transfer prices must correspond to the prices set by unrelated parties. While high-income countries have started adopting these rules in the first half of the 20th century, LMICs were sluggish to follow. In 1980, only six LMICs had TP rules in force. The rules gained popularity by the end of the 20th century and were widely adopted after the millennium. Figure 1 plots the rollout of TP rules in LMICs³ after 1980. The bars indicate the number of LMICs that adopted TP rules in a particular year (left axis); the line depicts the cumulative number of LMICs that had TP rules in place at a particular point in time (right axis).

Figure 1: Introduction of transfer pricing regulations, 1980–2019



Note: this graph shows the evolution of TP regulations over time. The left axis counts the number of countries with new TP legislation per year, whereas the line graph scaled on the right axis shows the cumulative number of countries with TP legislation per year in our sample.

Source: authors' illustration based on the International Tax Institutions (ITI) database (Wamser et al. 2024) .

In the Appendix, we provide background and anecdotal evidence on the introduction of TP legislation by countries, suggesting that in part drivers internal to the country shaped take-up behaviour (like increased presence by MNEs); in part factors external to the country (milestone publications like the OECD's TP guidelines in 1995 and the UN manual on TP legislation in 2013, e.g., encouraged several LMICs to enact TP legislation; there is also indication for learning, i.e. countries adopting the provisions when geographically or economically close neighbours take up the rules). In particular, the former reasons may pose a threat to our empirical identification design, which we address below.

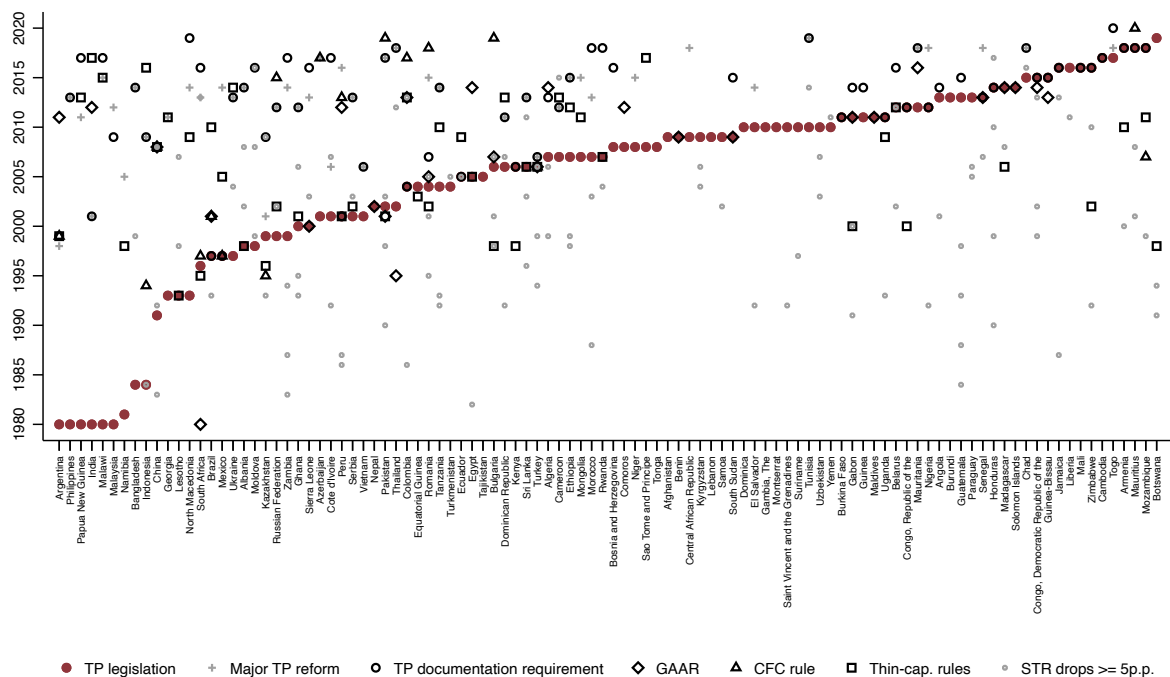
³ LMICs comprise all low- and middle-income countries as classified by the World Bank.

2.2 Data and descriptive statistics

The aim of the macro data analysis is to empirically assess the impact of TP regulations on corporate income tax collection in the developing world. The empirical analysis relies on a cross-country panel dataset on corporate income tax collection drawn from UNU WIDER’s Government Revenue Database (UNU-WIDER 2021). The data covers 124 LMICs for the years 1980 to 2019. Table B1 in the Appendix depicts summary statistics, variable definitions and data sources used. The revenue data is linked to information on countries’ adoption of TP legislation (see Laudage Teles et al. 2022 for more details). We, moreover, add information on other anti-profit shifting provisions: general anti-avoidance rules (GAAR), controlled foreign company (CFC) regulations and thin-capitalization rules (TCRs), drawn from the Research School of International Taxation’s (RSIT) International Tax Institutions (ITI) database (Wamser et al. 2024). We control for these provisions in our empirical model to isolate the fiscal effects of TP rules, see below for further details.⁴

We augment our dataset by information on countries’ statutory and effective corporate tax rates, taken from the Tax Foundation (2022) and by data on GDP, GDP per capita and GDP growth, taken from the World Bank (2021). Moreover, we account for data on general elections (data from V-Dem 2023) and the autocracy-democracy index polity2 (Polity IV Project 2021) and an index for countries’ trade openness (World Bank 2021) and FDI inflows taken from UNCTAD (2022), which will be used as control regressors.

Figure 2: Timing of TP legislation and other anti-shifting reforms



Note: the graph lists our sample countries (horizontal axis) indicating the year of introduction of TP legislation (red dot) as well as major changes in TP provisions (introduction of legal documentation requirements (circle) and other TP reforms (cross)) as well as other major anti-profit shifting reforms (diamond: general anti-avoidance rules; triangle: controlled foreign company rules; square: thin capitalization rules) and major drops in the statutory corporate tax rate (grey dots).

Source: authors’ illustration based on ITI database (Wamser et al. 2024).

⁴ We exclude countries with episodes of major disruption through civil wars and conflicts during our sample frame around the treatment year: Afghanistan, Ivory Coast, Eritrea, Ethiopia, Iraq, Libya, Mali, Sierra Leone, Serbia, Chad, Yemen. This restriction is not decisive for our results, however.

2.3 Estimation strategy

To estimate causal effects of the introduction of TP legislation on corporate income tax revenues, we follow a dynamic DiD approach with staggered treatment adoption. The treatment group comprises countries that introduced TP legislation during our sample period, with countries being categorized into different cohorts E_i based on their initial treatment timing, i.e. the year of TP introduction. We estimate event study models of the form

$$\ln(Y_{i,t}) = \alpha_i + \gamma_t + \sum_{\ell \neq -1} \delta_\ell D_{i,t}^\ell + \mathbf{X}'_{i,t} \beta + \varepsilon_{i,t} \quad (1)$$

where the dependent variable $Y_{i,t}$ denotes corporate income tax revenue in country i and year t . Country and year fixed effects (α_i and γ_t) are included to control for time-constant unobserved country-specific revenue determinants and for general time trends in the outcome variable. The indicator $\ell = t - E_i$ measures the relative time to treatment such that $D_{i,t}^\ell = \mathbf{1}\{t - E_i = \ell\}$ is an indicator for country i being ℓ years away from initial treatment. The coefficients of interest are the δ_ℓ s, which measure the average treatment effect on the treated with respect to relative time ℓ . The vector \mathbf{X}' includes the country controls described above. $\varepsilon_{i,t}$ is the error term.

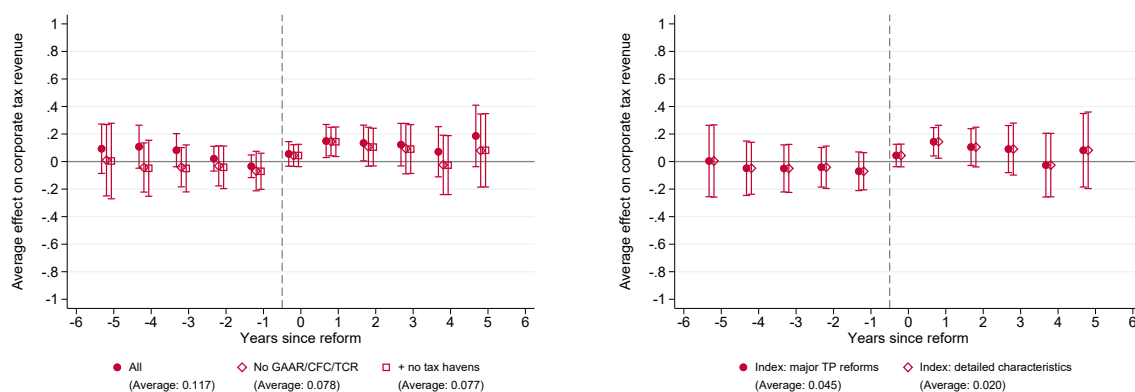
The recent literature on DiD has documented that estimating Equ. (1) conventionally, i.e. with OLS in a two-way fixed effects model does not deliver consistent estimates under treatment effect heterogeneity and/or heterogeneous dynamic treatment paths (see e.g. Roth et al. 2023; De Chaisemartin and D'Haultfoeuille 2023). We address this limitation by presenting results using the modified dynamic DiD estimator by De Chaisemartin and d'Haultfoeuille (2022), which only uses not-yet treated units as a control group for later-treated units. In robustness checks, we show that our findings are robust to using alternative estimators.⁵

2.4 Main results

Our main results are reported in Figure 3. Panel (a) depicts our baseline estimates – relying on the estimator by De Chaisemartin and d'Haultfoeuille (2022). Corporate tax revenues in treated and non-treated countries move in parallel prior to the introduction of TP provisions, corroborating the common trend assumption in the DiD design. After treatment, revenues increase in treated relative to control nations.

⁵ See De Chaisemartin and D'Haultfoeuille (2023) and Roth et al. (2023) for a survey of the emerging literature on DiD analysis in settings with heterogeneous and dynamic treatment effects. In the Appendix, we apply simple OLS and the estimator by Sun and Abraham (2021), which relies on *never-treated* countries as control units.

Figure 3: Main results—macro data analysis



(a) Baseline estimates

(b) TP index

Note: the figure depicts De Chaisemartin and d'Haultfoeuille (2022) estimates of Equ. (1). Panel (a) depicts estimates of the baseline model, which include all countries in our data (“All”), estimates where we drop countries with major other changes in anti-profit shifting regulation (“No GAAR/CFC/TCR”) and specifications, where we, additionally, drop tax havens from the data. Panel (b) depicts estimates of models, where we capture the strictness of TP regimes as described in the main text. Source: authors’ calculations.

One obvious identification concern is that the introduction of TP legislation may correlate with confounding events, in particular changes in other anti-profit shifting policies. Figure 2 illustrates the timing of changes in anti-profit shifting rules in LMICs. The figure shows that TP legislation is commonly the first anti-profit shifting policy implemented by LMICs, potentially reflecting that trade mis-pricing is perceived to be one, if not the most important tax avoidance channel (e.g., Heckemeyer and Overesch 2017). Other anti-shifting rules are commonly introduced many years later. This renders analyzing the impact of TP reforms particularly attractive as estimated effects are unlikely to be confounded by dynamic treatment effects of earlier anti-tax avoidance reforms.

Figure 3(a) shows that our findings are robust to dropping countries from the analysis that implemented other major changes in anti-tax avoidance regulations (GAAR, CFC and TCR) within a -5/+5-year window around treatment (see diamonds). The same holds true when we additionally drop countries that experienced large corporate tax changes, political regime changes or large FDI inflows around the TP reform or held general elections parallel to the introduction of TP legislation. Furthermore, the findings are robust against absorbing region-year fixed effects and tax capacity-year fixed effects. See Section B.3 of the Online Appendix.

Our findings are also robust to dropping tax haven countries from the data as shown in the last specification of Figure 3(a) (following the definition in Dharmapala and Hines 2009, see the Appendix for alternatives). In Figure 3(b), we acknowledge that TP rules differ in their tightness depending on the characteristics of TP regimes. We construct two indices: the first focuses on the existence of TP legislation and TP documentation requirements. The latter require firms to log their intra-firm trade prices and show that they comply with the arm’s length standard. The index takes on the value 0 in the absence of any TP legislation, the value 1 if TP legislation is in place; the value 2 if, additionally, authorities may request TP documentation in tax audits and the value 3 if contemporaneous TP documentation requirements are enacted in countries’ tax law. Complementary, we construct a second index, following the methodology in Mescall and Klassen (2018), who weigh different aspects of TP systems (e.g., the methods allowed to calculate arm’s length prices, penalty regimes and rule enforcement) to define a discretized index on a 0–10 scale for the strictness of countries’ TP rules (see the Appendix for more details). The results are presented in Panel (b) and confirm our baseline findings: tighter TP regulations are associated with higher levels of revenue collection. In the Appendix, we further show that, in line with intuition, no analogous effect of TP legislation emerges for revenue from the *personal* income tax base, which serves as a placebo test.

The findings hence point to a positive effect of TP legislation on corporate tax revenue collection. Quantitatively, the point estimates suggest the effect to be sizable, consistent with several prior papers on other anti-profit shifting rules (see Section A.2 in the Appendix): The introduction of TP laws raises corporate tax revenue collection by around 5–8% (cf. Figure 3). Recent studies put the corporate revenue loss from profit shifting in LMICs well above 10%—Jansky and Garcia-Bernardo (2023), for example, estimate that lower-middle income countries lose around 17% in corporate tax revenues;⁶ our estimated effect is hence quantitatively relevant. A number of factors may add to the sizable response: As TP rules are commonly introduced as LMICs’ first anti-tax avoidance policy, their enactment may signal that countries start targeting multinational tax avoidance and that other policies and administrative reforms may follow suit. Part of the response may hence reflect anticipation of additional anti-profit shifting measures in the future. Anecdotal evidence (see, e.g., Bustos et al. 2022), moreover, suggests that TP reforms tend to be associated with an upscaling of tax authority staff to accommodate the additional administrative tasks. Estimated effects must thus be interpreted as reflecting the legal and potentially associated administrative changes.

Effect size in the post-period, moreover, exhibits a hump-shaped pattern, suggesting that the revenue effect fades out over time – consistent with prior findings in Wier (2020). This might reflect that firms, over time, find other means to reduce their tax burden. Alternatively, the pattern might relate to uncertainty on the side of firms regarding authorities’ enforcement capacity after the introduction of TP legislation. Firms may at first be cautious and find it optimal to be less tax-aggressive; when the actual enforcement intensity is revealed over time, their tax aggressiveness increases again. This obviously holds if firms, when rules are enacted, overestimate the tightness with which they will be enforced by countries’ tax administration. But even without such systematic biases, related effects can emerge if the firms’ expected tax and fine costs from profit shifting are a non-linear function of the tax authorities’ enforcement intensity.

3 Micro data analysis

While the macro-data evidence provides a cross-country perspective on the effectiveness of TP regulations as a major anti-profit shifting policy, it does not allow shedding light on the detailed mechanisms at work—that is, whether the rules indeed lower intra-firm trade mis-pricing. We hence offer complementary micro data evidence on the effect of a tightening of TP rules in South Africa, which establishes such a link.

3.1 Institutional background

South Africa is an upper middle-income country with a GDP per capita of around 7,000 USD in 2023 and a tax-to-GDP ratio of about 25% (relative to an average of 16% on the African continent and an average of 33.5% in the OECD). Corporate income is taxed at a rate of 28% and, similar to other LMICs, corporate taxes are an important revenue source (with a corporate-tax-to-GDP ratio of 4.7% relative to a 2.7%-average in the OECD).

We study the effect of a tightening of TP regulations in 2016, when South Africa—following recommendations by the OECD in its BEPS Action Item 13—introduced tight TP documentation requirements. While the country had TP legislation in place since 1995, systematic documentation was not required, albeit the South African tax revenue authority could request TP-related information in the course of audits (see SARS’s Practice Note 7).

⁶ The revenue loss estimates in Tørsløv et al. (2023) are smaller (around 10%) but their data, contrary to Jansky and Garcia-Bernardo (2023), comprises few countries outside the developed world.

The new rules required firms with expected intra-firm trade above 100 million South African Rand (around 7 million USD) to submit so-called ‘local files’ with their corporate tax returns, which contain detailed documentation of intra-firm trade relationships, including trade volumes per product category and partner country, information on contracts and functions and a documentation showing that intra-firm transfer prices are set at arm’s length. Treated firms could also be requested to submit a ‘master file’, which provides a comprehensive overview over the business model, organization and functions of the whole MNE group. The rules were designed to put tax authorities in the position to better identify tax risks and were perceived as a major tightening of TP regulations (e.g., OECD 2015; Joubert 2020). Large South-African headquartered firms with consolidated group revenue above 10 billion South African Rand, moreover, became subject to ‘Country-by-Country Reporting,’ which required them to provide information on the distribution of income and real activity across jurisdictions, in which they are active. We relegate investigating the effect of the introduction of the latter provisions to future research but show that Country-by-Country Reporting does not impact our estimates of interest on the effects of the tighter TP documentation rules.

3.2 Data

The key aim of this section is to determine the impact of the tightened TP provision on intra-firm price setting behaviour. The analysis draws on confidential customs data on imported goods, which is provided by the South African Revenue Service and covers all customs transactions in the period from 2012 to 2020.⁷ The data includes information on the trading firm and the 6-digit HS product category. We focus on import trade, as the import data (contrary to export information) allows us to observe whether transactions are intra-firm or extra-firm. We use this data to calculate unit prices at the level of the product category-relation(intra/extra-firm)-partner country-firm-quarter. Prices are winsorized at the 1%-level to account for the impact of outliers (which is neither qualitatively nor quantitatively relevant for our results, however). The average/median unit price in our data is 2928.96/326.65 South African Rand (with a std.dev. 11,037.93).

Firms are subject to the new TP documentation requirements if their intra-firm trade in a given year is expected to be larger than 100 million South African Rand. In our baseline analysis, we approximate treatment by a narrow definition, based on the customs data at hand. The first definition (TREAT 1) considers firms as treated if their intra-firm import trade in the pre-treatment period (in at least one year between 2013 and 2015), exceeded the 100-million-South African Rand mark. This definition fully ignores export trade, where we cannot distinguish between intra-firm and extra-firm transactions. The second (TREAT 2) definition considers firms as treated if the sum of their intra-firm import trade and *simulated* intra-firm export trade exceeds the 100-million-Rand threshold. Intra-firm export trade is simulated, extrapolating the firms’ fraction of intra-firm imports (by value) to the export side. According to the first treatment definition 92 firms fall under the new TP documentation rules, 122 firms according to the second. Both treatment definitions are likely to be narrow, as service trade (which we do not observe) is not accounted for. We thus, as a third treatment definition, define large goods-traders as treated by the reform (presuming a positive correlation of goods and service trade). To avoid arbitrariness, firms are defined as treated if their overall trade (imports plus exports), multiplied by the sample average of the fraction of intra-firm trade (around 25%, conditional on intra-firm trading) exceeds 100 million Rand (TREAT 3). According to this definition, 810 firms belong to the treatment group.

As sketched in more detail further below, our estimation strategy follows prior evidence, showing that intra-firm price distortions are concentrated in tax haven trade (e.g., Davies et al. 2018). In the base analysis, we account for haven countries in Dharmapala and Hines (2009) and the lists of the European Union and Oxfam (see Appendix A.3). Our results are also robust to using alternative definitions as shown be-

⁷ See Appendix C3 for exact data sources.

low. 29,208 South African firms trade with tax havens as defined by our baseline haven definition, 1,119 engage in intra-firm trade with haven countries. Around 8% of all firms-product-destination-country-quarter imports in our data relate to trade with a tax haven country, around 1% to intra-firm trade with a haven.

In complementary analyses, we also draw on tax administrative data, namely on the population of corporate tax returns in South Africa,⁸ to track how the taxable income reporting of treated firms emerged relative to control entities around the time of treatment. To avoid the impact of outliers, the data is winsorized at -1/+1. The income-to-asset ratio at the 25/50/75-quantile is -0.27/0/0.098, the average profitability ratio is -0.118.

3.3 Estimation strategy

We estimate the impact of the TP reform on the intra-firm pricing of treated firms in static and dynamic DiD models, which compare the pricing of treated transactions (intra-firm trade by treated firms with tax haven countries after 2016) to the pricing of non-treated transactions. Formally, the model reads:

$$\ln(p_{f,k,c,i,t}) = \sum_{\ell \neq -1} \delta_{\ell} D_{f,k,c,i,t}^{\ell} + \alpha X_{k,c,i,t} + \varphi_{f,k,c} + \varkappa_t + \varepsilon_{f,k,c,i,t}, \quad (2)$$

where $p_{f,k,c,i,t}$ is the unit price for import trade by firm f in product category k with partner country c in quarter t in relation i (intra/extra-firm). $D_{f,k,c,i,t}^{\ell}$ indicates the relative time to treatment for treated firm-product-country cells (intra-firm trade by treated firms with a tax haven economy after 2016). In the static versions of the model, we include a treatment indicator, which takes on the value 1 for treated firm-product-country cells after treatment (from 2016 onwards).⁹ The specifications include a full set of firm-product-partner country fixed effects $\varphi_{f,k,c}$ and quarter-year fixed effects \varkappa_t , which filter out time-constant idiosyncratic differences in pricing across firm-product-partner country-cells as well as common pricing shocks over time.

The vector $X_{k,c,i,t}$ comprises source country controls (the corporate tax rate, GDP and GDP per capita). In additional specifications, we absorb source-country-year fixed effects and product-category-year fixed effects and control for haven-specific and intra-firm-trade-specific time trends as well as intra-firm-haven specific time trends.

3.4 Main results

Table 1 presents estimates from static DiD models. All estimates point to a significant drop in the pricing of intra-firm imports from tax haven countries for treated firms after the reform. Specification (1) accounts for a full set of firm-product-partner country fixed effects and a full set of quarter-year fixed effects as well as baseline controls. Treated firms are defined according to the TREAT 2-definition. The estimates suggest that import prices on tax haven trade by treated firms, on average, dropped by 18% after the reform. This findings is corroborated in Specifications (2) to (5), which include additional control variables as defined above. Importantly, the results are robust to allowing for differences in price trends between intra-firm and extra-firm trade in non-haven and also in haven countries. If there were common shifts in haven-trade related pricing, this would hence be absorbed by the control regressors (the coefficient estimate for the intra×haven×post regressor turns out small, however, and in most specifications does not gain significance at conventional levels).

⁸ Again, see Appendix C3 for exact data sources.

⁹ Treatment is defined at the annual level with 2016 being the treatment year, where the reform was announced in February and enacted in December 2016/October 2017.

Again, the estimated effect is sizable. Note that Wier (2020) finds elasticities in the intra-firm trade pricing of South African firms with low-tax countries in the range of -3. A corporate tax rate differential of 20 percentage points would, for example, be associated with import trade overpricing of 60%, a tax differential of 15 percentage points with 45%. Against this background, our estimates suggest that the TP reform reduced overpricing, but did not abolish it.

In Specifications (6)–(7), we show that our findings are robust to changes in the treatment definition (as defined above). We also assess the robustness to using a narrower tax haven definition, which yields a somewhat larger estimate for the TP effect (coeff: -0.325; s.e.: 0.072). In additional robustness checks, we drop all firms from the estimation sample, that are subject to the South African Country-by-Country Reporting requirements; in additional specifications, we also drop firms, which are subject to Country-by-Country Reporting in their foreign parent country. This leaves our estimates unchanged. We leave a thorough assessment of the Country-by-Country Reporting policy to future research; reestimating our baseline model for firms subject to country-by-country Reporting also indicates diminished income shifting, albeit less precisely estimated (coeff: -0.545, s.e.: 0.433).

Figure 4 presents estimates from the dynamic model in Equ. (2). The figure conveys two key insights: first, there is no significant difference in the pre-treatment price development between treated trade relative to non-treated trade. Prices of treated imports fall sharply after the policy change and then remain constant throughout the post-period. These findings are robust to including different sets of control variables (see above). In placebo tests in the Appendix, we, moreover, show that neither the development of prices for extra-firm trade with havens nor of prices for intra-firm trade between South African and non-haven countries exhibit a break around the reform.

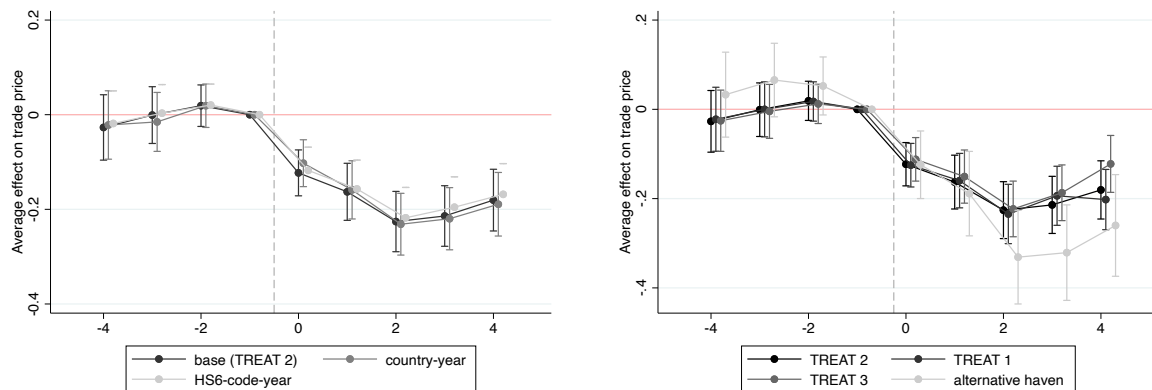
Table 1: Effect of transfer pricing rules on trade mis-pricing and income reporting for South Africa

	<i>Effect on trade mis-pricing</i>							<i>Effect on income rep.</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
intra X haven X post	-0.1764***	-0.1498***	-0.1548***	-0.1325***	-0.1823***	-0.1421***	-0.0900***	0.0339***
X TREAT	(0.0224)	(0.0373)	(0.0377)	(0.0375)	(0.0469)	(0.0368)	(0.0365)	(0.0162)
intraXpost	-0.0340***	-0.0335***	-0.0346***	-0.0289***	-0.0236***	-0.0335***	-0.0335***	
	(0.0051)	(0.0051)	(0.0052)	(0.0052)	(0.0052)	(0.0051)	(0.0051)	
havenXpost	0.0370***	0.0374***		0.0237	0.0123**	0.0374***	0.0374***	
	(0.0041)	(0.0041)		(0.0042)	(0.0058)	(0.0041)	(0.0041)	
intra X haven X post		-0.0275	-0.0160	-0.0383	-0.0085	-0.0359	-0.0679**	
		(0.0311)	(0.0315)	(0.0313)	(0.0398)	(0.0303)	(0.0302)	
Year FE	YES	YES	NO	NO	YES	YES	YES	YES
Ctry-year FE	NO	NO	YES	NO	NO	NO	NO	
Product-year FE	NO	NO	NO	YES	NO	NO	NO	
Basic controls	YES	YES	YES	YES	YES	YES	YES	
Extended controls	NO	NO	NO	NO	YES	NO	NO	
Firm FE								YES
CbCR	TREAT 2	TREAT 2	TREAT 2	TREAT 2	TREAT 2	TREAT 1	TREAT 3	TREAT 2
Observations	8,918,631	8,918,631	8,918,631	8,918,631	7,376,497	8,918,631	8,918,631	1,495,112

Note: standard errors in brackets, which account for clustering at the firm-product-partner country level (Spec. (1)–(8)) and the at the firm level (Spec. (9)) respectively. ***/**/* indicate statistical significance at the 1%/5%/10%-level. In Specifications (1)–(8), the dependent variable is the log of the unit price (observational unit: 6-digit product-relation-partner country-firm-year), in Specification (9), pre-tax income over total assets (observational unit: firm-year). 'intra' indicates intra-firm trading relationships; 'haven' tax haven trade as defined in the main text; 'post' is a dummy variable indicating time periods after 2016; 'TREAT' indicates treated firms as defined in the main text. Additionally, all specifications (apart from Spec. (3) with country-year fixed effects) control for the source country corporate tax rate and the source country tax interacted with a dummy indicating intra-firm trade. Specification (5) additionally controls for economic and market development as measured by GDP and GDP per capita. Specifications (1)–(5) rely on the treatment definition TREAT 2 (defined based on trade in 2015), Specifications (6) and (7) on the treatment definitions TREAT 1 and TREAT 3, also defined based on trade in 2015. In Specification (8) firms are defined as treated if their trade in 2013–15 exceeds 100 million South African rand and they also engage in intra-firm trade with a tax haven country.

In a final set of analyses, we turn to the universe of corporate tax returns and assess whether treated firms' adjustments in intra-firm pricing behaviour indeed translate into higher taxable income reporting. Static and dynamic DiD analyses show that treated firms' pre-tax profitability (=taxable income/total assets) significantly increases relative to untreated multinational control firms, see Specification (8) in Table 1 and Figure C2 in the Appendix, in line with reduced income shifting.

Figure 4: Main results—micro data analysis



(a) Baseline estimates

(b) Robustness checks

Note: the figure presents dynamic difference-in-differences estimates as modeled in Equ. (2). All models account for baseline controls (the statutory corporate tax rate and regressors that absorb price trends around the reform specific to intra-firm trade and tax haven trade). Figure (a) presents our baseline estimates and robustness checks, where we additionally control for a full set of source-country-year fixed effects and a full set of HS6-year fixed effects. The additional specifications in Figure (b) account for different treatment definitions (see main text) and for a narrower tax haven definition, where we only account for havens on the Dharmapala and Hines (2009)-list.

Source: authors' calculations.

4 Conclusions

In this paper, we shed first light on the fiscal consequences of anti-profit shifting rules in LMICs. The focus is on TP provisions, which constrain profit shifting by mis-pricing of intra-firm trade. Using information on corporate tax revenue collection for more than 120 LMICs over a period of 30 years, we track how the rollout of TP regulations impacted corporate tax revenue collection in the developing world. Our estimates suggest that TP rules bite: corporate tax revenue collection increases when TP legislation is introduced.

This evidence is complemented by a micro-data analysis that allows us to zoom in on adjustments in firm behaviour. Testing ground is the introduction of comprehensive legal TP documentation rules in the country of South Africa. We show that the reform significantly reduced the mis-pricing of intra-firm imports from tax havens and increased the profit reporting of multinational firms.

Overall, the paper shows that anti-profit shifting rules may indeed help LMICs to collect more revenue and thereby provide more goods and services to their citizens. To obtain a complete picture of the welfare impact, governments must balance these effects against burdens from administering and enforcing TP laws (whose quantification, we consider to be an interesting road for future research).

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Appendix

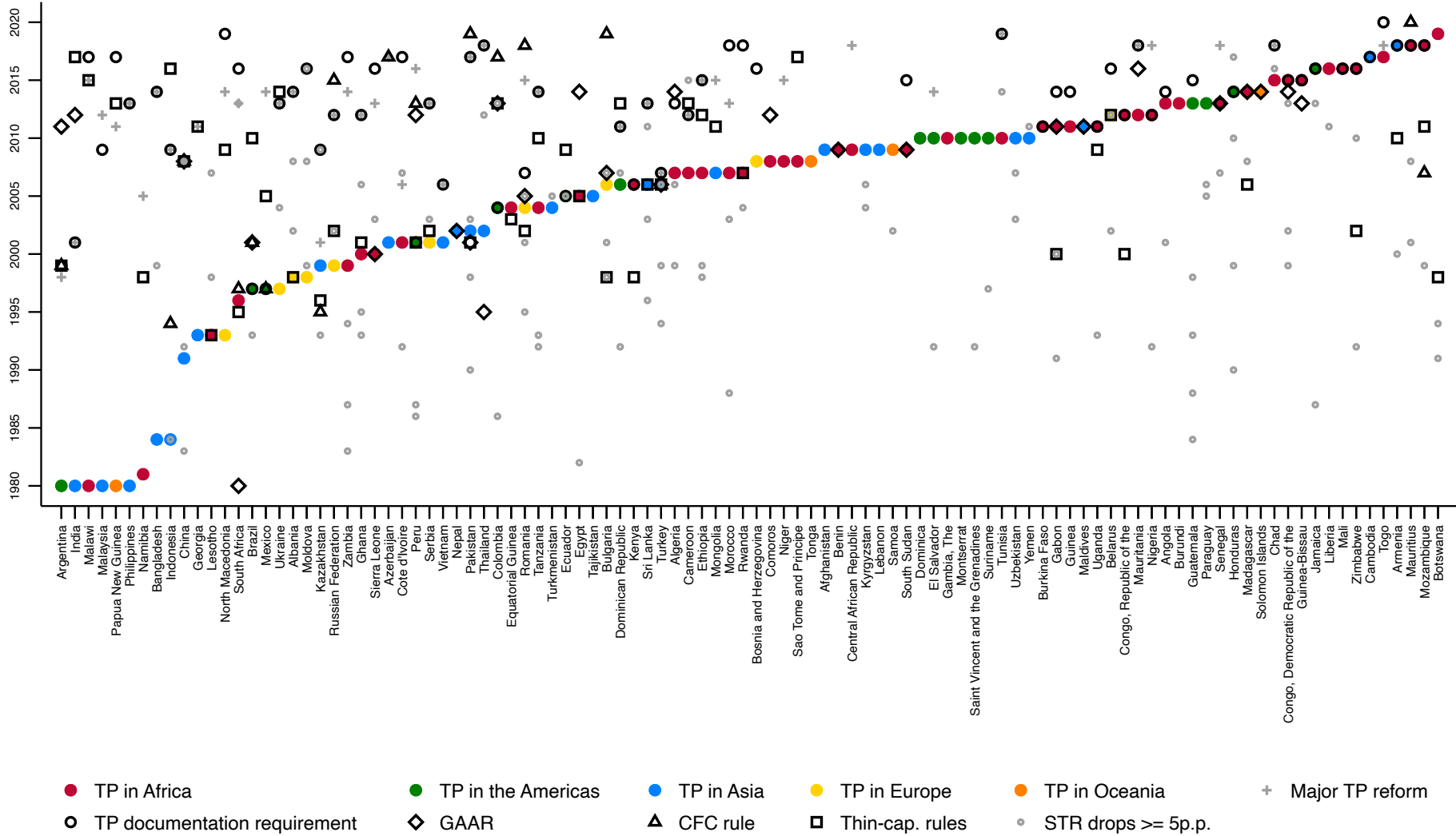
A Background material

A1 The introduction of transfer pricing regulations in low- and middle-income countries

While high-income economies widely introduced transfer pricing (TP) legislation during the 20th century (some even early and in the mid of the century), low- and middle-income countries (LMICs) have been more sluggish to take up these rules. Only a few countries implemented the regulations in the 1990s; however, after the turn of the millennium, TP legislation was adopted more widely.

We compiled detailed information on the implementation of TP regulations in LMICs worldwide, including data on the year of introduction of TP legislation, as well as of major TP reforms like the introduction of TP documentation requirements (Research School of International Taxation 2022). This data is complemented by comprehensive hand-collected information on various anti-profit shifting regulations, including controlled foreign company (CFC) rules, thin capitalization rules (TCR) and general anti-avoidance rules (GAAR) (Research School of International Taxation 2024). Table A1 and Figure A1 provide information on the timing of the take-up of the different anti-tax avoidance rules between 1980 and 2020. The figure illustrates that TP provisions are in most instances the first anti-profit shifting rules that countries introduce. Other common measures, such as TCRs or CFC provisions, are often implemented with significant delays. It is very rare for LMICs to implement TP rules parallel with other anti-profit shifting provisions. One potential reason for countries to prioritize TP legislation as their first anti-tax avoidance measure is that mis-pricing tends to be one, if not the most important channel through which multinational enterprises (MNEs) transfer profits from high-tax to low-tax countries (see, e.g., Heckemeyer and Overesch 2017). Figure A1 also illustrates major corporate tax reforms where countries have reduced their statutory corporate tax rates by 5 percentage points or more. There is no visible correlation between the timing of anti-shifting regulations and these tax rate reforms.

Figure A1: Overview on anti-tax avoidance rules and tax rate reforms, 1980–2020



Note: the figure shows the years of introduction of anti-profit shifting rules and tax rate drops, based for 102 low- and middle-income countries. Six countries had TP legislation before 1980 and are displayed on the left side of the graph: Argentina (1932), Philippines (1939), Papua New Guinea (1957), India (1961), Malawi (1964), and Malaysia (1967). Source: authors' illustration based on ITI database (Wamser et al. 2024).

Countries' adoption of TP rules is likely influenced by both internal and external factors. Our sample period was generally marked by increasing globalization and growing public awareness of multinational tax avoidance. Internal factors that may shape the adoption of TP legislation hence include a greater presence of multinational firms within a country's borders or increased profit outflows to tax haven countries. In some countries, the adoption of TP legislation was triggered by a lost TP case, which highlighted the need to better protect the country's corporate tax base. One prominent example is Kenya, which adopted TP legislation in the year following the Kenyan revenue authority's historic loss in a TP case against the Unilever group in 2005 (Waris 2017).

External factors have also seemed to impact TP rule-take-up, however. Notably, two key publications have prompted many LMICs to introduce TP legislation: the OECD TP Guidelines (OECD 1995) and the UN Manual on TP for developing countries (UN 2013). Both publications defined a set of TP methods to calculate transfer prices and recommend the introduction of TP documentation requirements to facilitate TP rules' enforcement. While the OECD TP Guidelines were primarily developed for OECD member countries to adapt or introduce TP legislation, a number of non-OECD emerging economies adopted the guidelines in the late 1990s; after 2000 also other LMICs followed suit (Picciotto 2018). The UN Manual on TP builds upon the standards set out in the OECD TP Guidelines, offering more practical guidance for countries with lower enforcement capabilities, thereby further facilitating the implementation of the provisions by LMICs.

Moreover, TP rule adoption is shaped by learning and peer effects. Anecdotes suggest that countries adopt TP provisions when neighboring countries or countries that share common legal systems and languages adopted the rules and allowed for comparably low-costs implementation of provisions. Legal texts and provisions can, at least to a certain extent, be copied and countries could draw upon the experiences of fellow nations in the implementation of the rules (see Cooper et al. 2017). In Latin America, the introduction of TP legislation in Mexico in 1996, for example, motivated Argentina (1998), Chile (1997) and Brazil (1997) to introduce or revise their TP regulations in the following years (Baistrocchi 2000). Several countries in Africa, moreover, adopted TP legislation in response to Kenya introducing its rules in response to the lost Unilever-case (see above). Figure A1 also highlights regional TP rule adoption patterns. Finally note that the introduction of TP rules also often relates to international technical support by experts from multilateral donor or regional tax organizations (Vet 2023), rendering the time of implementation a function of when donor support is available.

Table A1: List of countries, years of introduction and variable coverage

Country	Code	Year of introduction						Obs. count	
		TP legis	ΔTP	TPdoc.law	GAAR	CFC	TCR	CIT rev.	FDI
Afghanistan	AFG	2009						15	33
Angola	AGO	2013		2014				0	28
Albania	ALB	1998	2014	2014			1998	31	28
Armenia	ARM	2018		2018			2010	26	28
Azerbaijan	AZE	2001	2017			2017		22	25
Burundi	BDI	2013						14	35
Benin	BEN	2009			2009			34	39
Burkina Faso	BFA	2011		2011				40	39
Bangladesh	BGD	1984	2014	2014				16	39
Bulgaria	BGR	2006			2007	2019	1998	25	30
Bosnia and Herzegovina	BIH	2008		2016				14	22
Belarus	BLR	2012		2016			2012	28	28
Belize	BLZ							7	35
Bolivia	BOL	2002	2015	2015				20	38
Brazil	BRA	1997		1997	2001	2001	2010	30	40
Bhutan	BTN							37	22
Botswana	BWA	2019					1998	15	36
Central African Republic	CAF	2009	2018					25	36

Continued on next page

Table A1: List of countries and variable coverage (continued)

Country	Code	Year of introduction						Obs. count	
		TP legis	ΔTP	TP doc law	GAAR	CFC	TCR	CIT rev.	FDI
China	CHN	1991	2008	2008	2008	2008	2008	24	40
Côte d'Ivoire	CIV	2001	2006	2017				24	40
Cameroon	CMR	2007	2012	2012			2013	26	33
Democratic Republic of Congo	COD	2015		2015	2014			30	30
Republic of Congo	COG	2012		2012			2000	32	37
Colombia	COL	2004		2004	2013	2017	2013	0	40
Comoros	COM	2008			2012			24	33
Cabo Verde	CPV	2015		2016	2015	2015		40	34
Costa Rica	CRI	2003	2013	2013				27	40
Djibouti	DJI							17	40
Dominica	DMA	2010						19	37
Dominican Republic	DOM	2006	2011	2011			2013	37	39
Algeria	DZA	2007		2013	2014			0	38
Ecuador	ECU	2005		2005			2009	22	39
Egypt	EGY	2005			2014		2005	32	39
Eritrea	ERI							10	27
Ethiopia	ETH	2007	2015	2015			2012	15	38
Fiji	FJI	2012			1974		1980	27	40
Micronesia	FSM							23	1
Gabon	GAB	2011		2014	2011		2000	0	29
Georgia	GEO	1993	2011				2011	25	25
Ghana	GHA	2000	2012	2012			2001	34	40
Guinea	GIN	2011		2014				0	35
The Gambia	GMB	2010						17	37
Guinea-Bissau	GNB	2015		2015	2013			27	36
Equatorial Guinea	GNQ	2004					2003	8	38
Grenada	GRD							22	38
Guatemala	GTM	2013		2015				33	40
Honduras	HND	2014		2014				13	39
Indonesia	IDN	1984	2009	2009		1994	2016	0	35
Islamic Republic of Iran	IRN							26	33
Iraq	IRQ							0	24
Jamaica	JAM	2016		2016				34	34
Jordan	JOR						2010	30	37
Kazakhstan	KAZ	1999	2001	2009		1995	1996	9	28
Kenya	KEN	2006		2006			1998	14	40
Kyrgyz Republic	KGZ	2009						18	25
Cambodia	KHM	2017		2017				23	29
Kiribati	KIR							13	32
Lao P.D.R.	LAO							26	32
Lebanon	LBN	2009						0	39
Liberia	LBR	2016						5	35
Libya	LBY							0	19
St. Lucia	LCA							18	40
Sri Lanka	LKA	2006	2013	2013			2006	40	40
Lesotho	LSO	1993					1993	35	40
Morocco	MAR	2007	2013	2018				40	40
Moldova	MDA	1998		2016				28	28
Madagascar	MDG	2014			2014		2006	30	40
Maldives	MDV	2011			2011			34	39
Mexico	MEX	1997	2014	1997		1997	2005	18	40
Marshall Islands	MHL			2019				12	14
North Macedonia	MKD	1993	2014	2019			2009	24	25
Mali	MLI	2016		2016				25	37
Myanmar	MMR							2	35
Montenegro	MNE	2002	2017					20	12
Mongolia	MNG	2007	2015				2011	21	29
Mozambique	MOZ	2018		2018		2007	2011	23	39
Mauritania	MRT	2012	2018	2018	2016			13	38

Continued on next page

Table A1: List of countries and variable coverage (continued)

Country	Code	Year of introduction						Obs. count	
		TP legis	Δ TP	TP doc law	GAAR	CFC	TCR	CIT rev.	FDI
Mauritius	MUS	2018		2018		2020		40	39
Namibia	NAM	1981	2005				1998	30	33
Niger	NER	2008	2015					27	35
Nigeria	NGA	2012	2018	2012				28	39
Nicaragua	NIC	2017		2017				20	40
Nepal	NPL	2002			2002			37	34
Pakistan	PAK	2002	2017	2017	2001	2019	2001	12	40
Peru	PER	2001	2016	2001	2012	2013	2001	33	37
Palau	PLW							20	23
Paraguay	PRY	2013						30	40
Russia	RUS	1999	2012	2012		2015	2002	20	28
Rwanda	RWA	2007		2018			2007	27	40
Sudan	SDN				1986			10	37
Senegal	SEN	2013	2018	2013	2013			26	35
Solomon Islands	SLB	2014			2014			22	37
Sierra Leone	SLE	2000	2013	2016	2000			22	33
El Salvador	SLV	2010	2014					30	35
Somalia	SOM							0	35
Serbia	SRB	2001	2013	2013			2002	20	12
South Sudan	SSD	2009		2015	2009			0	5
São Tomé and Príncipe	STP	2008					2017	23	29
Suriname	SUR	2010						9	16
Eswatini	SWZ				1975			28	34
Syria	SYR							9	32
Chad	TCD	2015	2018	2018				1	36
Togo	TGO	2017	2018	2020				40	35
Thailand	THA	2002	2018	2018	1995			40	40
Tajikistan	TJK	2005						0	28
Turkmenistan	TKM	2004						15	28
Timor-Leste	TLS							7	16
Tonga	TON	2008						0	36
Tunisia	TUN	2010	2019	2019				20	40
Türkiye	TUR	2006	2007	2007	2006	2006	2006	40	40
Tanzania	TZA	2004	2014	2014			2010	28	38
Uganda	UGA	2011		2011			2009	25	32
Ukraine	UKR	1997	2013	2013			2014	28	27
Uzbekistan	UZB	2010						10	27
St Vincent and the Grenadines	VCT	2010						28	40
Venezuela	VEN	2000		2002		1999	2007	34	33
Vietnam	VNM	2001	2006	2006				23	40
Vanuatu	VUT							1	40
Samoa	WSM	2009						13	38
Yemen	YEM	2010						4	23
South Africa	ZAF	1996	2013	2016	1962	1997	1995	33	34
Zambia	ZMB	1999	2014	2017				15	39
Zimbabwe	ZWE	2016		2016			2002	29	40

Note: this table lists all 123 LMICs from which our macro-data analysis departs. Columns 3-8 show the years of introduction of different anti-tax avoidance rules, namely TP legislation, major TP reform (Δ TP), TP documentation requirements in domestic tax law (TP doc law), general anti-avoidance rule (GAAR), controlled foreign company (CFC) rule, and thin capitalization rule (TCR). The last two columns show the number of observations per country for CIT revenue and FDI.

A2 Literature overview

The literature on the effect of anti-profit shifting provisions on multinational firm behaviour is, in general, surprisingly small. Existing studies, which are largely focused on high-income countries, find sizable reductions in international tax avoidance when anti-shifting rules are introduced or tightened. In the following, we present seminal empirical papers from the related literature and compare the exist-

ing findings to our estimates. An overview of the magnitudes estimated in related empirical papers is presented in Table A2.

Transfer pricing rules. Most closely related to our paper is a study by Beer and Loeprick (2015), which shows that TP rules that aim to constrain mispricing of intra-firm trade and profit shifting to lower-tax countries (namely TP documentation provisions) do bind and reduce profit shifting—as measured by the tax sensitivity of reported pre-tax profits—by around one half. An early study by Bartelsman and Beetsma (2003) already showed weak evidence that tighter TP rule enforcement reduces profit shifting. Qualitatively and quantitatively consistent evidence is also found in other related work on TP provisions (Lohse and Riedel 2012; Mescall and Klassen 2018).

Thin capitalization rules. Seminal work by Büttner et al. (2012) studies the impact of thin capitalization rules (TCRs) on firm behaviour—i.e. provisions aimed at reducing debt shifting within multinational firms by denying tax deductibility of (intra-)firm interest payments beyond a specified debt-to-equity threshold. The authors document that strict TCRs cut debt shifting (i.e. the tax-sensitivity of debt ratios) by about half. Similar evidence is presented by Bilicka et al. (2022), who study the introduction of a worldwide debt cap in the UK, which denies the tax deductibility of interest payments if the ratio of UK debt to overall group debt passes a predetermined threshold. The authors show that the policy triggered a 29% reduction in the UK-to-worldwide debt ratio (which can be seen to serve as an indirect measure for debt-shifting from the UK). Again, other papers echo these findings and point to sizable effects of TCRs on the debt-shifting of MNEs (Wamser 2008; Weichenrieder and Windischbauer 2008; Overesch and Wamser 2010 and Blouin et al. 2014).

Controlled foreign company rules. A seminal paper by Clifford (2019) finds that controlled foreign company (CFC) rules—which make passive income in low-tax subsidiaries taxable in MNEs' parent country—on average reduce reported financial profits in multinational subsidiaries by 13% when CFC rules become applicable. She also shows that about half of the income is relocated to MNEs' parent country. Other papers also find evidence consistent with significant effects of CFC rules on the asset allocation of multinational firms (Altshuler and Hubbard 2003; Ruf and Weichenrieder 2012; Egger and Wamser 2015).

Country-by-Country Reporting. Recent studies assess the effect of Country-by-Country Reporting—a recent addition to the set of anti-avoidance rules, which requires firms to provide detailed information on the distribution of income and real activity across tax jurisdictions—on profit shifting behaviour. Country-by-country Reporting has been introduced in many countries since 2016 as it is one key action of the OECD's BEPS reform package from 2015. Joshi (2020) and Overesch and Wolff (2021) document that the introduction of Country-by-Country Reporting in the European Union increased effective tax rates of firms and banks in scope of the reform compared to unaffected control units. Other papers also find evidence that these reforms reduce aggressive tax planning and tax evasion (Johannesen and Larsen 2016; De Simone and Olbert 2022; Godar et al. 2024).

Table A2: Overview on effect sizes of anti-profit shifting rules in the literature

Article	Dep. variable	Rule	Effect size
Bartelsman and Beetsma (2003)	Value-labour ratio	TP	31% ⁿ
Lohse and Riedel (2012)	Pre-tax profits	TP	50%
Beer and Loerprick (2015)	Pre-tax profits	TP	50%
Wier (2020)	Arm's length price deviation	TP	-50% (insignificant)
Bustos et al. (2022)	Royalties, services, interest payments	TP	insignificant
Büttner et al. (2012)	Debt ratio	TCR	-50% ⁿ
Bilicka et al. (2022)	Debt ratio	TCR	-29%
Wamser (2008)	Debt ratio	TCR	-20%
Weichenrieder and Windischbauer (2008)	Debt ratio	TCR	-120 p.p.
Overesch and Wamser (2010)	Debt ratio	TCR	-33%
Blouin et al. (2014)	Debt ratio	TCR	around -50%
Clifford (2019)	Foreign profits	CFC	-13%
Altshuler and Hubbard 2003	Asset allocation towards low-tax affiliates	CFC	reduced
Ruf and Weichenrieder 2012	Passive assets	CFC	-77%
Egger and Wamser 2015	Fixed assets	CFC	- 7 million Euro
Joshi (2020)	ETR (firms)	CbCR	1-2 p.p.
Johannesen and Larsen (2016)	Abnormal returns	CbCR	-5 to -10%
Overesch and Wolff (2021)	ETRs (banks)	CbCR	3.7 p.p.

Note: this table provides an overview of empirical papers that estimate the effects of anti-profit shifting legislation on different outcome variables that allow for the assessment of profit shifting reductions. Most studies employ DiD, propensity score matching or regression discontinuity design as methods. Note that data sources (accounting vs. reporting data) and geographical coverage differ across the studies. Studies marked by ⁿ relate the effect to the change in tax sensitivity. In Bartelsman and Beetsma (2003), for example, the tax sensitivity in lax-enforcement (tight-enforcement) countries is -0.0031 (-0.0021).

All of the cited papers analyze the effectiveness of anti-shifting rules for high-income countries. While the setup and the specific anti-profit shifting policy studied differ, all papers point to sizable responses by multinational firms to the enacted anti-profit shifting provisions. We add to the literature by contributing evidence from LMIC contexts. Studying anti-profit shifting provisions in these countries is of particular interest as it is not clear whether existing evidence from high-income countries carry over to LMICs, with weaker government institutions and tax capacity. It is, in fact, a priori not clear whether anti-shifting rules show any effectiveness in LMICs at all: if they are not adequately enforced and administered, their effect on multinational profit shifting may also be null or small.

Two recent studies present estimates for the effect of TP reforms on transfer mispricing in LMIC contexts. Bustos et al. (2022) reject any changes in intra-firm pricing behaviour to a tightening of TP rules in Chile in 2012. Wier (2020) finds some indication that a TP reform in South Africa in 2012 temporarily constrained transfer mispricing by around 50%, albeit effects are not statistically significant. Both reforms induce a shift in the burden of proof from the tax authority to the taxpayer, where the Chilean reform also introduced TP documentation requirements. It is important to note that the nature of the reform is distinct from the introduction of TP legislation assessed in our macro data study. The type of reform is closer to the South African intervention studied in the micro data analysis, which tightened preexisting TP legislation.

In our micro-data analysis, we find that the introduction of TP documentation requirements in South Africa in 2016 triggered a strong around 18% reduction in intra-firm import prices in trade with tax haven countries. The reasons why our findings differ from those by Bustos et al. (2022) might be twofold. First, the methodological approaches differ: we focus on the effect on pricing of tax-haven trade rather than the tax elasticity of trade pricing across all intra-firm trading relations. Second, differences in the countries' institutional context and in the nature of the reform may also add to explaining the differences. Chile,

at the time of the reform, featured a by international standards moderate corporate tax rate of 20% in the reform years (and even lower rates in years before the reform: 17%); South Africa, in turn, taxed corporate income at a rate of 28% within our sample frame. Profit shifting incentives may hence have been much lower before the Chilean reform than in the South African case—in particular in the light of existing evidence, suggesting that shifting incentives increase overproportionally in corporate tax rate differentials. The Chilean reform may thus have treated a set of firms, which is less prone to engage in profit shifting relative to the South African intervention. The South African reform, moreover, restricted treatment to the largest traders in the country, while the Chilean reform treated all multinational firms. Again, the literature suggests that it is in particular large firms, which engage in profit shifting (e.g., Wier 2020; Davies et al. 2018), adding to the fact that the South African reform may have treated a more shifting-prone set of firms. Other factors, like differences in enforcement regimes may be important as well—albeit anecdotal evidence suggests that the reforms were neatly enforced in both countries (see EY 2012).

A3 Tax haven countries

Various analyses in the paper rely on us defining tax haven economies. We do so by drawing on standard tax haven lists: Dharmapala and Hines (2009), the European Union’s list of non-cooperative jurisdictions for tax purposes (‘black list’), and Oxfam’s tax haven list. Please see the countries on each of these lists below:

Dharmapala and Hines: Andorra, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Cyprus, Dominica, Gibraltar, Grenada, Hong Kong, Ireland, Isle of Man, Jordan, Lebanon, Liberia, Liechtenstein, Luxembourg, Macao, Maldives, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, Netherlands Antilles, Niue, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Seychelles, Singapore, Switzerland, Tonga, Turks and Caicos Islands, Vanuatu, Virgin Islands (U.S.)

EU black haven list: Fiji, Costa Rica, American Samoa, Bahamas, British Virgin Islands, Vanuatu, US Virgin Islands, Anguilla, Guam, Palau, Trinidad Tobago, Panama, Turks and Caicos Islands, Samoa

Oxfam: Bahamas, British Virgin Islands, Cayman Islands, Vanuatu, United Arab Emirates, Albania, Virgin Islands, Anguilla, Antigua and Barbuda, Bahrain, Bermuda, Gibraltar, Guam, Hong Kong, Ireland, Luxembourg, Malta, Netherlands, Palau, Singapore, Trinidad and Tobago, Aruba, Bosnia and Herzegovina, Cook Islands, Curacao, Faroe Islands, Greenland, Jersey, Marshall Islands, Mauritius, Montenegro, Nauru, Canada, Niue, Oman, Switzerland, Serbia, Taiwan

Information on the EU’s and Oxfam’s tax haven lists were drawn from <https://www.worlddata.info/tax-havens.php>, accessed in April 2023.

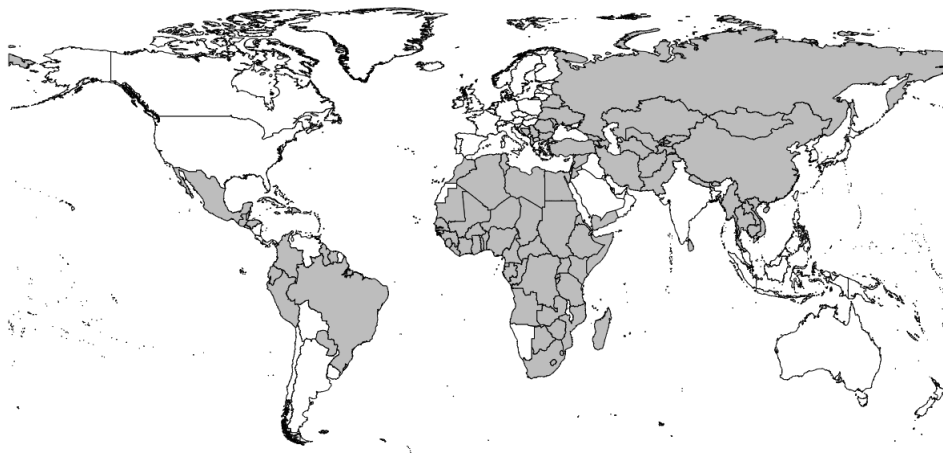
B Macro data analysis

B1 Descriptives

In the macro-data analysis, we identify the effect of TP legislation on our outcome variable by comparing countries with TP legislation to countries that have not-yet implemented TP legislation. Figure B1 shows all low- and middle-income countries that form our treatment group because they have introduced TP

legislation during our sample period (1985–2019).¹⁰ Table B1 provides descriptive statistics for all variables used in Section 2 of the paper.

Figure B1: Transfer pricing legislation, treatment and control countries



Note: in this map, 94 low- and middle-income countries from our baseline sample are colored because they introduced TP legislation between 1985 and 2019. These countries form our staggered treatment group.

Source: authors' illustration based on ITI database (Wamser et al. 2024).

Table B1: Summary statistics

	N	Mean	SD	Min	Max
Corporate tax revenue (log)	2,141	5.14	2.38	0	13.20
FDI inflows (log)	3,550	4.92	2.51	0	11.86
TP legislation indicator	4,399	0.28	0.45	0	1
GAAR indicator	4,399	0.09	0.28	0	1
CFF indicator	4,399	0.05	0.22	0	1
TCR indicator	4,399	0.14	0.34	0	1
Statutory tax rate	4,359	0.29	0.11	0	0.75
Effective marginal tax rate	4,359	0.15	0.06	0	0.31
GDP growth	4,399	3.42	7.05	-50.25	149.97
GDP (log)	4,399	22.58	2.24	17.25	30.29
GDPPC (log)	4,320	8.48	0.86	6.06	10.48
Trade in % of GDP	4,039	76.68	42.38	6.32	348
Polity2	3,799	1.03	6.33	-10	10

Note: this table shows the summary statistics of all variables included in the macro data analysis.

Source: tax revenue data (UNU-WIDER 2021), FDI data (UNCTAD 2022), anti-profit shifting rules and effective tax rates (Research School of International Taxation 2024), statutory tax rates (Tax Foundation 2022), GDP and trade data (World Bank 2021), polity index (Polity IV Project 2021).

B2 Construction of the TP score index

A main challenge of the exercise at hand is to define a proxy for the tightness of countries' transfer pricing regimes. In the main macro analysis, we rely on a binary treatment variable, capturing whether TP legislation is in place in a given country or not. In additional analyses, we construct measures that also reflect the tightness of TP regimes. The construction of our TP risk index follows a paper by Mescall and Klassen (2018), who interviewed TP experts in an online survey in 2010 to assess the scope and tightness of countries' TP regimes on a scale from 1 to 5 (which they call "transfer pricing risk"). From these interviews, they obtain around 450 country assessments for 33 countries.

¹⁰ In our analyses, we drop all countries that have introduced TP legislation prior to 1985 such that we could observe at least five pre-treatment years for all treatment countries. We furthermore only include countries for which we observe at least one pre- and one post-treatment measure of the outcome variable.

To create a time-varying measure reflecting the tightness of TP regimes, the authors correlate the regime tightness as assessed by the TP experts with the following characteristics of the TP regime:

- *ContempDoc*: 1 if the government requires the documentation to be written contemporaneous with transaction, 0 otherwise.
- *SecretComp*: 1 if the government uses proprietary tax data to calculate transfer price, 0 otherwise.
- *PenUncert*: 1 if the government has discretion over penalty reduction, 0 otherwise.
- *NoCCA*: 1 if the government does not allow cost-contribution arrangements, 0 otherwise.
- *NoComm*: 1 if the government does not allow commissionaire arrangements, 0 otherwise.
- *NoForeignComps*: 1 if the government does not allow foreign comparables when estimating transfer price, 0 otherwise.
- *APA*: 1 if the government allows advance pricing agreements, 0 otherwise.
- *BenchmarkData*: 1 if benchmark data is available to taxpayer, 0 otherwise.
- *AgeRules*: is 2010 less the year TP rules were adopted
- *TPEnforc*: 1 to 5 assessment of enforcement strictness where a score of 1.0 (5 out of 5) is most strict and 0.2 (1 out of 5) is least strict.

Mescall and Klassen (2018) used information on the regulations from Deloitte’s annual Transfer Pricing Strategic Matrix publications. Regressing the overall TP risk score on these characteristics of TP regimes, yields the following coefficient estimates.

$$\begin{aligned}
 TPScore = & 1.36 + 0.237 \cdot SecretComp - 0.408 \cdot APA + 0.644 \cdot NoForeignComps \\
 & + 0.543 \cdot PenUncert + 0.282 \cdot NoCCA + 0.315 \cdot NoComm - 0.316 \cdot BenchmarkData \\
 & + 0.406 \cdot ContempDoc + 0.0111 \cdot AgeRules + 2.490 \cdot TPEnforc
 \end{aligned}$$

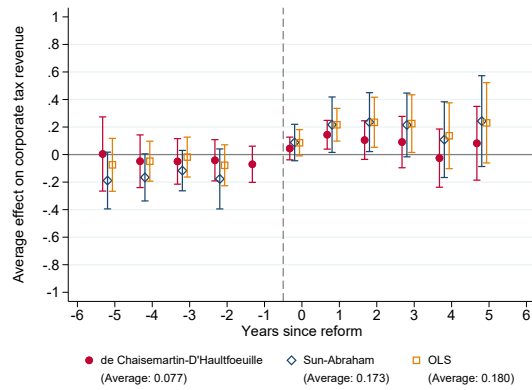
Following Mescall and Klassen (2018), we use these coefficients as weights to extrapolate the score for overall TP risk to other years and countries, based on variation in the underlying regime characteristics.

We have collected data on these various characteristics of transfer price legislation from different sources. We most heavily drew on information from Deloitte’s Global TP Country Guide, but complementarily also used the Bloomberg Tax Report, EY TP Guide, EY Worldwide Corporate Tax Guide, European Tax Handbook, Global Tax Handbook, IBFD tax guide, KPMG Global TP Review, OECD TP Country Profile, PKF Worldwide TP guide, PwC International TP guide, TPA Country Guide. Variables are coded following Mescall and Klassen (2018).

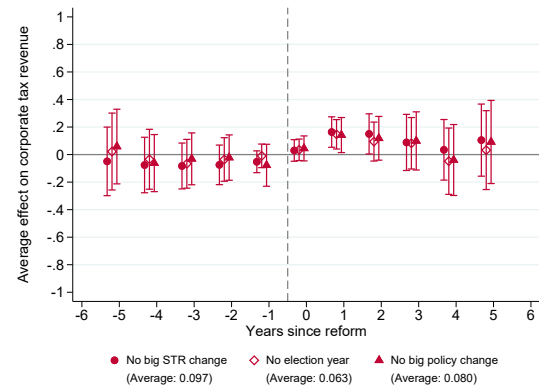
B3 Additional results: effect of TP legislation on corporate tax revenue

In this section, we present a number of robustness checks on the effect of TP legislation on corporate tax revenue collection, which are depicted in Figure B2. While our baseline results in the main text draw on the estimator by De Chaisemartin and d’Haultfoeuille (2022), Panel (a) shows that our findings are robust to drawing on alternative estimators, namely Sun and Abraham (2021) and simple TWFE models using OLS.

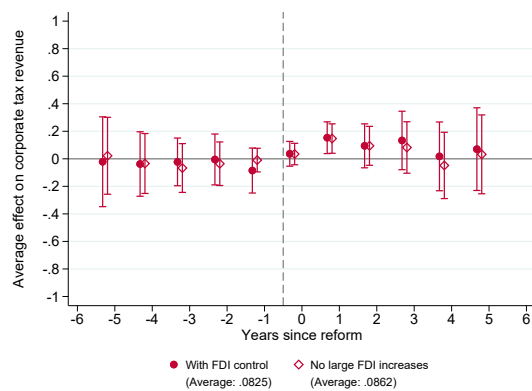
Figure B2: Macro data analysis—robustness checks



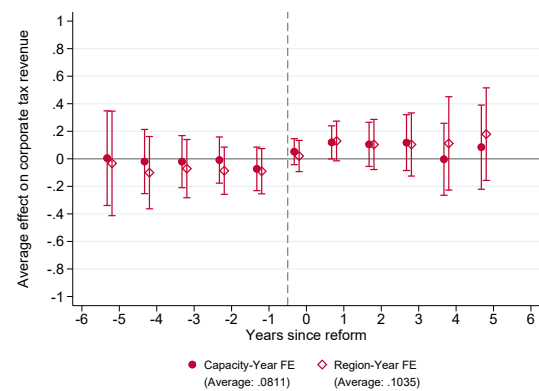
(a) Other DiD estimators



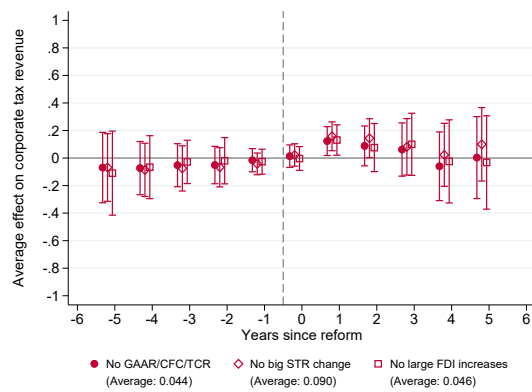
(b) Confounding policy reforms



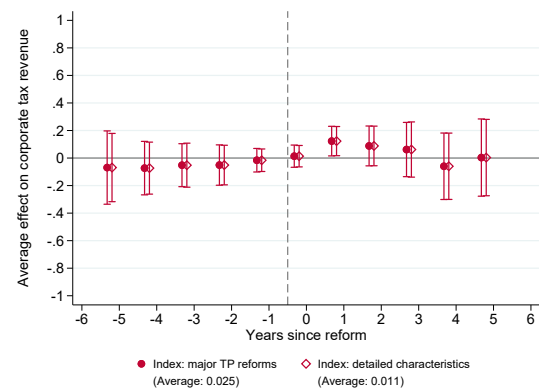
(c) Controlling for FDI



(d) Capacity-year and region-year-FE



(e) Broad haven definition and policy reforms



(f) Broad haven definition and index

Note: the figure presents estimates of Equ. (1) in the main text, using log corporate tax revenue (in USD) as dependent variable. The treatment is the introduction of TP legislation across treated countries. In Panel (a), we show results using different estimators: estimates using De Chaisemartin and d'Haultfoeuille (2022) are shown in red dots, Sun and Abraham (2021) estimates in blue diamonds and TWFE OLS estimates in yellow squares. In Panel (b), we drop countries with major tax rate changes (dots), countries in which TP reform years coincide with general election years (diamonds), and countries with major changes in political regimes (squares), see the main text for details. In Panel (c), we control for FDI (dot) or exclude countries with major FDI increases in the two years before/after treatment (diamond). The specifications in Panel (d) include a full set of capacity-year-FE (dots) or region-year-FE (diamond). Panel (e) reassess the models from Panel (b) with a broader tax haven definition. Panel (f) shows the results from the specification using the TP index (as in Figure 3(b) of the main paper) and a broad tax haven definition.

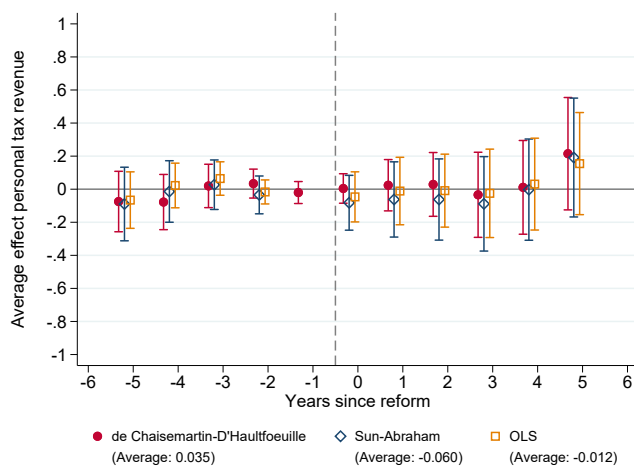
In Panel (b), we, furthermore, assess the robustness of our findings to dropping further countries from the estimation that experienced confounding reforms (in addition to the anti-profit shifting rules discussed in the main text). The red dots show results from specifications, where we drop countries that experienced big changes in the statutory tax rate in the post-reform period (more than 5 percentage points). Our results stay robust. This also holds true if we drop countries in which the introduction of TP rules coincide with general state election years (diamonds) or if we drop countries with major changes in political regimes (measured by a change in the polity2 index of more than 7 points).

We, furthermore, show that our findings are robust when we take foreign direct investment (FDI) flows into account. In the first specification of Panel (c), marked by the red dots, we control for FDI inflows into the country. This dampens concerns that TP rules may be introduced at times when countries expect an inflow of FDI, which may equally raise corporate tax revenue collection. This leaves our estimates largely unchanged. The same holds true when we drop countries with strong FDI shifts in the period from two years before to two years after the studied TP reform, in the upper tail (95%) of the FDI flow distribution.

In further robustness tests, we show that the findings are also robust to including a full set of region-year¹¹ fixed effects and tax capacity-year fixed effects in the specifications. The tax capacity measure is constructed from the 2019 wave of the OECD’s Tax Administrative Survey (RA-FIT 2019) as the fraction of tax authority operating expenses to corporate tax revenue. Indicators for the quartiles of this tax capacity variable are interacted with a full set of year fixed effects and included in the set of regressors. This, again, leaves our findings largely unchanged, see Panel (d) of Figure B2.

The last two graphs of Figure B2 present results from specifications where we apply a broader tax haven definition, i.e. where we exclude all countries that are mentioned on any tax haven list, see Section A3 of this Appendix. Panel (d) shows the analogous results to Panel (b), while Panel (f) shows the results from Figure 3(b) of the main paper, in which we use the TP index as main explanatory variable. Applying a broader tax haven definition does not change any of the results.

Figure B3: Transfer pricing legislation and personal income tax revenue



Note: the figure presents estimates of Equ. (1) in the main text, using log personal income tax revenue (in USD) as dependent variable. The treatment is the introduction of TP legislation across treated countries. Control variables included as indicated in the main text. Estimates using De Chaisemartin and d’Haultfoeuille (2022) estimator are shown in red dots, Sun and Abraham (2021) estimator in blue diamonds and TWFE OLS estimates in yellow squares.

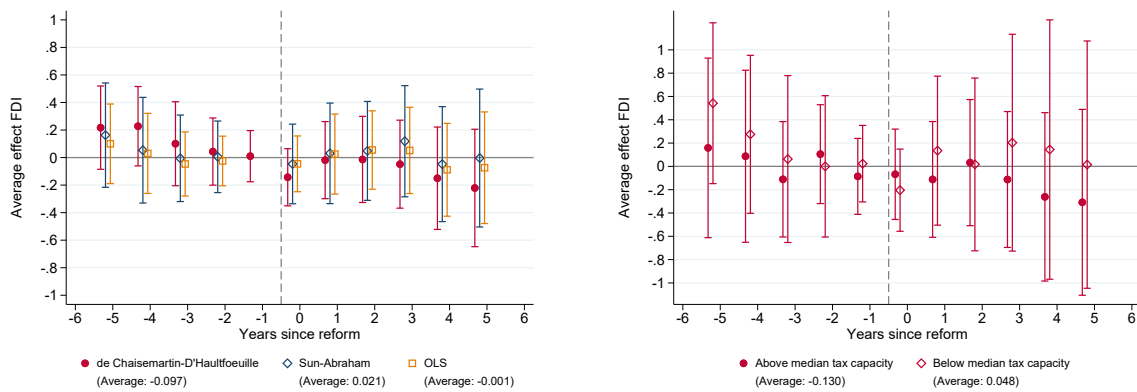
¹¹ We use the World Bank’s world region definition: East Asia & Pacific, Europe & Central Asia, Latin America & the Caribbean, Middle East & North Africa, South Asia, Sub-Saharan Africa. The region dummies are interacted with a full set of time fixed effects.

Finally, we add a placebo test, where we rerun our baseline model using *personal* income tax collection as dependent variable. Personal income tax revenue is collected from individual taxpayers (while multinational firms are commonly incorporated) and variation in TP legislations is hence expected to keep personal income tax collection unaffected. Figure B3 shows the results of our placebo estimation. Prior to the introduction of TP rules, personal income tax revenues evolve in parallel for countries with and without TP legislation. As expected, also after TP legislation is introduced, we find no significant difference in personal income tax revenue for treated and control countries.

B4 Additional results: effect of TP legislation on foreign direct investment

A number of prior papers, moreover, suggest that anti-avoidance regulations may exert real effects. We reassess this question, reestimating our baseline model using foreign direct investment inflows as the dependent variable. Panel (a) of Figure B4 shows the results of the effect of TP legislation on FDI inflows. Contrary to prior studies for developed countries (see, e.g., De Mooij and Liu 2020), we do not find clear evidence for a negative effect of the introduction of TP rules on real activity in LMICs—but estimates also tend to be rather imprecise and there is, in fact, a downward trend in the post-period when we apply the estimator by De Chaisemartin and d’Haultfoeuille (2022).

Figure B4: Macro data analysis—results for FDI



(a) Baseline estimates

(b) Split by median tax capacity

Note: the figure presents estimates of Equ. (1) in the main text, using FDI inward flows as dependent variable. The treatment is the introduction of TP legislation across treated countries. Control variables included as indicated in the main text. Panel (a) presents baseline estimates using different estimators. Estimates using De Chaisemartin and d’Haultfoeuille (2022) estimator are shown in red dots, Sun and Abraham (2021) estimator in blue diamonds and TWFE OLS estimates in yellow squares. Panel (b) shows a sample split between countries with a high and low tax capacity, which is measured by the tax administrations’ expenditure in relation to total corporate tax revenue in 2019 (RA-FIT 2019).

One potential reason is that LMICs are characterized by a weak tax administrative environment with high levels of corruption. In this setting, a lack of legal guidance on TP choices may foster corruptive behaviour and double taxation of firms. If the rules limit tax auditor discretion and corruptive activity, their introduction may enhance the country’s attractiveness as a location for foreign direct investments.

We test this presumption in Panel (b) of Figure B4, by rerunning the model separately for treated countries with below and above median tax capacity, as measured by the tax administrations’ expenditure over total corporate tax revenue in 2019 (RA-FIT 2019)). Indeed, in line with the presumption spelled out above, the downward trend in FDI in the post-period is somewhat stronger (weaker) in the set of countries with higher (lower) levels of tax capacity. Note, however, that the results using the sample split are even more noisy compared to the baseline estimates from Panel (a) and these findings therefore need to be interpreted with caution.

C Micro data analysis: South Africa

C1 Transfer price documentation rules and Country-by-Country Reporting in South Africa

In 2016, South Africa enacted a major TP reform to reduce international tax avoidance. In February 2016, the Finance Minister announced in his budget speech that the country was going to tighten up documentation requirements by multinational firms in the tax domain, following the work in the OECD's BEPS project, in particular Action 13. The aim was to put tax authorities in a better position to identify tax risks. The new requirements were finalized in December 2016 and October 2017 respectively.

The revised tax regulations require the following two sets of firms to provide additional information to the tax authorities with their corporate tax returns:

- The ultimate parent entity, resident in South Africa, of an MNE group with a total consolidated group revenue of R10 billion or more during the Fiscal Year immediately preceding the Reporting Fiscal Year, as reflected in its consolidated financial statements for such preceding fiscal year, is required to file a country-by-country report, master file and local file
- Any multinational entity with potentially affected transactions for the year of assessment, without offsetting any potentially affected transactions against one another, that exceeds or is reasonably expected to exceed R100 million, is required to file a local file and may also be required to file a master file.

In this paper, we will focus on the second set of rules and firms, which became subject to tighter documentation requirements in the transfer pricing domain (by the requirement to submit a local and a master file). We leave a thorough assessment of the effect of Country-by-Country Reporting on multinational firms' behaviour to future work. In our empirical analysis, we restrict ourselves to showing that our main findings are not impacted by the this reform.

Our analysis hence focuses on the new information requirements for firms as specified in the "master file" and "local file". The new regulations thereby largely followed the provisions set out by the OECD in its final report and implementation guidelines on Action point 13 of its BEPS project. The master file provides information on the global activities of multinational groups, including its TP strategy, organizational structure (including, for example, supply chains, important products etc.) as well as the group's legal and financial context. The local file includes detailed information on TP documentation. The file requires companies to provide detailed information on intra-group transactions (volumes and prices) for each category of controlled transactions involving a related party in each country in which the company operates. MNEs also need to provide details on contracts, functions and business relations as well as local organizational structures. Intra-firm trading prices must be documented and the company must show that prices are set in line with arm's length provisions.

The submission of local files constitute a significant tightening of transfer pricing provisions in South Africa. Transfer pricing rules were introduced in the country in 1996. But there was no legal requirement to contemporaneously document intra-firm transfer prices albeit SARS could request related information in the context of firm audits (see SARS's Practice Note 7 and the overview provided in the final report of the Davis Tax Committee on Base Erosion and Profit Shifting).¹² The tightening of the transfer price documentation rules hence arise long two dimensions: first, treated companies now had to contemporaneously document their transfer prices and submit the documentation with their tax returns; second,

¹² See <https://www.taxcom.org.za/library.html>. Wier (2020) studies an earlier TP reform in 2012, which shifted the burden of proof on the correct application of the arm's length principle from the tax authority to the taxpayer.

as highlighted by commentators, the depth and breadth of the required provisions, increased. There is a widespread perception that the documentation rule are comprehensive and impose a significantly increased compliance and reporting burden on taxpayers than before (e.g., Joubert 2020).

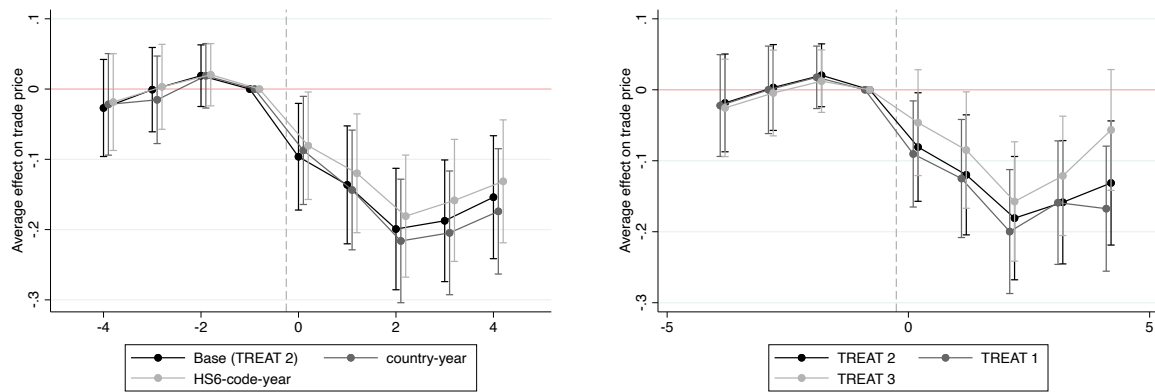
C2 Robustness tests

Finally, this section presents two additional findings that complement the micro data analyses in the main text.

First, we show the findings in Figure 4 hold when we absorb specifics in the pricing trends of intra-firm-trade with tax havens (see Figure C1).

Second, we show the evolution of prices charged in extra-firm haven trade and the prices for intra-firm trade with non-haven countries (conditional on product-firm-destination country fixed effects and time fixed effects). There is no break in pricing trends in either of these time lines in 2016, serving as a placebo test.

Figure C1: Price data analysis (South Africa)—robustness checks

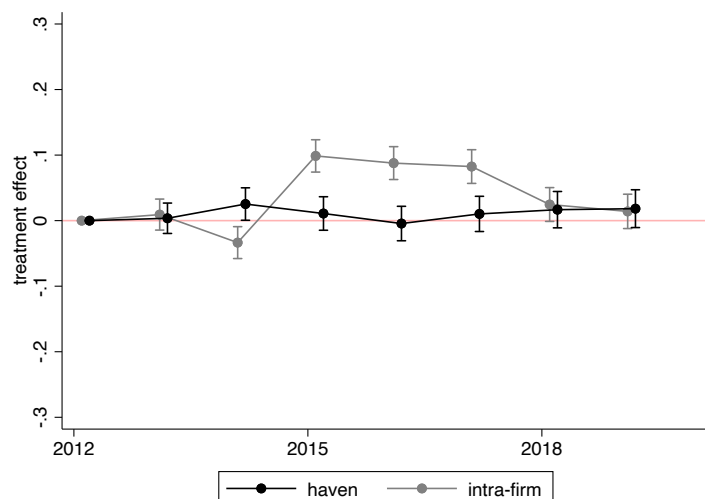


(a) Baseline estimates

(b) Robustness checks

Note: the figure presents dynamic difference-in-differences estimates. Contrary to Figure 4 in the main text, we absorb specifics of intra-firm-trade pricing trends in trade with tax havens. All models account for baseline controls (the statutory corporate tax rate and regressors that absorb price trends around the reform specific to intra-firm trade and tax haven trade). Figure (a) presents our baseline estimates and robustness checks, where we additionally control for a full set of source-country-year fixed effects and a full set of HS6-year fixed effects. The additional specifications in Figure (b) account for different treatment definitions (see main text).

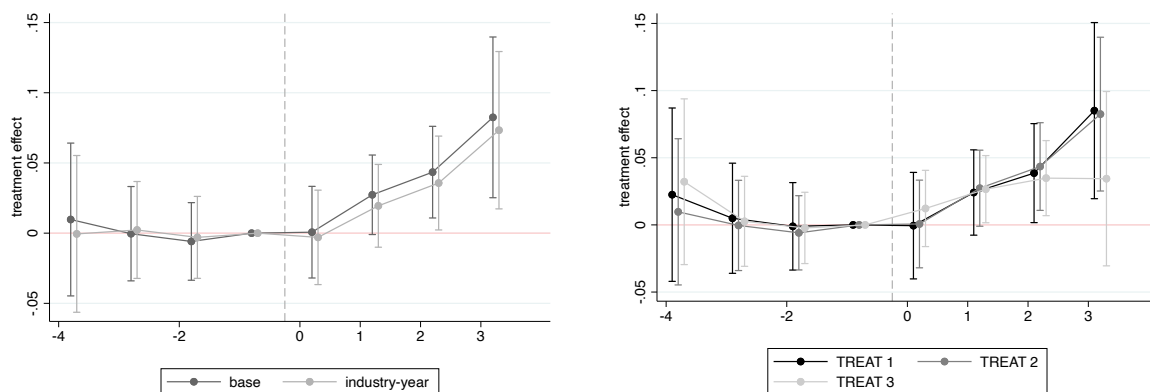
Figure C2: Evolution of unit prices in South Africa (intra- vs. extra-firm trade)



Note: the figure depicts the evolution of unit prices in extra-firm tax haven trade within our data frame (black line) and the evolution of intra-firm trade prices in trade with non-haven countries (grey line).

Third, we present event study estimates for the effect of the TP rule tightening in South Africa on the profit reporting of affected firms (i.e. firms that are treated by the reform and engage in intra-firm trading with a tax haven country prior to the reform), where treatment is defined according to the TREAT 2 definition in the main text. The analysis draws on the population of corporate tax returns. The dependent variable is the taxable income reported by firms to the South African Revenue Service, divided by total assets. The model includes firm fixed effects and time fixed effects to filter out time-constant differences in income reporting across businesses as well as common income shocks across time. The estimation data is restricted to multinational firms only to keep the treatment and control group homogeneous.

Figure C3: Micro data analysis (South Africa)—robustness checks



(a) Baseline estimates

(b) Robustness checks

Note: the figure depicts estimates from dynamic DiD models for the effect of a tightening of TP provisions in South Africa on the taxable income reporting of South African firms (defined as taxable income over total assets, winsorized at -1/1). Panel (a) depicts the baseline estimates (including full sets of firm and year fixed effects) and one robustness check, where we add a full set of industry-year fixed effects to the model. In Panel (a), we depict the estimates for different definition of treated firms. While the base estimates in Panel (a) rely on the TREAT 2 definition in the main text, Panel (b) also depicts estimates, where we rely on the TREAT 1 and TREAT 3 definition of the main text. Standard errors account for clustering at the firm level. 95% confidence intervals depicted.

The results are presented in Figure C3 and suggest that the pre-tax profitability of treated and control firms emerged in parallel prior to treatment. After treatment (i.e. after the year 2016), the pre-tax

profitability of treated firms increases relative to control entities (see panel (a) of Figure C3). This result prevails if we filter out common industry-shocks by augmenting the regression models by full sets of 2-digit SIC industry-year fixed effects. Panel (b), moreover, illustrates that similar results emerge, when we use alternative definitions of treated firms (TREAT 1 and TREAT 3).

C3 Data

This data subsection is created as per UNU-WIDER requirements for users of the National Treasury Secure Data Facility (NT-SDF).

Data access

The data used for this research was accessed from the NT-SDF. Access was provided under a non-disclosure agreement, and our output was checked so that the anonymity of no firm or individual would be compromised. Our results do not represent any official statistics (NT or SARS). Similarly, the views expressed in our research are not necessarily the views of the NT or SARS.

Data used: CIT firm-level panel (citfp_2008_2022_e5_v1) and customs data (ccd_i_Imports_e5_v1), where ‘i’ indicates the respective year.

Date of first access for this project: February 2, 2023.

Last accessed: April 5, 2024.

Software

Our analysis was conducted using Stata 18. User-written programs used include reghdfe (Correia 2014).

List of variables used

- CIT firm-level panel: taxrefno, taxyear, cit_taxable_income, ITR14_k_totassets, ITR14_c_foreign_broad, ITR14_c_foreign_strict, ITR14_c_partofgroup, ITR14_c_mne_type, mne_group_cbc, imp_mic_sic7_2d
- Customs data: customsvalue, statisticalquantity, statisticalunit, taxrefno, hs6, countryofdestination, countryoforigin, partyrelationshipind, month

Cleaning and sample notes

- Customs data: The data is restricted to import trade, for which the destination country is South Africa. We, furthermore, restrict the data to trade for which the ‘partyrelationshipind’ indicator either takes on the value ‘R’ (related-party trade) or the value ‘N’ (non-related party-trade). We, furthermore, dropped inconsistent entries, where the statistical unit of the traded goods is non-constant within a 6-digit HS product category for a given firm.
- CIT firm-level Panel: The sample is restricted to multinational firms following the broad definition in Kilumelume et al. (2021).