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ON THE EFFECT OF
TRANSFER PRICING REGULATIONS:
A DEVELOPING COUNTRY PERSPECTIVE

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SCHOOL OF BUSINESS AND
ECONOMICS

On the Effects of Transfer Pricing Regulations: A Developing Country Perspective*

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Abstract

Multinational profit shifting by mis-pricing of intra-firm trade is a major concern for less developed countries (LDCs). Many have enacted transfer pricing rules in order to constrain this type of tax avoidance behavior. Yet, not much is known on the rules' fiscal and economic effects. We offer a first empirical assessment, drawing on data for more than 120 low and middle income countries for a 30-year-period. Our results suggest that the introduction of transfer pricing regulations significantly increased corporate tax revenue collection in LDCs. The effect is fiscally sizable but fades out over time. We do not find indication for negative investment responses to the regulations.

JEL codes: H25, F23, O23.

Keywords: corporate taxation, international taxation, transfer pricing laws

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1 Introduction

Multinational profit shifting to tax havens is high on policymakers’ agendas. Evidence suggests that it is a sizeable phenomenon, which causes non-negligible tax revenue losses in high-tax countries (see, e.g., Beer et al., 2020; Riedel, 2018; and Tørsløv et al., 2022 for surveys). Less developed countries (LDCs) 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., 2022).¹

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

Despite their high prevalence, little is known on the fiscal and economic effects of TP regulations in LDCs. Theoretically, it is unclear whether TP rules are beneficial for enacting countries (see, e.g., Collier and Riedel, 2018). On the upside, the regulations might be instrumental in limiting mis-pricing behavior and profit outflows, thus raising corporate tax revenue (CIT) collected by LDCs and public good provision. On the downside, critics stress that the additional tax and compliance costs related to the regulations may deter foreign direct investments (FDI), with potentially negative welfare consequences, e.g. related to less (non-agricultural) jobs creation, lower levels of total factor productivity (see, e.g., Hale and Xu, 2022) and less tax revenue collection (Keen and Slemrod, 2017).²

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

²Keen and Slemrod (2017) show that the enforcement elasticity of tax revenue—i.e. the elasticity with which tax revenue collection responds to tighter tax enforcement—is a sufficient statistic for the behavioral response to the administrative intervention.

For developed countries, a nascent literature documents that anti-profit shifting provisions shape firm behavior and constrain income shifting (see, e.g., Büttner et al., 2012; Beer and Loeprick, 2015; Clifford, 2019; Hugger, 2019; Bilicka et al., 2022). Analogous 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 LDCs and developed countries, which may limit the external validity of existing findings for the developing world. In this paper, we use information on corporate tax revenue collection and foreign direct investments for more than 120 LDCs over a 30-year-period to study the fiscal and economic consequences of the introduction of transfer pricing rules.

The revenue and FDI data is linked to newly compiled information on the role-out of TP rules in LDCs. More than 80 LDCs enacted TP regulations during our sample frame (1980-2019). Methodologically, we rely on dynamic difference-in-differences estimators and compare changes in corporate tax revenue collection and FDI in countries that enacted TP regulations to countries without changes in TP policies. As the fiscal and economic effects of TP provisions may well be dynamic in nature, we follow Sun and Abraham (2021) and De Chaisemartin and d’Haultfoeuille (2022a) and use estimators that are robust to heterogeneous and dynamic treatment effects.

The estimation results show that CIT collection and FDI in treated and non-treated nations developed in parallel prior to the introduction of transfer pricing laws. After treatment, corporate tax revenues in countries that enacted the rules increased significantly, by more than 10 percent, with some indication for a declining revenue effect over the post-treatment period. Foreign direct investments in LDCs are estimated to be largely unaffected by TP laws. This non-response may seem surprising and contradict the notion that the additional tax and compliance burden may shy off investment by multinational firms in developing nations. In the paper, we speculate that the zero-effect may in part relate to the low institutional quality in LDCs, where firms may face significant uncertainty and are prone to corruptive behavior, in particular in weakly regulated areas. The introduction of TP rules that provide guidance on what is an appropriate transfer price from the perspective of national tax law, might imply that firms investing in LDCs are less prone to tax officials’ discretion and arbitrariness, corruptive behavior and related double taxation. This

might increase firms' incentives to invest in developing nations and counterbalance potential negative investment incentives related to tax and compliance cost increases.

In additional analyses, we compare the estimated TP effects to the fiscal and economic consequences of statutory corporate tax rate changes, which are well-studied in the literature. Consistent with prior evidence, we show that corporate tax decreases are associated with lower tax revenue collection but, simultaneously, lead to an influx of foreign direct investments. Quantitatively, large corporate tax changes are found to exert a significantly stronger effect on tax revenue collection than changes in transfer pricing regulations.

The presented findings are robust to a comprehensive set of sensitivity checks. Specifically, we show that the findings remain largely unchanged when we include different sets of control variables (capturing countries' economic and governance characteristics, e.g. anti-profit shifting provisions other than transfer pricing rules) and account for region-time and tax-capacity time trends. The same holds true when we reestimate the model relying on different estimators and on different sample definitions.

Our findings complement an emerging literature on the fiscal and economic effects of anti-profit shifting regulation, which is so far exclusively set in the developed world: Most closely related to our work, Beer and Loeprick (2015) show that transfer pricing rules limit the mis-pricing of intra-firm trade of goods and services. Büttner et al. (2012), Blouin et al. (2015) and Bilicka et al. (2022) document that limits to the tax deductibility of interest costs impact intra-firm capital structures in a way that is consistent with reduced income shifting behavior. 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. There is, moreover, evidence that anti-profit shifting rules do not only constrain profit shifting but, simultaneously, also deter real economic activity by multinational firms (De Mooij and Liu, 2020; Merlo et al., 2020; Gauß et al., 2022). All cited papers focus on developed country contexts, however. Our paper contributes to the literature by testing for related effects in LDCs. In particular, our evidence suggests that LDCs benefit from these provisions and collect additional revenue without a major decline in real economic activity.³

³Hofmann and Riedel (2018) and Collier and Riedel (2018) discuss challenges of introducing anti-avoidance rules in less developed nations. Wier (2020), in a paper on the mis-pricing of intra-firm trade, offers correlational evidence that mis-pricing activities are smaller when tighter transfer pricing rules apply. His findings

Also note that, on a broader scale, our paper offers a new perspective by assessing the link between anti-profit shifting regulations and *tax revenue collection*. While it is the ultimate aim of anti-profit shifting policies to enhance corporate tax revenue collection, existing findings commonly only determine the direct effect of the policy on firm behavior (e.g. on intra-firm transfer price choices or distortions of the debt-equity structure), but do not assess whether these adjustments indeed result in more revenue collection. Determining the impact of policies on tax revenue collection can be interpreted as a summary measure that also takes other behavioral adjustments than the very direct effect on the targeted profit shifting margin into account (see, e.g., Keen and Slemrod, 2017): If firms, for example, respond to TP policies by enhancing income relocation to low-tax countries through other channels or if they lower investment, any repercussion of these activities on corporate tax revenue collection is accounted for in the analysis.

The paper proceeds as follows. In Section 2, we provide background information on transfer pricing regulations and on our data. Section 3 describes the estimation strategy. Section 4 presents the estimation results. Section 5 concludes.

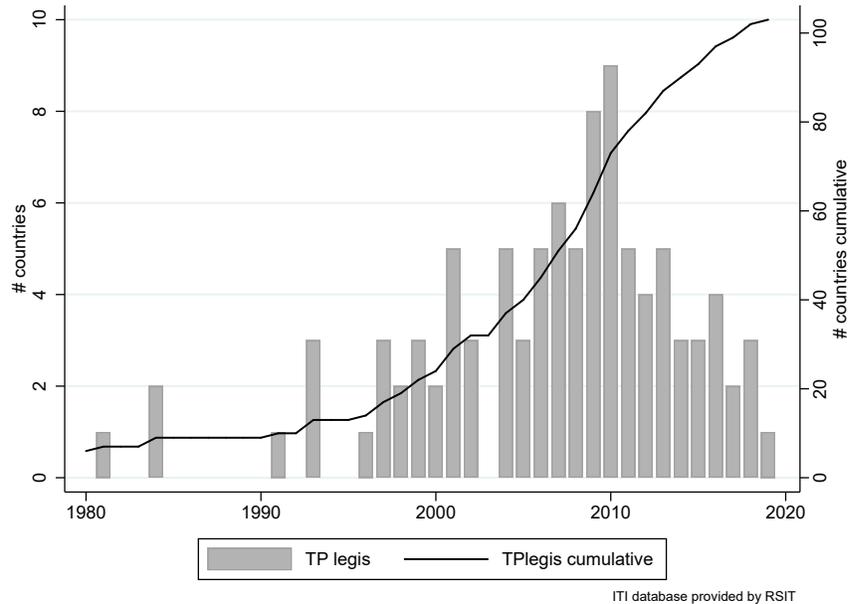
2 Background, Data and Theoretical Considerations

Transfer Pricing Regulations

Our paper contributes to a flourishing literature on multinational profit shifting. Prior evidence suggest that profit shifting is a sizable phenomenon and that mis-pricing of intra-firm trade accounts for a significant fraction of total shifting volumes (see, e.g., Cristea and Nguyen, 2016; Davies et al., 2018, Heckemeyer and Overesch, 2017, Wier, 2020; Tørsløv et al., 2022). To prevent profit outflows from their borders, governments worldwide have augmented their tax laws by TP regulations. Their overarching principle is that the rules 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, developing nations were sluggish to

rely on strong assumptions, however, as he compares anti-profit shifting measures over a small number of years only in a simple pre-after analysis.

Figure 1: Introduction of Transfer Pricing Regulations, 1980-2019



Note: This graph shows the evolution of transfer pricing 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.

follow. In 1980, only six developing economies had TP rules in force.⁴

The rules became more popular by the end of the 20th century and were widely adopted after the millennium. Figure 1 plots the role-out of TP rules in LDCs after 1980 (where LDCs comprise all lower and middle income countries according to the World Bank’s income group classification). The bars indicate the number of LDCs that adopted transfer pricing rules in a particular year (left axis); the line depicts the cumulative number of less developed countries that had transfer pricing rules in place at a particular point in time (right axis). In the 1980s, three new countries introduced TP legislation; in the 1990s, 13 new countries. After 2000, the number of countries with TP legislation rose sharply, from 24 countries in 2000 to 73 in 2010. In 2019, 103 developing countries had TP rules in force. Figure 2 depicts the treatment status of all 124 LDCs in our data by the end of the sample frame (in 2019).

Theoretical Considerations

⁴Note that there is some variation in the design of transfer pricing laws across countries. See Laudage Teles et al. (2022) for a discussion.

The aim of this paper is to empirically assess the impact of TP regulations on CIT collection and FDI in the developing world. As sketched in the introduction, it is theoretically unclear whether these regulations are actually beneficial for the enacting countries.

On the one hand, the rules may limit harmful profit shifting and hence raise CIT revenue collection. They might even foster FDI: Formal TP rules limit tax auditor discretion over price choices and may hence lower the scope for tax auditor discretion, corruptive behavior and related double taxation, thereby enhancing tax certainty for investing MNEs, lowering their burden and enhancing countries' attractiveness as investment location. This, in turn, can have positive repercussions on welfare: it can increase countries' tax revenue collection and public good provision (e.g., Keen and Slemrod, 2017), foster non-agricultural job creation, and enhance factor productivity and income (e.g., Hale and Xu, 2022).

On the downside, one may have doubts whether TP rules can be effectively administered and enforced in LDCs, where tax administrative capacity tends to be low. If enforcement is weak, multinational profit shifting prevails and revenue gains from the regulations are limited. Moreover, to the extent that TP provisions increase firms' compliance burden and (if they bite) firms' corporate tax costs, investments may be deterred from countries that enact TP regulations, with potentially negative follow-on effects for revenue collection and overall welfare see the argumentation above.⁵

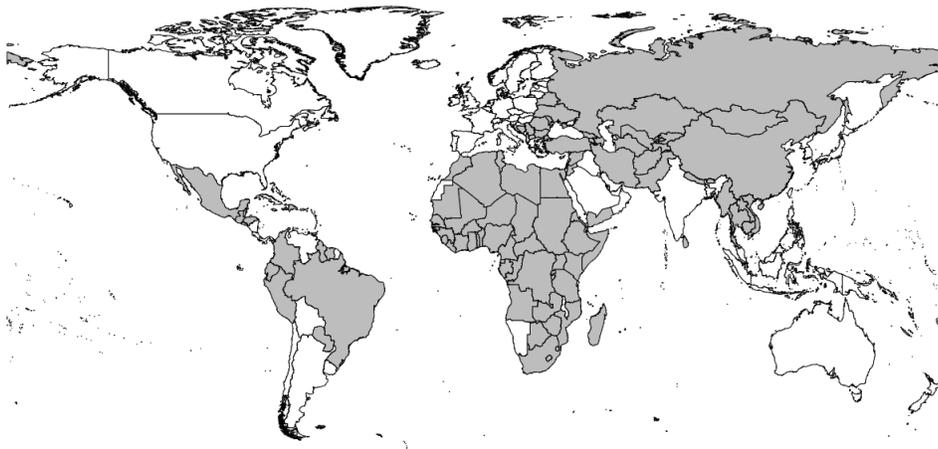
Data and Descriptive Statistics

The impact of TP rules on CIT revenue collection and FDI is hence eventually an empirical question – that will be assessed in this paper. The empirical analysis relies on a cross-country panel dataset on 124 low and middle income countries for the years 1980 to 2019. Table 1 depicts summary statistics, variable definitions and data sources used. Corporate tax revenue data is gathered from UNU WIDER's Government Revenue Dataset (UNU-WIDER, 2021) and the OECD's Global Revenue Statistics Database (OECD, 2022).⁶ Inward FDI flows (measured in current US dollars) are taken from UNCTAD (2022) aggregate FDI Statistics.

⁵The welfare impact of TP provisions furthermore depends on the compliance and administrative costs of the provisions – for both the tax revenue agency and for affected firms. The data at hand, unfortunately, does not include information on such costs.

⁶Note that a small number of countries features strong spikes in tax revenue time series (Bolivia, Cape Verde, Costa Rica, Cuba, Fiji, Marshall Islands, Montenegro and Nicaragua). We exclude these countries from the data to mitigate the effect of outliers.

Figure 2: Transfer Pricing Legislation, Treatment and Control Groups



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.

The revenue and FDI data is linked to information on when countries adopted TP regulations. The latter information stems from the *International Tax Institutions (ITI) Database* (see Laudage Teles et al., 2022 for more details). The ITI database also includes information on other dimensions of anti-profit shifting laws (whose introduction and amendment may correlate with the introduction of TP documentation rules), namely on the existence of general anti-avoidance rules (GAAR), CFC rules and limits to the deductibility of interest costs. We control for these provisions in our empirical model to isolate the fiscal and economic effects of transfer pricing rules.

We furthermore augment our dataset by information on countries' statutory corporate tax rates, taken from the Tax Foundation (2022) and by data on GDP per capita and GDP growth, taken from the World Bank (2021).

3 Estimation Strategy

To estimate causal effects of the introduction of TP legislation on CIT revenue and FDI, we follow a dynamic difference-in-differences (DiD) approach with staggered adoption (binary treatment). 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

Table 1: Summary Statistics

Variable	Obs	Mean	SD	Min	Max
<i>Dependent variables</i>					
Corporate income tax revenue in current USD (in log)	2,763	19.41	2.93	0	26.96
FDI inward flow in million in current USD (in log)	4,183	4.85	2.59	0	11.86
<i>Tax variables</i>					
Indicator Transfer Pricing Legislation	4,960	0.31	0.46	0	1
Indicator General anti-avoidance rule	4,960	0.09	0.28	0	1
Indicator Controlled Foreign Company Legislation	4,960	0.04	0.21	0	1
Indicator Limit Tax Deductibility Interest Costs	4,960	0.28	0.45	0	1
Statutory Tax Rate	3,346	0.30	0.11	0	0.75
Drop in Statutory Tax Rate > 5pp	3,201	0.04	0.20	0	1

Note: This table shows descriptive statistics for the main variables of our empirical analysis. Note that all tax variables on anti-avoidance rules are coded 1, when formal rules in that domain are enacted in corporate tax law. If information on the year of introduction of the rules is unavailable, we use the year of the earliest source that mentions the existence of the rule. The maximum tax rate in our dataset of 75 percent has Iran in 1990 to 1992. Our results are robust if we exclude this outlier.

initial treatment timing, i.e. the year of TP introduction.⁷ We estimate event study models of the form

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

where the dependent variable $Y_{i,t}$ is either CIT revenue or inward FDI 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 characteristics and for general time trends in the outcome measures. 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 following country controls: anti-tax avoidance rules (dummy variables indicating if GAAR, CFC provisions and limits on the deductibility of interest costs are enacted, respectively), the statutory corporate tax rate and GDP per capita and GDP growth. $\epsilon_{i,t}$ depicts the error term.

⁷Table A1 in the Appendix provides a full list of all countries with their year of TP introduction. Please note that 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.

The recent literature on DiD has documented that estimating Equ. (1) conventionally, i.e. with OLS in a two-way fixed effects model (TWFE) does only deliver consistent estimates under very strong assumptions (De Chaisemartin and d’Haultfoeuille, 2020; Callaway and Sant’Anna, 2021; Sun and Abraham, 2021; Goodman-Bacon, 2021; Borusyak et al., 2021). If there is treatment effect heterogeneity and/or heterogeneous dynamic treatment paths, the estimated $\delta_{\ell s}$ can be severely biased and can even flip sign due to negative weights. In traditional event studies, Sun and Abraham (2021) can, in addition, show that even under a strong parallel trends assumption, the OLS coefficients are hardly interpretable as they are contaminated by treatment effects from other years $\ell \neq t$.

We address these concerns by presenting results using the modified dynamic DiD estimators by Sun and Abraham (2021) and De Chaisemartin and d’Haultfoeuille (2022a). These estimators differ from the TWFE estimator by allowing for treatment effect heterogeneity across countries and over time. Specifically, they ensure that already-treated units are not used as a control group for later-treated units, which might otherwise bias the estimates (Goodman-Bacon, 2021; De Chaisemartin and d’Haultfoeuille, 2020). Sun and Abraham (2021) rely on *never-treated* countries as control units (countries without TP legislation by the end of our sample frame). The obvious concern against this strategy is that these never-treated countries might be very specific nations, which may significantly differ from treated countries and may hence not be well suited as control units.

We can show that there are no significant differences in outcome trends between treatment and control group countries prior to treatment (when relying on the estimator proposed by Sun and Abraham, 2021), which dampens this concern. Complementarily, we also run specifications, where we use the estimator by De Chaisemartin and d’Haultfoeuille (2022a), who use *not-yet-treated* countries (rather than never-treated countries) as control group.⁸

Finally, we present estimates from simple TWFE models to grasp the importance of estimate bias by heterogeneous and dynamic treatment effects.

⁸Note that De Chaisemartin and d’Haultfoeuille (2020) and Callaway and Sant’Anna (2021) produce identical results if no control variable are used. See De Chaisemartin and D’Haultfoeuille (2022b) and Roth et al. (2022) for a survey of the emerging literature on DiD analysis in settings with heterogeneous and dynamic treatment effects.

4 Results

Main Results

Our main results are reported in Panels (a) and (b) of Figure 3. Panel (a) reports estimates of TP legislation on corporate income tax revenue in an event window of six periods before and eight periods after the reform. The blue diamonds show estimates from the interaction-weighted estimator of Sun and Abraham (2021). As suggested by Sun and Abraham (2021), we exclude two leads (last lead and lead -1) due to multicollinearity between the relative time dummies and between relative time dummies and year fixed effects. The red-filled dots depict estimates from the estimator of De Chaisemartin and d’Haultfoeuille (2022a). The yellow squares present estimates from standard TWFE regressions. All estimators account for the economic and policy control variables described above.⁹

The estimates show a consistent picture: Corporate tax revenues in treated and non-treated countries emerged in parallel prior to the introduction of transfer pricing provisions, corroborating the common trend assumption in the DiD design. After treatment, revenues increased in treated relative to control nations. The estimator by De Chaisemartin and d’Haultfoeuille (2022a) and the TWFE model suggest that corporate tax revenues, on average, rose by 11.4 percent and 12.7 percent in the post-treatment period. Sun and Abraham (2021) yields slightly larger point estimates. There is also indication that the revenue effect declines over the post-treatment period.

The sizable estimated effect is consistent with prior literature, which has documented that (i) profit shifting is a quantitatively relevant phenomenon, in particular in the developing world (e.g., Johannesen et al., 2020; Tørsløv et al., 2022); (ii) that trade mis-pricing is one, if not the, quantitatively most important profit shifting channel (e.g., Davies et al., 2018; Heckemeyer and Overesch, 2017; Liu et al., 2020); (iii) that multinational firms belong to the biggest taxpayers in less-developed countries (e.g., Wier and Erasmus, 2022); and that developing countries – supported by capacity building and training interventions of donor countries from the developed world – put considerable emphasis on a sound implementation

⁹Note that we filled missing control variables by carrying forward (and backward) values across time. However, as shown in the robustness section, the results do not change if we run the specification without any controls.

and administration of TP regulations.

There are also several possible explanations why the revenue effect may fade out over the post-reform period. First, firms might respond to the introduction of TP regulations by substituting strategic mis-pricing of intra-firm trade with other profit shifting channels (e.g. by distortions in the debt-equity structure or the location of valuable assets and functions at low-tax affiliates). If such adjustments take time, the revenue effect is expected to decline over time. Second, firms may only with a time lag learn how tightly TP laws are enforced by countries' tax administrations. If there is high uncertainty on authorities' enforcement capacity after the introduction of TP rules, firms may initially be cautious and find it optimal to be less tax-aggressive; when the actual enforcement intensity is revealed over time, their tax aggressiveness then increases.¹⁰ Third, multinational firms may lower their real activity in response to TP regulations. If such adjustments occur with a time lag, again the tax revenue effect is expected to decline over the post-reform period.

In Panel (b) of Figure 3, we empirically assess the latter channel: the impact of TP regulation on FDI. Again drawing on the three different estimation models, we find no indication for major adjustments in FDI inflows when TP rules are enacted. In the five-year period after treatment, none of the estimators points to a drop in FDI inward flows in treated nations. For the Sun and Abraham (2021) and the TWFE model, the same holds true for deeper post-treatment years. The estimator proposed by De Chaisemartin and d'Haultfoeuille (2022*a*) yields negative point estimates for longer lags, but standard errors tend to be large and none of the coefficients is statistically significant at conventional significance levels. Note that we thus, contrary to prior studies for developed countries (see e.g., De Mooij and Liu, 2020), do not find clear evidence for a negative effect of the introduction of TP rules on real activity in LDCs. One potential reason is that LDCs 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 behavior and double taxation of firms. If the rules limit tax auditor discretion and corruptive activity,

¹⁰This 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.

their introduction may enhance the country’s attractiveness as a location for foreign direct investments.

Panels (c) and (d) of Figure 3 compare our baseline estimates to the impact of an alternative tax policy reform, which is well-studied in the literature: changes in the statutory corporate tax rate. Prior empirical evidence suggests that firms respond sensitively to corporate taxation, by relocating more taxable income to lower-tax countries and by diverting real business activity (e.g., Feld and Heckemeyer, 2011; Clausing, 2007 and Devereux, 2007).

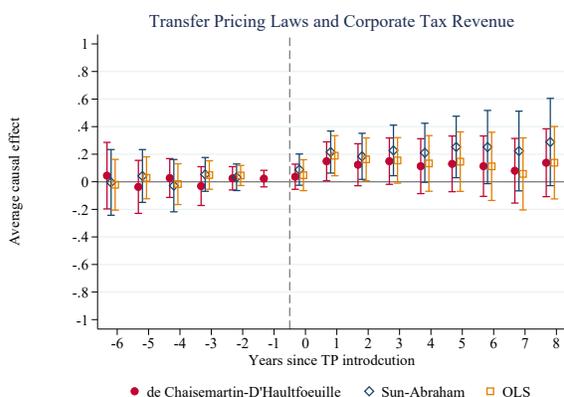
Drawing on our data and estimation methodology in Section 3, we estimate the fiscal and economic impact of 78 large corporate tax rate cuts during our sample frame – where large corporate tax cuts are defined as cuts by more than 5 percentage points. During our sample frame, the average corporate tax rate of LDCs dropped from 40 percent in 1980 to 25 percent in 2019.¹¹ Consistent with prior evidence, Panel (d) of Figure 3 shows that corporate tax rate cuts are associated with a strong influx of foreign direct investments. On average, FDI increases by 30 percent. Evaluated at the average corporate tax cut in treated countries (reflecting a change by 9.3 percentage points or, in relative terms, 25 percent), this translates into a tax elasticity of around 1.2, which is in the range of the existing literature (see, e.g., Feld and Heckemeyer, 2011). Panel (c) of Figure 3 shows a positive effect of corporate tax rates on tax revenue collection – which is quantitatively about twice as large as our estimated TP effect and more long-lasting in nature.

Robustness tests

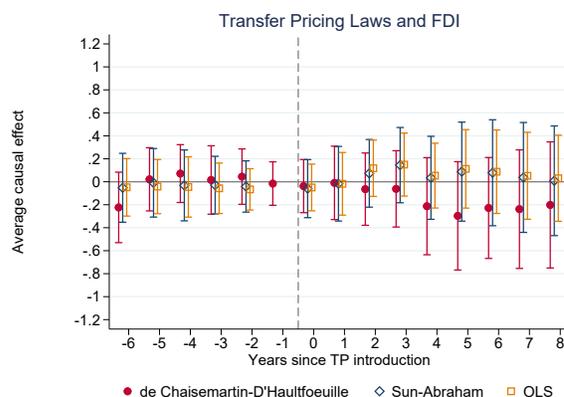
We, furthermore, ran sensitivity checks to assess the robustness of the results. Panels (a) and (b) of Figure 4 show that our estimates are robust to excluding control variables from the model (for a discussion of control variables in staggered treatment design, see, e.g., Caetano et al., 2022). The FDI estimates in Panel (b) resemble our baseline findings; the estimates for corporate tax revenue in Panel (a) turn out somewhat larger in size. The latter finding is consistent with economic conditions and policy choices acting as a potential confounder in the analysis. If transfer pricing policies are e.g. correlated with the implementation of other

¹¹Specifically, we exploit the first tax cut that a country experiences during our sample frame for empirical identification. If countries experience a second large tax cut within 10 years from that first change, we exclude them from the sample.

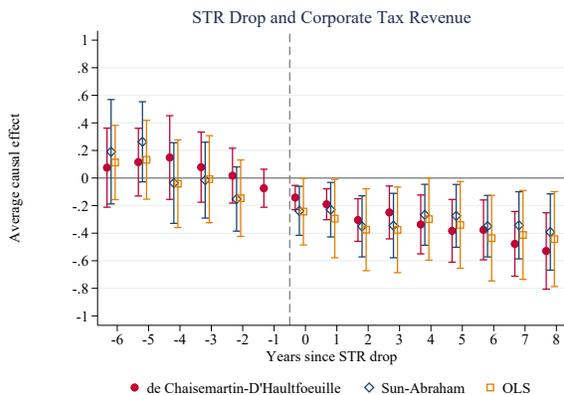
Figure 3: Main Results



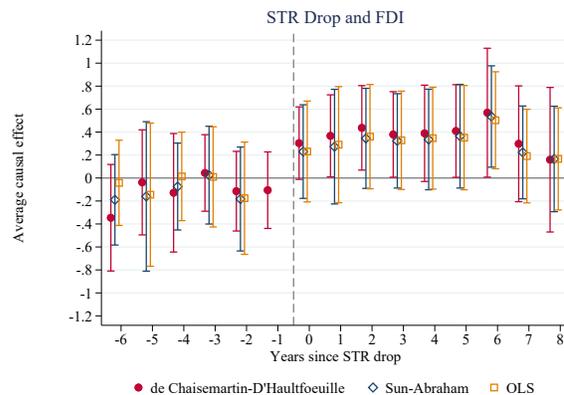
(a) TP rules and CIT revenue (N=2,500)



(b) TP rules and FDI (N= 3,621)



(c) STR drop and CIT revenue (N=2,036)



(d) STR drop and FDI (N=2,928)

Note: The upper two graphs show the results for TP legislation on corporate tax revenue (in log, Panel (a)) and FDI (in log, Panel (b)). The lower two graphs depict the results for the large corporate tax rate cut as treatment. Estimates using Sun and Abraham (2021) are shown in blue diamonds. Results using the estimator by De Chaisemartin and d’Haultfoeuille (2022a) are depicted in red-filled dots and the results from TWFE regressions in yellow squares.

anti-profit shifting rules, our estimates may pick up the effect of both provisions, when the effect of other anti-profit shifting provisions is not appropriately controlled for.

In Panels (c) and (d), we exclude the BRIC states (Brazil, Russia, India and China) from the analyses to show that the results are not driven by a set of large emerging economies. In Panels (e) and (f), we account for the possibility that differences in regional trends in tax revenue collection and FDI systematically correlate with the take-up of TP rules, hence acting as a confounder in the analysis. We address this concern by augmenting the estimation model by a full set of region-time fixed effects.¹² This leaves our estimates qualitatively and quantitatively unchanged. Along similar lines, Panels (g) and (h) allow countries with different levels of tax authority capacity to follow different revenue and investment trends by augmenting the vector of regressors by a full set of tax-capacity-time fixed effects.¹³ All these modifications leave our estimates largely unchanged. As the tax capacity measure is only available for 76 countries, the sample size shrinks in the latter sets of specifications, however, and estimates become less precise but the overall pattern of the findings prevails.

5 Conclusions

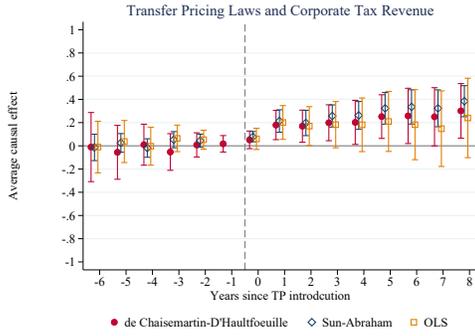
In this paper, we shed first light on the fiscal and economic consequences of anti-profit shifting rules in less developed countries. The focus is on transfer pricing provisions, which constrain profit shifting by mis-pricing of intra-firm trade. Using country-level information on corporate tax revenue collection and foreign direct investments for more than 120 low- and middle-income countries over a period of 30 years, we track how the role-out of TP regulations impacted revenues and investment inflows in the developing world.

Taking account of the staggered treatment design, we estimate event studies that allow for dynamic and heterogeneous treatment effects. Our estimates suggest that TP rules

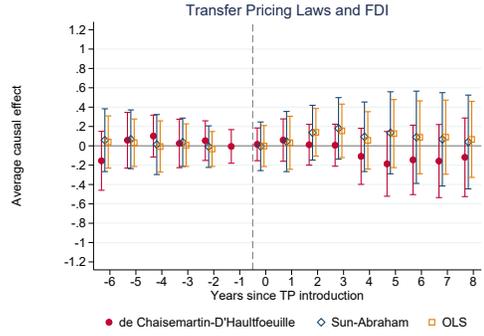
¹²We use the World Bank's world region definition: East Asia & Pacific, Europe & Central Asia, Latin America & the Caribbean, Middle East & North Africa, South Asia, Sub-Saharan Africa. The region dummies are interacted with a full set of time fixed effects.

¹³The tax capacity measure is constructed from the 2019 wave of the OECD's Tax Administrative Survey as the fraction of tax authority resources devoted to tax enforcement. Specifically, we compare the tax authority personnel assigned to tax enforcement with the total number of tax authority employees. Indicators for the quarters of this tax enforcement variable are interacted with a full set of time fixed effects and included in the set of regressors.

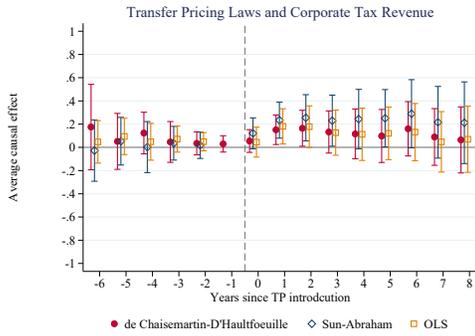
Figure 4: Robustness Results



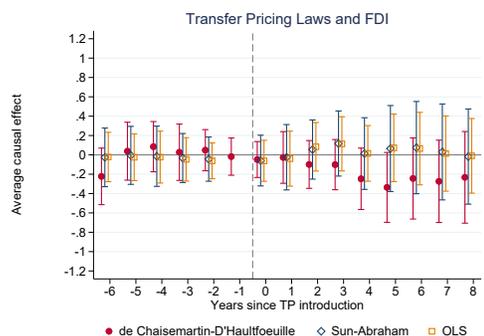
(a) Without control variables (N=2,500)



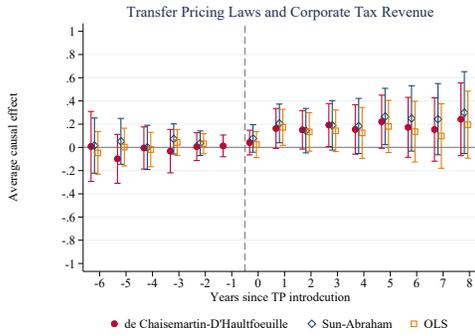
(b) Without control variables (N=3,779)



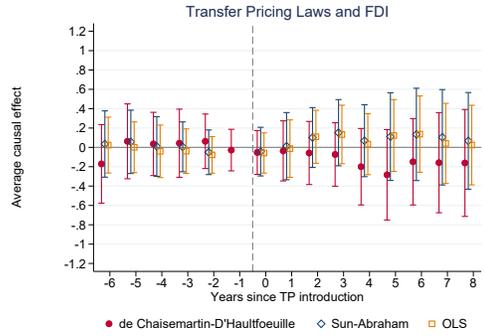
(c) Without BRIC states (N=2,426)



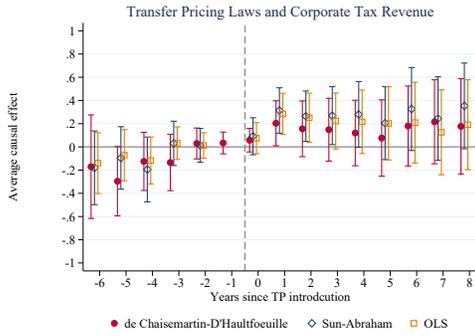
(d) Without BRIC states (N=3,513)



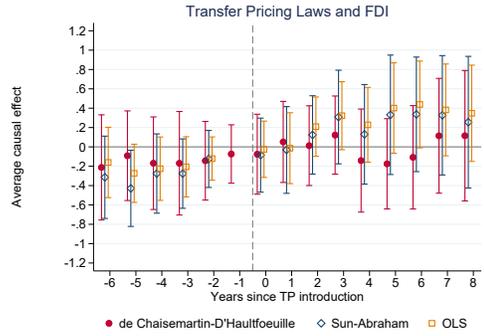
(e) With region-time trends (N=2,479)



(f) With region-time trends (N=3,611)



(g) With capacity-time trends (N=1,604)



(h) With capacity-time trends (N=2,249)

Note: This figure reruns the main specification (Figure 3 (a) and (b)) with different sample and variable adjustments. The left graphs always depict the results for TP legislation as treatment on CIT revenue, while the right graphs show the results for TP legislation on FDI.

bite: corporate tax revenue collection increases when transfer pricing rules are introduced. Moreover, contrary to prior results on the effect of TP rules in the context of developed countries, we do not find clearcut evidence for a reduction in firms' real economic activity in response to the introduction of TP provisions in LDCs. Overall, the results hence speak in favor of the regulations. They indicate that TP provisions indeed help LDCs to collect more revenue and thereby to provide more goods and services to their citizens. To obtain a complete picture of their impact, governments in LDCs must balance these effects against the administrative burden from administering and enforcing TP laws.¹⁴

¹⁴Another interesting avenue for future research is to determine the impact of TP rules on firms' compliance costs. While information on the tax administrative burden of administering and enforcing transfer pricing laws is available in the government sphere, this does not hold true for compliance costs on firms' side.

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A Online Appendix

Table A1: List of countries and variable coverage

country	iso3code	Year of introduction		Obs. count	
		TP legis	STR drop	CIT rev.	FDI
Afghanistan	AFG	2009	.	15	40
Angola	AGO	2013	2001	0	40
Anguilla	AIA	0	.	0	7
Albania	ALB	1998	2002	31	28
Argentina	ARG	1932	1990	30	40
Armenia	ARM	2018	2000	26	28
Azerbaijan	AZE	2001	.	22	25
Burundi	BDI	2013	.	14	40
Benin	BEN	2009	.	34	28
Burkina Faso	BFA	2011	.	40	40
Bangladesh	BGD	1984	1999	16	40
Bulgaria	BGR	2006	1998	25	31
Bosnia and Herzegovina	BIH	2008	2003	14	23
Belarus	BLR	2012	2002	28	28
Belize	BLZ	0	1993	30	40
Brazil	BRA	1997	1993	30	39
Bhutan	BTN	0	.	36	40
Botswana	BWA	2019	1991	15	40
Central African Republic	CAF	2009	.	25	40
China	CHN	1991	1983	23	40
Cote d'Ivoire	CIV	2001	1992	38	40
Cameroon	CMR	2007	2015	27	37
Congo, Democratic Republic of the	COD	2015	1999	30	40
Congo, Republic of the	COG	2012	.	34	40
Colombia	COL	2004	1986	30	40
Comoros	COM	2008	.	24	40
Djibouti	DJI	0	.	0	40
Dominica	DMA	2010	.	19	7
Dominican Republic	DOM	2006	1992	39	32
Algeria	DZA	2007	1999	0	40
Ecuador	ECU	2005	1999	22	40
Egypt	EGY	2005	1982	32	40
Eritrea	ERI	0	.	10	27
Ethiopia	ETH	2007	1998	15	40
Micronesia, Federated States of	FSM	0	.	25	11
Gabon	GAB	2011	1991	0	34
Georgia	GEO	1993	.	25	28
Ghana	GHA	2000	1993	34	40
Guinea	GIN	2011	.	0	37
Gambia, The	GMB	2010	.	17	40
Guinea-Bissau	GNB	2015	.	26	40
Equatorial Guinea	GNQ	2004	.	19	38
Grenada	GRD	0	.	22	7
Guatemala	GTM	2013	1984	33	40
Guyana	GUY	0	1993	33	40
Honduras	HND	2014	1990	30	40
Indonesia	IDN	1984	1984	18	40
India	IND	1961	1986	36	40
Iran	IRN	0	1993	26	40
Jamaica	JAM	2016	1987	34	40
Jordan	JOR	0	1997	30	40
Kazakhstan	KAZ	1999	1993	24	27
Kenya	KEN	2006	.	14	40
Kyrgyzstan	KGZ	2009	2004	18	27
Cambodia	KHM	2017	.	23	40
Kiribati	KIR	0	.	11	19
Kosovo	KSV	2009	.	0	0
Lao People's Democratic Republic	LAO	0	2012	26	40

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

country	iso3code	Year of introduction		Obs. count	
		TP legis	STR drop	CIT rev.	FDI
Lebanon	LBN	2009	1981	0	40
Liberia	LBR	2016	2011	5	40
Libya	LBY	0	2000	0	40
Saint Lucia	LCA	0	.	28	7
Sri Lanka	LKA	2006	1996	40	40
Lesotho	LSO	1993	1998	35	40
Morocco	MAR	2007	1988	40	40
Moldova	MDA	1998	1999	25	28
Madagascar	MDG	2014	2008	30	40
Maldives	MDV	2011	.	25	40
Mexico	MEX	1997	.	18	39
North Macedonia	MKD	1993	.	24	26
Mali	MLI	2016	.	38	40
Myanmar	MMR	0	2012	2	40
Mongolia	MNG	2007	.	27	34
Mozambique	MOZ	2018	1999	13	40
Mauritania	MRT	2012	.	26	39
Montserrat	MSR	2010	.	0	7
Mauritius	MUS	2018	2001	40	40
Malawi	MWI	1964	1991	32	40
Malaysia	MYS	1967	1989	35	40
Namibia	NAM	1981	.	30	40
Niger	NER	2008	.	27	40
Nigeria	NGA	2012	1992	28	40
Nepal	NPL	2002	.	37	40
Pakistan	PAK	2002	1990	12	40
Peru	PER	2001	1986	33	40
Philippines	PHL	1939	.	30	40
Palau	PLW	0	.	20	31
Papua New Guinea	PNG	1959	1993	35	40
Paraguay	PRY	2013	2005	30	40
Romania	ROU	2004	1995	30	30
Russian Federation	RUS	1999	2002	20	27
Rwanda	RWA	2007	2004	27	30
Sudan	SDN	0	2000	10	40
Senegal	SEN	2013	2007	27	40
Solomon Islands	SLB	2014	.	22	25
Sierra Leone	SLE	2000	2003	22	40
El Salvador	SLV	2010	1992	30	40
Somalia	SOM	0	.	0	34
Serbia	SRB	2001	2003	19	12
South Sudan	SSD	2009	.	0	0
Sao Tome and Principe	STP	2008	.	11	30
Suriname	SUR	2010	1997	9	9
Eswatini	SWZ	0	2002	28	40
Syrian Arab Republic	SYR	0	2000	0	35
Chad	TCD	2015	2016	10	40
Togo	TGO	2017	.	40	40
Thailand	THA	2002	2012	40	40
Tajikistan	TJK	2005	.	0	28
Turkmenistan	TKM	2004	2005	15	28
Timor-Leste	TLS	0	.	7	17
Tonga	TON	2008	.	0	40
Tunisia	TUN	2010	2014	20	40
Turkey	TUR	2006	1994	40	40
Tanzania	TZA	2004	1992	26	40
Uganda	UGA	2011	1993	28	40
Ukraine	UKR	1997	2004	29	28
Uzbekistan	UZB	2010	2003	10	28
Saint Vincent and the Grenadines	VCT	2010	1992	28	7
Vietnam	VNM	2001	.	29	40
Vanuatu	VUT	0	.	1	23
Samoa	WSM	2009	2002	15	40

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

country	iso3code	Year of introduction		Obs. count	
		TP legis	STR drop	CIT rev.	FDI
Yemen	YEM	2010	2011	4	40
South Africa	ZAF	1996	2013	40	40
Zambia	ZMB	1999	1983	14	40
Zimbabwe	ZWE	2016	1992	38	40