Effective Tax Rates, Firm Size and the Global Minimum Tax

Pierre Bachas, Anne Brockmeyer, Roel Dom & Camille Semelet

November 2024*

Abstract

We document new facts on corporate taxation and the revenue potential of corporate minimum taxes, leveraging firm-level tax returns from 16 countries. First, effective taxes rates (ETRs) follow a humped-shaped pattern with firm size: small firms benefit from reduced rates, while large firms take up tax incentives, leaving mid-sized firms with the highest ETRs. On average, the ETR for the largest 1% of firms is 2.2 percentage points lower than the average ETR for top decile firms. Second, although statutory tax rates are above 15% in all sample countries, over a quarter of top firms face an ETR below 15%, challenging the simple tax haven vs non-haven dichotomy. Third, a simple 15% domestic minimum tax for the top 1% firms could raise corporate taxes by 14% on average across countries, absent behavioral responses. In contrast, the global minimum top-up tax would only raise a quarter of this revenue due to its generous deductions and a smaller number of firms in scope.

*Pierre Bachas: World Bank Research and EU Tax Observatory pbachas@worldbank.org. Anne Brockmeyer: IFS, UCL, World Bank and CEPR, abrockmeyer@worldbank.org. Roel Dom: University of Antwerp and World Bank, roel.dom@uantwerpen.be. Camille Semelet: University of Munich, ifo Institute and World Bank, semelet@ifo.de. We gratefully acknowledge funding from the Global Tax Program, the Knowledge for Change Trust Fund and the Innovations in Tax Analytics Program at the World Bank. Bachas' time was partly funded by a grant from the Norwegian Agency for Development Cooperation (NORAD, grant no. QZA-22/0011). Brockmeyer's time was partly funded by UKAID from the UK government through the Centre for Tax Analysis in Developing Countries (TaxDev) and a UKRI Future Leaders Fellowship (grant reference MR/V025058/1). The findings, interpretations, and conclusions expressed in this work do not reflect the views of the World Bank, its Board of Executive Directors, or the governments that they represent. All errors are our own. We thank the revenue authorities in all 16 countries as well as several World Bank colleagues for an excellent collaboration. In particular, we thank Antonio Giraldi, Christoph Ungerer, David Fernando Pineda Pinto, Denis Mukama, Dora A. Vivas Perez de Gonzalez, Enamorado Irias, Fernando Pelaez Longinotti, Innocente Murasi, John Karangwa, Jose C. Bermudez Sanchez, Jose F. Suriano Buezo, Marc Schiffbauer, Maria Rodriguez Quezada, Milan Lakicevic, Naomi Alexander, Pedro Rafael Zuniga Figueroa, Roldan Manuel, Sol Mascarenhas, and Theonille Mukamana, David Suarez Castellanos and Juan Camilo Obando. We are grateful to Santiago Cesteros and Rafael Vilarouca for excellent research assistance, as well as to Alipio Ferreira, Adrienne Lees, Giulia Mascagni, Kyle McNabb, Vedanth Nair, Edris Seid, Ben Waltmann for their support with the analysis in selected countries. We thank Flurim Aliu, Annette Alstadsaeter, Katy Bergstrom, Michael Best, Michael Devereux, Petr Janský, Claus Thustrup Kreiner, Rebecca Lester, John Loeser, Helen Miller, Vedanth Nair, Oyebola Okunogbe, Steven Pennings, Imran Rasul, Mahvish Shaukat, Joel Slemrod, Gabriel Zucman and Davide Zufacchi as well as seminar/conference participants at the EBRD, ifo Institute, IFS, IIPF, PSE, TaxDev, University of Munich and the World Bank for helpful comments.

1 Introduction

The corporate income tax remains a key source of government revenue, particularly for developing countries where it collects up to 20% of tax revenue. Yet, many firms, and especially large corporations, have paid less and less tax on their profits over the past two decades (Garcia-Bernardo et al., 2022). Profit shifting to tax havens has increased, and governments have competed to attract firms by offering generous tax incentives, such as reduced rates, income exemptions and tax credits (Tørsløv et al., 2020). We study which firms benefit from these tax incentives, and what the implications are for a minimum corporate tax.

To answer these questions, we assemble a unique dataset of firm-level corporate income tax returns for 16 countries. We document several new facts on corporate taxation, which are broadly consistent across countries. First, tax incentives primarily benefit the largest firms: the effective tax rate (ETR) for the largest 1% of firms by revenue is on average 2.2 percentage points lower than the ETR for other top decile firms in the same country. Second, over a quarter of the largest firms face an ETR below 15%, even though our sample only contains moderate to high tax countries, with statutory rates of at least 15% in all countries, and at least 25% in 13 out of 16 countries. Thus, a minimum corporate tax of 15% would impact firms in most countries and not just in tax havens. Our simulation of a simple domestic minimum tax on the top 1% of firms, abstracting from behavioral responses, suggest that the tax could raise corporate tax revenue substantially. Third, by carefully modeling an application of the global minimum tax rules (Pillar II) for five countries, we show that direct revenue gains are modest in most countries, due to the small number of firms in scope and the generous deductions for payroll and assets (carve-outs).

Our data covers 16 countries that are heterogeneous in their size and development, including countries in Africa (Ethiopia, Eswatini, Rwanda, Senegal, South Africa and Uganda), Latin America (Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Jamaica, and Mexico), and Europe (Albania and Greece). These countries are not tax havens (the median country's statutory rate is 27%, the lowest rate is 15%), and do not headquarter many large multinationals. Our administrative data include all firms filing corporate taxes, hence capturing the entire formal economy and presenting a much larger sample than survey or financial data, which

are sparse in developing countries.[1]

To build an effective corporate tax rate using comparable sources and definitions, we harmonize key variables across countries. We define a firm's effective tax rate as its corporate tax liability divided by its profits. Profits (or losses) equal revenue minus material, labor, operational, depreciation, and financial costs. Hence, to calculate profits, we deduct standard production and financial costs from revenue, but do not deduct country-specific incentives that affect the tax base or tax rate. Differences between the ETR and the statutory rate are thus due to policy-driven tax expenditures, which we classify in five categories: income exemptions, special deductions, preferential tax rates, tax credits and loss carry-forward.[2] From the micro data we confirm that total corporate tax expenditures are large (1.0% of GDP on average in our sample) and approximately match the official macroeconomic aggregate.

In the first part of our analysis, we show that firm size, proxied by total revenue, is a key determinant of ETR dispersion within countries. In all countries, tax expenditures accrue disproportionately to small and medium firms (SMEs), and to the largest firms, such that upper mid-sized firms face the highest tax rates. ETRs peak around the ninth decile of firm size, and then decline at the top in most countries, remaining flat in the other countries. The rising slope of ETRs over the lower part of the firm-size distribution is explained by a higher propensity for smaller firms to register losses, and, once we control for losses, by reduced statutory tax rates.

The ETRs of the largest 1% of firms are 2.2 percentage points below those of other top decile firms (2.6 percentage points below for the top 0.1%). This is mainly explained by their take-up of tax credits and of income exemptions, not by differential patterns of loss-making or by reduced statutory tax rates. The lower ETRs among top 1% firms are also partly explained by location, which might capture tax advantages of special economic zones, whenever those are not directly observable on the tax return. The drop in ETRs at the top holds across industries, when computing ETRs over several years, and with alternative definitions of firm size.

In the second part of our analysis, we assess the scope and revenue potential of a minimum

[1] Tax return data miss the informal sector, but still have much wider coverage than financial data which in most developing countries cover only the largest firms. Survey data often have poor coverage among the largest firms. Firm censuses, where they exist, cover all firms but rarely contain data on tax liabilities and profits.

[2] Some countries in our sample do not permit loss carry-forward. At the same time, loss carry-forward is not always considered as a tax expenditure category. We hence document the robustness of our results to excluding loss carry-forward from the list of tax expenditures.

corporate tax. Reforming tax expenditures is often politically and legally difficult. A minimum tax can be a second-best tool to start leveling the playing field of taxation. Given that we observe a clear drop in ETRs at the top of the firm-size distribution, we begin by simulating the mechanical revenue gains from applying a 15% domestic minimum tax on the top 1% firms in each country, not allowing any exemptions. Many of the largest firms in each country face an ETR below 15%: across the 16 countries, the mean (median) share of top 1% firms paying less than 15% in taxes is 28.2% (27.8%). Conditional on paying an ETR below 15%, the mean (median) ETR is only 3.1% (2.4%). As a result, we find that a domestic minimum tax on the largest 1% of firms could raise revenue substantially: absent behavioral responses, CIT revenue could increase by 14.2 (7.8)% in the average (median) country.

Yet, the international community has now enacted a much more complex global minimum tax (Pillar II of the OECD/G20 Inclusive Framework). The global minimum tax (GMT) collection rules incentivize all countries to tax the profits of multinational firms in scope at a rate of at least 15%, as the firm's affiliates would otherwise be taxed by another country.[3] The GMT rules markedly differ from our hypothetical domestic minimum tax: the GMT only applies to subsidiaries of large MNEs (with global revenue above 750 Million EUR), permits generous carve-outs (deductions) for tangible assets and payroll, applies at the group level (enabling consolidation of profits across firms in a group), and does not consider refundable tax credits as a tax incentive.

In the final part of the paper, we carefully model the GMT rules in five countries where the data permits it, and contrast the revenue gain from the GMT to the simple domestic minimum tax. Few estimates of the revenue gains from the GMT exist, in part because the Country-by-Country Reporting (CbCR) micro data on profits of MNEs is rarely available. We fill this gap with two novel methods. We first identify via Orbis the subsidiaries of in-scope MNEs and their group structure. For our five countries, the number of in-scope subsidiaries in Orbis is close to those in the publicly available aggregate CbCR data. The list of Orbis subsidiaries is then merged with CIT returns, with a 65% match rate. The imperfect match implies that our first method yields a lower bound on the GMT revenue potential. To address this, we develop a second method: we build a list of foreign-owned firms by combining the Orbis-matched data and foreign ownership data from the tax administration. We select the N foreign-owned firms with highest top-up profits, where N

[3]They would be taxed either by the headquarter country or by another country in which the firm has affiliates.

is the number of firms reported as being in scope in the aggregate CbCR data for our countries. By selecting the foreign-owned firms with highest top-up tax, we estimate an upper bound on the revenue potential of the GMT.

Our estimated revenue gains for the GMT are modest, and much smaller than those for the simple domestic minimum tax in the same countries. Costa Rica could experience a sizable 22.6% increase in CIT revenue from the GMT, but revenue gains in Greece, Honduras, Jamaica and South Africa would be much smaller, ranging from 0.3% to 6.3% of CIT revenue. The lower and upper bound estimates are fairly close to each other. What explains the lower revenue potential of the GMT? First, the firms in scope of the GMT are fewer in number and smaller than top 1% firms, as the GMT excludes domestic standalone firms. Second, the GMT tax base is narrower: it allows for group consolidation and the deferral of tax assets. In addition, the GMT allows firms to deduct a share of their payroll and tangible assets, which considerably reduces their tax base.

Our study only offers a positive description of corporate taxation. We do not model behavioral responses, in part due to the large uncertainty around firms' and countries' responses to the fast changing global environment. The simple domestic minimum tax for large firms presents a benchmark for the mechanical revenue potential of an uncoordinated minimum tax. Yet, beyond differences in scope and tax base definition, the GMT is a coordinated effort to reduce profit shifting incentives, which could raise tax revenue in all non haven countries. In this paper, we do not consider changes to firms' profit shifting incentives, which would mainly benefit large high-income countries (see Ferrari et al. 2022; Devereux 2023). Further, while our paper shows that tax incentives disproportionally benefit the largest firms, it does not take a stance on welfare: it is possible that the ETR-firm-size patterns we document correspond to governments' objectives.

The paper is organized as follows. Section 1.1 places our work in the literature. Section 2 describes our data and method. Section 3 documents the ETR-firm-size relationship and analyzes the drop in ETRs at the top. Section 4 examines the potential revenue gains from a domestic minimum tax. Section 5 models the global minimum tax in selected countries. Section 6 concludes with a discussion of policy implications.

1.1 Related Literature

Effective Tax Rates Our work relates to the literature at the intersection of economics and accounting that calculate firms' effective tax rates (ETRs) (Devereux and Griffith, 1998, 2003). ETRs capture how corporate tax burdens differ from what is implied by statutory tax rates. The literature distinguishes between forward-looking ETRs (considering future tax burdens based on the tax code) and backward-looking ETRs (considering realized burdens based on taxes paid). To calculate backward-looking ETRs, existing studies (see Table A.1 and Janský 2022 for a summary), mainly use financial accounting data, which has limitations due to differences between financial and tax accounting rules (Graham et al., 2012). Moreover, the coverage of financial data is partial, especially for low and middle-income countries. Our work advances this literature by using administrative corporate tax returns, enabling a more precise measure across a diverse set of countries.

The OECD recently started publishing aggregate data from country-by-country reporting (CbCR), providing an alternative to estimate ETRs of MNEs and their affiliates (Baraké et al., 2022; OECD, 2020; Hugger et al., 2023; Garcia-Bernardo and Janskỳ, 2024).[4] CbCR data is organized in bilateral matrices by ultimate parent entity (UPE) and affiliate, containing jurisdiction-level information on MNE activity, profits, and taxes. Although their publication is a major step forward, CbCR data, by construction, only contain affiliates of large MNEs and the aggregate data does not permit a granular examination of firm level ETRs. Further, the data suffers from two well-documented issues: a lack of inter-temporal adjustments and double-counting of profits, which can bias ETR estimates (Blouin and Robinson, 2020). The release of micro CbCR data and addressing the aforementioned issues could permit, at term, a precise estimation of the effective taxation of MNEs.

Firm Size and Tax Minimization By unpacking the determinants of the heterogeneity in ETRs across the firm size-distribution, we contribute to the literature on tax minimization. Tax avoidance, notably via profit shifting, and tax evasion have received most attention (see Slemrod 2019).[5] This

[4]Under BEPS Action 13, large MNEs are required to file a country-by-country (CbC) report with their global allocation of income, profit, and taxes paid in countries where they operate. This report is shared with tax administrations.

[5]The extensive literature on profit shifting can be categorized into micro-studies that identify specific channels, such as transfer mis-pricing for goods and services, location of intangible assets and patents, debt shifting (e.g. Desai et al. 2004; Dischinger and Riedel 2011; Karkinsky and Riedel 2012; Buettner et al. 2012; Wamser 2014; Egger and Wamser 2015; Gumpert et al. 2016; Cristea and Nguyen 2016; Davies et al. 2018; Beer et al. 2020; Bilicka 2019; Clifford 2019; Wier 2020; Liu et al. 2020; De Mooij and Liu 2020, 2021; Hebous and Johannesen 2021); and macro-studies assessing aggregate profits shifted (e.g. Tørsløv et al. 2022; Wier and Zucman 2022; Fuest et al. 2022).

literature tends to find that tax minimization varies with firm size: evasion rates decrease with firm size (Basri et al., 2021; Bachas et al., 2019; Best et al., 2022), while avoidance increases (Gumpert et al., 2016; Davies et al., 2018; Wier and Erasmus, 2023).

We are the first to document that the availability and take-up of tax expenditures also exhibits a size dependence, with a marked drop in ETRs at the top, in several countries and with comparable data.[6] The limited work on tax expenditures points to their importance: Egger et al. (2020) show that larger firms' bargaining power enables them to negotiate tax advantages from governments. Garcia-Bernardo et al. (2022) find that only a moderate share of the recent fall in global ETRs is due to profit shifting, with the remainder due to domestic tax policy such as tax expenditures. Klemm (2010) shows the relevance of tax expenditures in selected low-income countries.

Minimum Taxes Finally, we contribute to the growing literature on corporate minimum taxes, and the revenue effects of a Global Minimum Tax (GMT) on MNEs. Most studies use theoretical frameworks to assess the impact of the GMT (Devereux et al., 2020; Cobham et al., 2021; Hindriks and Nishimura, 2022; Hanappi and González Cabral, 2022; Ferrari et al., 2022; Janeba and Schjelderup, 2023; Hebous and Keen, 2023; Haufler and Kato, 2024; Hines Jr, 2024). A few studies model the GMT rules in detail and estimate revenue gains (OECD, 2020; Baraké et al., 2022; Hugger et al., 2024). We uncover large mechanical revenue gains from a 15% domestic minimum tax on the top 1% firms. Yet, our estimates for the GMT are much lower, and below those based on CbCR data: Baraké et al. (2022) estimate that European countries could raise CIT revenue by 16%, while Hugger et al. (2024) find gains of 6% to 8% of CIT revenue, with two-thirds of those gains attributed to direct top-up taxation, and the remaining third due to reduced profit shifting. However, given the limitations of the aggregate CbCR data discussed above, these studies may overestimate the tax gains of the GMT. By drawing on micro tax data, we can apply firm-level adjustments with respect to carve-outs, the de minimis rule, and prior losses. Our estimated revenue gains suggest that previous studies may be optimistic.

[6]Other work studies the relationship between ETRs and firm size in a single country, summarized in Table A.1.

2 Data and Methodology

2.1 Data

We assemble a novel dataset of corporate tax records from 16 countries, listed in Table 1. The dataset includes countries in Africa, Latin America, and Europe, and covers a wide range of income levels (from Ethiopia with a GDP per capita of 700 USD to Greece with a GDP per capita of 19,000 USD) and population sizes (from Eswatini with 1.2 million inhabitants to Mexico with 128 million inhabitants). Each country's data includes all corporate tax returns in the country, over a five-year span on average. In the main analysis, we focus on the latest pre-COVID cross-section, typically 2019, but for some countries we use data from earlier years.[7] Administrative tax data record firms' reported taxable income, costs, and all tax exemptions which allows for a breakdown of the tax burden. Unincorporated firms and firms filing under simplified regimes are excluded, as their tax treatment differs across countries, and information on profits is often missing. Appendix C details each country's tax system and our treatment of any special tax regimes. Although administrative micro tax data are increasingly available (Pomeranz and Vila-Belda, 2019; Mascagni et al., 2016), our study is one of the first to use such data across many countries.

The number of firms in each dataset correlates with a country's size and income level, ranging from 5,700 firms in Senegal to 404,000 firms in Colombia. The share of profitable firms varies from around 50% in Mexico to 85% in Colombia. By definition, the data include formal incorporated firms filing the corporate income tax. Table A.2 shows that, compared to firm registries (which typically include unincorporated firms), the number of firms captured in CIT ranges from less than 10% in the lowest-income countries (e.g. Senegal, Rwanda) to 80% in richer countries (e.g Albania, Greece). Yet, the ratio of total revenues in the micro data to the GDP of the country is typically high (median country at 95%), although it is lower in the lowest-income countries. This reflects the fact that, even in countries with a vast unincorporated sector, production is concentrated within large corporations.[8]

Our sample of countries features moderate to high statutory corporate tax rates. The lowest

[7] We decided to use 2019 as our baseline, instead of 2020 or 2021, to prevent the data from reflecting the effects of the COVID-19 pandemic and its tax relief measures, which we study in a related paper (Bachas et al., 2024).
[8] An alternative view is that these countries' GDP fails to fully incorporate informal firms' activity.

statutory rate is 15% (in Albania), and in most countries, the rate is between 25% and 30%. Given that the global minimum tax was set at 15%, we would not expect the minimum tax to have a direct impact on these countries in the absence of generous tax incentives.

Although countries were not randomly chosen, our sample appears representative of non tax-haven low and middle-income countries in terms of size, GDP per capita, and statutory tax rates. These specific countries are included because they reached out for advice, or because we worked with their tax administration on other analyses. Inclusion in the sample hence reflects either a proactive interest by countries or an openness to make micro data available for analytics. The absence of Asian countries hints at more limited access to confidential tax data in these countries.

2.2 Methodology

Objective We aim to compute ETRs that are comparable across countries with different tax systems and tax reporting requirements. Thus we select concepts from the CIT returns that are consistently used across countries. To the best of our ability we aim to distinguish variables that measure 'standard' deductions—allowed in all countries and for all firms, and reflecting economic costs—and variables measuring tax expenditures, which can be country and firm-specific.

Accounting concepts We consider the concepts that can be consistently measured across countries' tax returns, and the relationships between them in Figure 1. Total revenue is composed of sales plus other incomes (e.g. non-operating incomes, rents, interests). The deductions that firms typically subtract from their revenue to calculate their profits include the cost of material inputs, labor, and capital costs, as well as financial costs, and depreciation of capital. We call the difference between revenues and costs "profit" (or loss). This concept is not always directly reported in tax returns as a line item, but can always be reconstructed. We consider that this measure of profit is the best proxy for economic profit that can be constructed from tax return data.

Our profit measure differs from taxable profit. To derive taxable profit, one needs to exclude tax-exempt incomes; reintegrate non-tax-deductible costs; apply tax incentives, capital allowances, and other deductions; and account for loss carry-forward. This yields the taxable profits, i.e. the tax base. Multiplying the tax base by the statutory tax rate yields the gross tax liability.[9] Tax credits

[9]We validate the data cleaning and variable construction process by ensuring that when we divide the gross tax liability by the tax base we obtain the statutory tax rate.

are then deducted from the gross tax liability, to obtain the net tax liability.

Computing Effective Tax Rates We define a firm's ETR as the net tax liability divided by the profit. The numerator, net tax liability, is the tax due net of any after-tax deductions and credits, but ignoring advanced payments and withholding of taxes already paid. Hence, any deduction that is subtracted either from the tax base (proxied in our methodology by profit) or from the gross tax liability is taken into account as a tax expenditure that lowers the effective tax burden that a firm faces. By taking the ratio of the net tax liability over profit, we obtain an ETR which reflects the gap between the statutory and effective tax rate due to tax expenditures.[10]

This ETR measure is transparent and arguably comparable across countries. To construct it we distinguish two concepts: standard deductions, which should reflect economic costs (material, labor, operating costs, and depreciation), and tax expenditures, which should reflect policy choices. Standard deductions are removed from the tax base to calculate profit (our ETR denominator) but tax expenditures are not removed. Drawing the line between standard deductions and tax expenditures requires choices. For example, the time schedule of capital depreciation can vary across countries and asset classes, raising the issue of whether accelerated depreciation should be considered a standard deduction or a tax expenditure (we decided on the latter). Standard deductions tend to be homogeneously defined, while the concepts included under tax expenditures are country-specific: e.g. the definition of non-deductible costs and exempt incomes, investment incentives, reduced tax rates as a function of sales or activity.[11] We categorize tax expenditures into five categories: income exemptions, special deductions, reduced rates, tax credits and loss carry-forward. The latter are not permitted in several sample countries, and when permitted, regulations differ on the amount and duration allowed. We show robustness to their exclusion as a tax expenditure.

Tax evasion A potential caveat is that profit (our denominator) may deviate from true economic profit due to tax evasion and avoidance. Under imperfect enforcement, firms may under-report sales, inflate costs, and shift profits abroad, which lowers reported profit and the net tax liabil-

[10] Figure A.1 shows an example of how these concepts are observed on Rwanda's tax return form.

[11] Previous studies used a range of denominators, including EBIT (Adhikari et al., 2006); EBITDA (Lazăr, 2014); gross income excluding variable costs (Nicodème, 2002); and measures with ad-hoc adjustments of taxable income (Wu et al., 2012); see Table A.1. Our ETR measure allows all costs, including depreciation, operational and financial expenses, to be deducted from the denominator.

ity. Our measure does not capture the extent to which firms lower their tax burden through these channels: it is an upper bound on the true ETR that firms face on their realized (instead of reported) profits. Relatedly, firms' decision to use tax expenditures could interact with tax evasion and avoidance decisions.[12] The data do not allow us to investigate these issues further, as evasion is unobservable, and we cannot estimate shifted profits. Instead, we capture the importance of tax expenditures as a share of firms' reported profit, holding evasion and profit-shifting fixed.[13]

3 Effective Tax Rates and Firm Size

3.1 Aggregate Tax Expenditures

We construct firm-level effective tax rates (ETRs) with the data and methods described in section 2. The last two columns of Table 1 show for each country the top statutory tax rate, the average ETR for all firms (imputing a zero ETR for loss-making firms), and the average ETR for profitable firms. We use the difference between the top statutory rate and the firm-specific ETRs multiplied by their profits to compute firm-level tax expenditures. By aggregating across firms, we obtain total corporate tax expenditures, which we express as a share of GDP. This measures the forgone revenue due to CIT expenditures, absent behavioral responses.

Figure A.2a displays our aggregate CIT expenditure estimates, ranking countries by GDP per capita. For our sample countries, tax expenditures represent 1.04% of their GDP on average. Albania, Ethiopia and Guatemala's CIT expenditures in the micro data are close to zero, while all other countries' tax expenditures are over 0.5% of GDP. We also include data from an additional 64 countries, using the Global Tax Expenditure Database which assembles data from official tax expenditure reports (Redonda, von Haldenwang and Aliu, 2022).[14] The average CIT expenditure in this extended sample of 80 countries are at 0.68% of GDP, slightly lower than in our sample.

Figure A.2b shows the correlation between our CIT expenditures estimates and those from government reports. The correlation is high but not perfect: our method yields higher estimates

[12] For example, tax planning could impact both international profit shifting and tax incentives take-up. By computing an ETR measure based on profit (after the deduction of all standard production costs), we do not consider tax avoidance taking place before this stage, for example through capital depreciation rules.

[13] Dyreng et al. (2017) show that ETRs have decreased in the same way for domestic and multinational firms, suggesting MNEs' ability to shift profits may not be a first-order difference between domestic firms and MNEs.

[14] Following international standards, tax expenditures should be computed yearly. In practice, developing countries do not systematically produce these reports, and computation methods vary significantly across countries.

on average, especially for African countries. We note that governments' methods to compute CIT expenditures differ across countries: for example, reduced rates are not counted as expenditures everywhere—they tend to be counted in high-income countries but rarely in developing countries. In addition, tax expenditure reports in low-income countries often do not cover all special tax regimes, sometimes explicitly stating this exclusion.[15] The perception of data reporting weaknesses is reinforced by the observation that poorer countries display lower tax expenditures than richer countries, which could reflect incomplete measurement. Our CIT expenditure estimates are arguably more comparable across countries.

3.2 Country-Level ETR-Firm-Size Curves

Which firms benefit from the sizable tax expenditures measured above? We rank firms based on their revenue within their country, and assign each firm to a percentile of revenue from 1 to 100.[16] To study the largest firms, we further separate the top 1 percentile of firms into five bins, each representing 0.2% of firms. We then measure the average ETR across firms in each quantile. We compute average ETRs by quantiles for two samples of firms. The first considers all firms, including zero-profit and loss-making firms to which we assign a zero ETR. The second is restricted to profitable firms, using the same revenue cutoffs between quantiles as in the first sample.

Figure 2 shows the pattern of ETRs in each of the 16 countries, first for all firms, including loss makers. We rank countries by their top statutory tax rate (STR), ranging from 15% for Albania to 35% in Colombia, with a median at 29%. We show the average ETR in each firm-size quantile and a polynomial fit capturing the ETR-firm-size relationship. The gray shaded area corresponds to the top 1% of firm size, which is graphically expanded to zoom in on the largest firms' ETRs. We observe two main patterns. First, in every country, the ETR rises between the first and ninth decile of firm size. Second, the relationship between firm size and ETRs always flattens and often reverses once we reach the top decile. In most countries, the largest firms (top 1%) pay a lower ETR than other top decile firms. In tandem, these patterns produce a humped-shaped relationship between firm size and ETRs in most countries, such that firms at around the ninth decile of the size distribution face the highest ETR.

[15] For example, Table 1 of Rwanda's 2021 tax expenditure report prepared by the Finance Ministry qualifies its income tax expenditure estimate by stating that it "*excludes some tax expenditures that are not currently measurable*".
[16] Table A.3 shows the number of firms per percentile for each country.

Which factors explain the relationship between ETRs and firm size? We first analyze the role of loss-making firms (to which we assigned an ETR of zero) and of reduced statutory tax rates, which benefit smaller firms in several countries. To examine this graphically, we restrict the sample to profitable firms only, and compute the firm-specific gap $ETR_i - STR_i$, where STR_i is the firm's statutory tax rate. Depending on the country, this may be a function of its revenue or its profits. We then take the average of the firm-specific tax rate gaps at each quantile of the size distribution, in each country, keeping the revenue quantiles fixed based on the full population.

Figure 3 plots the average tax rate gaps as a function of firm size quantiles.[17] The ETR-firm-size relationship is much flatter than in Figure 2: in 11 out of 16 countries the relationship is flat between the first and ninth decile. The flattening of the slope is due in part to the fact that smaller firms are more likely to report zero or negative profits (and be assigned a zero ETR), and partly due to reduced STRs for small firms in several countries (Albania, Costa Rica, Ecuador, South Africa). Figure A.4 shows the large reduction in the share of unprofitable firms along the firm size distribution.

At the top of the distribution, however, the ETR still drops in most countries: with the exception of the lowest tax countries (Albania, Guatemala and Jamaica, plotted first) plus Ethiopia, profitable firms in the top 1% pay a lower ETR than other top decile firms. The four countries without a drop in the ETR at the top display a flat relationship.[18]

3.3 Robustness of the ETR-Firm-Size Relation

The ETR-firm-size pattern we document is not driven by methodological choices: the pattern replicates within broad economic sectors, with a multi-year time horizon to define the ETR, and with alternative firm size measures. To succinctly display several robustness dimensions, we summarize individual country patterns by constructing a synthetic average country: we take the average of the ETR at each quantile across countries, weighing countries equally. Figure 4a displays the average ETR across the firm-size distribution (for profitable firms) for the 16 sample countries. The synthetic average country repeats the humped-shaped pattern of rising ETRs between the first and ninth decile, and the marked fall in ETRs at the top, observed in the majority of sample countries.

[17] Figure A.3 plots the same firm-size-ETR patterns as in Figure 2 for profitable firms only.

[18] Figure A.5 shows how the average ETR and the firm-specific tax gaps correlate with country characteristics and macroeconomic variables in the 16 countries. Tax gaps are larger in small countries and in low-STR countries.

Figure 4b shows the ETR-firm-size relationship after assigning firms to the four main sectors of activity: agriculture (primary), industry and construction (secondary), retail, and services. In each sector, we observe a humped-shaped pattern similar to the aggregate pattern. Industrial firms show the largest drop in ETRs at the top, but the reduction is also large for firms in services. Retail and agricultural firms display smaller ETR reductions at the top.

Figure 4c shows ETRs computed over multiple years (ranking firms based on revenue from the most recent year). Multi-year ETRs are constructed by taking the sum of tax liability over several years and dividing it by the sum of profits over the same years. We can construct two-year ETRs in all countries, and five-year ETRs in 12 countries. The sample of countries thus slightly changes with the time horizon we consider, but results are consistent across time horizons, and very similar to our main results, even though profits and losses are now averaged over the period. Each multi-year ETR measure displays a clear drop at the top percentile of the size distribution.

Our results are also robust to alternative definitions of firm size, such as payroll and total assets. Figure A.6 shows that the firm-size-ETR patterns look very similar when using these alternative size measures, even though the different size measures are imperfectly correlated.

Finally, we address the concern that larger firms, which are often subject to public financial reporting rules, report profits more accurately to ensure consistency between their financial and tax statements (Badertscher et al. 2019, Hoppes et al. 2020). This behavior could mechanically create a drop in ETRs at the top of the distribution. While we do not have access to firms' financial statements, we can show that the ratio between profits and assets is flat at the top of the firm-size distribution, both within the top decile and across the top three deciles (Figure A.7). This suggests that differential misreporting below the top of the firm-size distribution is not a first order concern.

3.4 Tax Reductions for the 1 Percent Largest Firms

Firms in the top 1% of the size distribution are of systemic importance: in our sample they account for 54% of revenue reported in the CIT declarations, 59% of profits, and 56% of corporate taxes on average (Table A.4). We thus examine in a regression setting the role of firm characteristics and of the different types of tax expenditures in accounting for the drop in ETRs at the top. Due to the nonlinearity of the ETR-firm-size pattern, we restrict this analysis to firms in the top 10% of size in each country, and consider the impact on the ETR of belonging to the top 1%. In the median

country by number of CIT returns, 23,000 firms file the CIT, so the top 1% corresponds to 230 firms (see Table A.3).[19] Using the most recent cross-section of profitable firms, we estimate the following model:

$$ETR_i = \gamma_0 + \gamma_1 D_i^{Top1} + \underline{\gamma_k} X_{\underline{k},i} + \epsilon_i, \quad (1)$$

where ETR_i is the effective tax rate of firm i, and D_i^{Top1} is a dummy equal to 1 if firm i belongs to the top 1% of revenue in its country. The coefficient γ_0 measures the average ETR for firms between the 90th and 99th size percentile, and γ_1 measures the difference in the ETR between the top 1% firms (above the 99th percentile) and to other top decile firms. $X_{\underline{k},i}$ is a vector of firm-specific variables including firm characteristics and dummies for the different types of tax expenditures that take value one if a firm reports a non-zero amount.[20]

We estimate equation 1 separately for each country and display the average of the γ_1 coefficients across countries in Table 2 (country-specific results are shown in Table A.7). Column 1 does not include any controls: on average across countries, firms in the top 1% of the size distribution pay 2.2 percentage points less in taxes than other top decile firms. The coefficient on the top 1% dummy is negative in 14 countries, and statistically significantly so in 10 out of 16 countries.[21]

Column 2 controls for firm characteristics including sector, location, firm age, and foreign ownership where available. Columns 3 to 7 control for different types of tax expenditures one by one: reduced tax rates, exempted incomes, special deductions, re-timing (i.e. loss carry-forward), and tax credits.

The two most important individual factors for the ETR differential at the top 1% are tax credits and firm characteristics. On average the coefficient on the top 1% dummy shrinks by over 30% when either is controlled for (columns 2 and 7).[22] Firm characteristics (sector, location, and age) might capture tax provisions that are not listed on the tax form, such as special economic zones or

[19] We also run analyses for the bottom 90% of the firm-size distribution, where we regress the ETR on the percentile of revenue to account for the increasing trend of ETRs with firm size. Results are shown in Table A.5 and confirm the importance of reduced tax rates for the progressivity of the ETR, as discussed in Section 3.2.

[20] We prefer comparing firms in the top 1% to other firms in the top decile rather than estimating the ETR-firm-size gradient across quantiles within the top decile, as it is transparent and reduces the need for functional form assumptions. We show robustness to other specifications in Table A.6.

[21] Table A.6 shows that the ETR advantage at the top rises if we expand the estimation window (comparing the top 1% to the top 20%) and keeps on rising within the top 1% (the average coefficient on the top 0.1% dummy is 2.6).

[22] Importantly, tax credits do not represent a compensation for taxes already paid elsewhere as shown by Figure A.8.

support for young firms. Exempt income also explains some of the variation in ETRs at the top of the size distribution (column 4), followed in decreasing order of importance by special deductions (column 5), re-timing provisions (column 6), and reduced statutory rates (column 3). Column 8 controls for all explanatory variables at once: the average coefficient on the top 1% dummy is reduced by three quarters, but some of the variation remains unexplained, and in four countries, the top 1% dummy coefficient is still significant.

Our inability to fully explain the variation could be because we only control for each tax incentive with a dummy variable, instead of using amounts. Taking into account amounts, i.e. fully decomposing the STR-ETR difference into its drivers, is not possible with our methodology and with the requirement that tax expenditure concepts are harmonized across countries. This is because some tax expenditures are deducted from the tax base while others are deducted from the tax liability, and these concepts interact. A full decomposition of the ETR would require country-specific exercises and distract from our focus on the ETR-firm-size pattern across countries.

Tax expenditures types and rationale Table A.8 lists the existence of each tax expenditure type by country (from the tax form): tax credits—a key provision explaining the ETR drop at the top—and income exemptions are available in 11 and 12 of the 16 sample countries, respectively. In Albania and Ethiopia, where neither are available, the ETR-firm-size profiles are flat. Ideally, we would categorize tax expenditures based on their economic rationale. This is challenging with the line items on the tax return: many provisions have generic names and refer to laws stating multiple goals. To clarify the intention of tax expenditures, we collected each country's official tax expenditure report. A qualitative analysis of individual tax provisions suggests that the main goals are to attract foreign direct investments, create job, and develop specific regions.[23] These tax expenditures are often available via special economic zones (SEZs). Indeed, the largest provisions listed in the tax expenditure reports for Costa Rica, the Dominican Republic, Ecuador, and Honduras concerns tax credits and income exemptions for SEZ firms.[24] Tax provisions for SEZs also seem important in African countries with large tax gaps (Eswatini, Senegal, Rwanda, and Uganda).

[23] Other aims of tax expenditures are to address externalities (environmental, health) and reduce employment discrimination, but these account for a much smaller share of GDP.

[24] Not all firms in SEZs are required to file corporate taxes. Thus, some firms might be absent from our dataset altogether. Including these firms in the analysis would likely strengthen our results.

4 A Simple Minimum Tax on Corporations

4.1 Motivation

Section 3.4 showed that the largest firms benefit from a lower ETR. Such ETR differentials by firm size can be detrimental to both production efficiency and equity. For policymakers desiring to level the playing field, the most direct approach would be eliminating tax credits that disproportionately benefit the largest firms. However, eliminating these tax credits is often politically, legally, and administratively difficult. A simpler policy that would achieve the same goal is to impose a minimum tax on profits for a subset of firms, e.g. firms in the top 1% of the size distribution. Such a policy is a second-best tool in that it does not directly address the root cause of differences in the ETR by firm size–e.g. the tax credits–but achieves a minimum taxation for targeted firms. The approach is similar in spirit to the global corporate minimum tax, but much simpler, as will become clear when we discuss the complex rules of the global minimum tax in Section 5.

4.2 Revenue Potential

We model a simple 15% domestic minimum tax on profits, applied to all firms in the top 1% of size within each country. While the top 1% of size includes a higher share of MNEs than other firm-size percentiles, the majority of firms in the top 1% are actually domestic standalone firms (Table A.9, column 3). Applying a minimum tax broadly to include domestic firms and subsidiaries of MNEs seems desirable, both for tax competition and for efficiency reasons. We apply the minimum tax at the firm level (and not the group level), as information on groups is often missing, and rules on consolidation for tax filing vary across countries.

Figure 5a, shows for each country the share of firms with an ETR below 15% among profitable top 1% firms, ranking countries in descending order of their statutory tax rates. Across countries, 28% of top firms on average face an ETR below 15% on average. The variation in this share is limited: the largest share of 46% is observed in Colombia and the lowest share of 6% in Guatemala, while the share is 25% in the median country. Figure 5b, shows that conditional on paying an ETR below 15%, firms' reported ETRs tend to be very low: 2.95% in the median country.

These two panels highlight that, although, our sample does not contain tax haven countries

(the median statutory rate is 28.5%), many large firms still pay an ETR below 15%, which is often close to zero. This challenges the standard dichotomy between haven and non-haven countries: in practice, many moderate to high-tax countries provide generous tax expenditures, such that a substantial share of the largest firms pay almost zero taxes. As a consequence, a minimum tax could directly impact most countries, and push them to reconsider their tax incentive policies.

To understand the revenue potential of a simple minimum tax, Figure 5c plots the share of aggregate profits that would be affected. This equals the profits of top 1% firms with an ETR below 15% over the profits of all firms filling the CIT. We then simulate the mechanical revenue collection from applying a 15% minimum tax to top 1% firms with an ETR below 15%, computed as their profits times the difference between 15% and their ETR.[25] We assume that firm behavior remains unchanged.[26]

Figure 5d plots the hypothetical revenue collection of the simple domestic minimum tax, expressed as a percentage of baseline CIT revenue from all firms. The simulations predict an average rise in corporate tax revenue of 29%, with heterogeneity across countries. In half of the countries, a 15% minimum tax would raise at least 10% more revenue, and in a third of countries, at least 20% more revenue. While the average ETR among top 1% firms with an ETR below 15% is quite homogeneous across countries, the exposed profits and revenue potential of a domestic minimum tax are more heterogeneous. The variation is in part driven by the dispersion of the profit distribution: in small countries, a few large firms can account for a very high share of profits.

In summary, we show that a quarter of the largest firms' ETRs are below 15% in our sample of moderate to high-tax countries, and many firms pay almost zero tax. A simple 15% minimum tax on the top 1% of firms could raise revenue by more than 10% in half of these countries. However, this simple domestic minimum tax would not be considered as a "qualified domestic minimum tax" under the Global Minimum Tax rules, which are more complex and restrictive than our simulations. We now turn to modeling the detailed application of the pillar 2 rules in a subset of countries and compare the resulting top-up tax revenue to the revenue potential of the simple minimum tax.

[25] For loss-making firms, the additional tax payment due to the minimum tax is set to zero.

[26] As previously discussed, if incentives to avoid taxes and shop around jurisdictions for lower rates are curbed by the GMT, real economic activity might decrease globally (and some profits could be reallocated from low-tax to higher-tax jurisdictions), although the low rate of 15% partly mitigates this concern.

5 The Global Minimum Tax (Pillar 2)

5.1 The Global Minimum Tax in Theory

In 2021, 137 country-members of the OECD/G20 Inclusive Framework on base erosion and profit shifting (BEPS) reached an agreement to overhaul international tax rules starting in 2024. A key piece of this agreement is a 15% global minimum tax (GMT) on corporations.[27] The global minimum tax is applied to very large MNEs—those with a global consolidated revenue above 750 mio EUR in two out of the last four years. Affiliates for these MNEs are labeled as *in scope* of the GMT. The GMT base is *GloBE* (global anti-base erosion) income, calculated at the group-jurisdiction level. A number of additional provisions affect a firm's GMT liability, such as a reduction in the GMT tax base linked to the real economic presence in a country (*substance-based carve-outs*), and the possibility to further lower the tax base by transforming existing tax credits into so-called *qualifying tax credits* that meet a set of criteria. We discuss these provisions in more detail below.

The GMT is enforced via a set of interlocking collection rules. First, the country in which in-scope MNE affiliates are registered could apply the tax through a *Qualifying Domestic Minimum Top-up Tax* (QDMTT). If the source country does not apply the top-up tax, the country in which the MNE is headquartered could instead tax the under-taxed profits through the *Income Inclusion Rule* (IRR). And finally, if neither the country hosting the MNE affiliate nor the headquarter jurisdiction apply the top-up tax, the *Under-Taxed Profits Rule* (UTPR) would apply. This rule gives taxing rights to other countries in which the in-scope MNE has affiliates. These interlocking collection rules ensure that all countries have incentives to participate in the GMT by translating its provisions to domestic legislation. The status quo would imply foregoing tax revenue, as in-scope MNEs would be taxed anyways, with the revenue collected by other countries. Table A.10 shows that 39 countries already adopted the GMT and 16 prepared draft legislation. While most are high-income, ten low and middle-income countries either implemented the GMT or are considering implementation.

How might the global minimum tax impact our sample of countries? These countries rarely headquarter large MNEs and are thus unlikely to benefit from claims to under-taxed profits via the Income Inclusion Rule (Barake et al., 2022). Yet, the GMT could allow these countries to raise

[27] The OECD statement on the agreement can be read here and the GMT GloBE rules here.

the ETRs on large firms to 15% through a QDMTT. If the GMT is applied widely, a rate increase up to 15% in a source country would merely redistribute the top-up tax gains from the MNE's headquarter country to the source country, without deterring investment.[28] We hence consider the scope and revenue implications of the global minimum tax through the lens of a QDMTT.

5.2 The Global Minimum Tax in Practice

We now describe how we apply the GMT rules to simulate QDMTT revenue in a subset of five countries: Costa Rica, Greece, Honduras, Jamaica and South Africa. The first step is to identify the firms in scope of the GMT. Tax administrations do not always know which firms are subsidiaries of MNEs, and rarely know about the global activities of MNEs headquartered abroad. The Country by Country Reporting (CbCR) data is designed to close this gap: it mandates that MNEs with global revenue above 750 Million Euros report to their headquarter country the breakdown of sales, profits, and taxes paid by country of operation. In turn, MNEs' headquarter countries should share this data bilaterally with all source countries. Yet, countries in our sample do not currently use the CbCR micro data.[29] To assess the revenue potential of the GMT, we use two alternative strategies, which rely on existing data and are replicable in many countries. The first strategy merges the CIT data with Orbis data available via institutional subscription. The second strategy uses a foreign ownership indicator from each country's administrative tax records and the *aggregate* CbCR data indicating the total number of in-scope MNE affiliates, which is publicly available. We detail these two methods, and then explain how we proxy the top-up tax revenue using the CIT records.

Method 1: Orbis match Orbis contains information on the ownership structure of firms, as well as some financial data. How complete is the Orbis ownership and economic data for our sample? Table A.11 compares the number of firms and groups predicted to be in scope of the GMT in Orbis (columns 7 and 8) and the number of firms and groups in the aggregate CbCR data (columns 9 and 10), for each country. Orbis ownership data appears fairly complete: the number of in-scope

[28] The OECD published a paper specifically to advise developing countries on how to reform their tax expenditures in light of the new agreement (OECD, 2022). It states that "*Pillar Two and the GloBE Rules, in particular, should empower governments to pursue tax reform and remove tax incentives where the costs outweigh the benefits from such incentives*", and later, "*Given the global character of Pillar Two, inaction would only lead to forgone revenues.*".

[29] Even in an EU country such as Slovakia, the government did not use the micro CbCR data prior to engaging with researchers (Boukal et al., 2024).

subsidiaries and groups in Orbis and in the CbCR data are close for most countries. This is expected since Orbis has good coverage of firms headquartered in or with affiliates in high-income countries, and this coverage extends to these MNEs' subsidiaries worldwide. Yet, economic activity data for subsidiaries in low and middle-income countries is almost always missing (Table A.12, columns 5 and 6). Thus, we need to use administrative tax records to capture firms' tax bases.

We extract the list of firms in scope from Orbis by identifying all MNE subsidiaries in the relevant countries and checking whether the MNE group meets the criteria that its global consolidated revenue was above 750 million EUR in two of the last four years. Our partner tax administrations in Costa Rica, Honduras and Jamaica then merge Orbis extraction with their CIT records, using company names. For South Africa, we did not have to perform the Orbis merge since firms report the global revenue of their MNE on their CIT declaration.[30] The share of firms on the Orbis list that merge with the tax data ranges from 75% in Costa Rica to 70% in Honduras and 56% in Jamaica. At the level of the group, when at least one firm per group can be merged, the merge rates are slightly higher. However, given the imperfect merge, the number of firms that are in scope and identified in the tax administrative data is lower than the number in the aggregate CbCR data. Thus, the Orbis matched sample will yield a lower bound on the number of firms affected by the GMT and on the GMT revenue potential. We use an alternative strategy to obtain an upper bound.

Method 2: Aggregate CbCR match For this strategy, we use a variable in the administrative tax records indicating whether a firm is foreign-owned (see Table B2, column 3, for the the precise source of this information, which differs across countries). For each country, we combine this sample of foreign-owned firms with the list of Orbis-matched firms (from method 1) to obtain a list of CIT filers that are subsidiaries of MNEs. We then rank firms on this list by the amount of top-up tax expected under a QDMTT (see below for how we construct this), and select the top firms, until we match the number of in-scope firms from the aggregate CbCR data. For example, the CbCR data indicates that for 2019, 703 firms are in scope in Costa Rica (Table A.11, column 9). We hence select the 703 firms with the highest potential top-up tax from the list of foreign firms. We do not know if the global revenue of the MNE group is large enough for these firms to be in scope as per the GMT rules. However, by selecting the firms with the highest top-up tax, we

[30]For Greece, we attempted the merge based on a tax ID variable available in Orbis, but obtained a merge rate of only 39%. For Greece, we thus focus on method 2, using aggregate CbCR data.

obtain an upper bound on the revenue potential of the GMT. Another reason why the estimate from this method would be an upper bound is that we have to calculate the top-up tax at the firm level rather than the group level for a significant share of firms, as group identifiers are only available in Orbis. Hence, we are only able to consolidate the returns–which could reduce a group's top-up tax–for firms appearing in Orbis, but not for other foreign-owned firms.

Calculation of the top-up tax We now present the key steps we follow to compute the top-up tax under the global minimum tax. Appendix B.2 discusses the data and definitions used in detail.

1. We consolidate firms' outcomes at the group level, when group identifiers are available. Firms not identified as belonging to a group are considered as a one-firm group. We thereafter examine all outcomes at the group level. We apply the GMT de minimis exclusion whereby groups with profits and sales below a threshold are exempted from the top-up tax.[31]
2. We calculate the effective tax rate of the group. If a group had previous losses, we apply the deferred tax asset (DTA) as per the OECD GMT rules, which raises the groups' ETR. The DTA is essentially the tax-benefit of previous losses carried forward.[32]
3. We deduct the carve-outs from the tax base. This implies deducting 10% of payroll and 8% of tangible assets in the first year post implementation. Ten years after implementation, carve-outs are reduced to 5% of payroll and 5% of tangible assets.
4. We identify groups with an ETR below 15% as liable for the top-up tax. We calculate the top-up tax as profits times the difference between the ETR and 15%.

5.3 Direct Tax Revenue Gains from the Global Minimum Tax

Revenue potential Figure 6a plots the predicted revenue from the top-up tax as a share of baseline corporate income taxes, in each country. The predicted revenue is the sum of the simulated top-up tax payments by firms in scope, after applying the year 1 carve-outs, and absent any behavioral responses. For each country, we show the upper bound scenario (aggregate CbCR match) and

[31] The de minimis exclusion stipulates that MNEs are not subject to top-up tax in countries in which they have an average GloBE revenue below 10 million Euro and the average GloBE income tax is either negative or below 1 million Euro, averaged over the last five years.

[32] Loss making firms are able to carry forward the equivalent of 15% of their losses as "tax assets" from the previous year. This tax asset is then added to the covered taxes of the next year, thus raising the ETR of the firm. If the resulting ETR is larger than 15%, firms can carry the remaining tax asset to the next years.

the lower bound scenario (Orbis match). Figure 6b shows the number of groups liable for top-up tax in each country, and in parenthesis the number of firms belonging to those groups.

The revenue gains vary substantially across countries, with a maximum gain of over 20% of CIT revenue in Costa Rica, and a minimum of less than 0.3% in South Africa. The upper and lower bound revenue gains are close to each other in most countries, except for Honduras where the lower bound is 1.47% of CIT revenue and the upper bound is 6.30%. The number of entities and groups in scope is closely correlated with the revenue potential, except in South Africa which has a much larger economy than the other countries and hence has a double-digit number of firms liable for top-up tax, but still a negligible revenue gain in aggregate.

Why are the potential revenue gains larger for Costa Rica than for the other countries? Costa Rica does not have a significantly larger number of in-scope firms as a share of its population, and the ETR among those firms is similar to that of other countries. Instead, the aggregate profit share of its in-scope firms is larger than in other countries (see Table B1). In addition, the carve-outs for economic substance are more limited, as we will see below. Thus, Costa Rica seems to operate as a hub for large MNEs in the region which have some real activity in the country but also engage in or are used for strategic tax minimization.

The role of carve-outs Figure 7 shows revenue gains for different scenarios, in the order of the steps we take to compute the top-up tax, using the aggregate CbCR upper bound method. The first bar shows the revenue gains of a 15% minimum tax without any carve-outs permitted. The second bar plots the revenue gains, after applying, the carve-outs in the first year of application (10% of payroll and 8% of tangible assets). The third bar corresponds to the application of the carve-outs after ten years (5% of payroll and 5% of tangible assets). The equivalent results for the Orbis match lower bound method are shown in Figure B1.

Allowing a share of the payroll and of tangible assets to be deducted from the tax base was a compromise in the negotiations for the Global Minimum Tax. The carve-outs imply that the GMT only limits "harmful" tax competition in the form of aggressive profit shifting but allows and effectively encourages tax competition to attract real economic activity. In Greece, Honduras, Jamaica and South Africa, the initial carve-outs reduce the revenue gains by around 60% on average. In Costa Rica, carve-outs make a much smaller dent in aggregate revenue potential, suggesting that

MNE affiliates in Costa Rica have limited economic presence. In general, tangible assets play a more important role in reducing the tax base than the wage bill. We also observe substantial heterogeneity across firms, highlighting the importance of conducting analyses with micro data.

Refundable tax credits The fourth bar in each panel in Figure 7 corresponds to a hypothetical scenario. It assumes that all existing tax credits are converted from non-refundable to refundable. A non-refundable tax credit is one which cannot lower a taxpayers' liability below zero. A refundable tax credit instead allows such a situation in which the tax authority owes the taxpayer a refund. Refundable tax credits were permitted under GMT rules, primarily to protect green tax credits. Hence, these refundable tax credits effectively reduce a firm's CIT liability without giving rise to GMT top-up tax. The possibility that governments may choose to convert non-refundable tax credits into refundable tax credits has been highlighted as a key loophole of the GMT, with some countries already intending to convert their existing tax credits (e.g. Singapore).

If we assumed that all existing tax credits were converted, and we apply the conservative carve-out rates for year 10, the revenue potential of the GMT would fall to zero in South Africa and to almost zero in Costa Rica, Honduras and Jamaica. Only Greece, which had to slash its tax credits during bail-out from the financial crisis, would be unaffected by this scenario.

How likely is such a full-conversion scenario? Transforming non-refundable tax credits to refundable ones raises the volatility of countries' tax revenues. This is a major concern for countries with limited fiscal space, i.e. especially for developing countries. It is also possible that countries abandon the use of their current tax credits, but instead of offering refundable tax credits, offer firm subsidies outside of the tax system, to continue supporting firm production while remaining compliant with GMT rules. This would likely raise the net cost of subsidizing firms (i.e. it would raise CIT revenue by less than the new subsidies cost), but it seems a plausible policy choice, given the increased focus on industrial policy globally.

A 20% Minimum Tax Rate The last bar in Figure 7 corresponds to a scenario with a 20% minimum tax rate, as initially proposed at the onset of the GMT negotiations. We apply the ten year carve-outs. Unsurprisingly this scenario raises the revenue gains, but does so exponentially, as it limits the role of carve-outs, and expands the number of firms required to pay a top-up tax.

5.4 Comparison of Revenue Gains: Global vs Domestic Minimum Tax

While we found large potential revenue gains from a simple domestic minimum tax, the direct revenue gains from the GMT appear much smaller, in all countries we study. In Costa Rica, the country with the highest revenue potential in both cases, the simple domestic minimum tax could raise CIT revenue by over 60%, but the GMT would realize less than a third of these gains. For South Africa, which has the lowest revenue potential under the GMT, the simple minimum tax would still increase CIT revenue by 9%, but the estimated GMT revenue increase is below 0.3%.

What explains these large differences in revenue gains between the two policy tools? First and foremost, the GMT affects a much smaller number of firms. On average the GMT is levied on significantly fewer firms than the simple minimum tax (comparing columns 4 versus column 2 of Table A.9). In addition, firms in scope for the GMT are not necessarily among the top 1% of firms in size within a country (Table A.9, column 5). Some domestic standalone firms are much larger in both revenue and profits than GMT-liable subsidiaries.

Second, the GMT base is different, as it allows firms to a) consolidate profits and losses within a group, b) carry deferred tax assets (i.e. losses in previous periods), and c) deduct a share of their wage bill and tangible assets. This means that the top-up tax which the GMT generates is smaller than the simple domestic minimum tax, even when restricting to those firms liable for both. Figure B3 shows that the consolidation at the group level weakly lowers the GMT top-up tax: this factor is not quantitatively important, as many groups have only one affiliate per country. The comparison of panel (d) in Figure 5 and in Figure A.9 shows that the deferred tax assets can be large in some countries. Finally, substance-based carve-outs are an important factor, as discussed in Section 5.3.

6 Discussion and Policy Implications

This paper has presented new facts on corporate taxation, drawing on administrative data from 16 countries. We document a consistent inverse U-shaped relationship between firm size and effective tax rates. This is an important finding, as the size-dependence of effective tax rates has been shown to affect the efficiency, equity and effectiveness of tax policy. For instance, changes in tax-related costs can alter the distribution of sales between MNEs and their national competitors (Martin et al., 2023; Gauß et al., 2024). Similarly, lower ETRs at the top of the firm size distribution may give a

competitive edge to the largest firms versus their smaller competitors. Reduced ETRs for top firms may also affect the income distributions. In general, corporate taxation enhances tax progressivity, as firms' profits accrue disproportionately to rich individuals, and the corporate income tax acts as a backstop against evasion of personal income taxes (Del Carmen et al., 2024). Yet, corporate income taxes are also, in part, passed through to workers via lower wages (Suárez Serrato and Zidar, 2016; Fuest et al., 2018). The distributional implications of our findings are thus complex and depend on the concentration of ownership and employment across the firm size distribution.

Our findings may also be consistent with obstacles to tax policy implementation. It is unclear, for instance, whether the ETR drop at the top is due to differential take-up of incentives across firm size or due to an intended targeting of the policy to large firms. If it is the former, then our results suggest that small and medium enterprises struggle to access tax credits, some of which may stimulate welfare-desirable behaviors such as R&D spending or greening production. This matters as evidence suggests that the effectiveness of tax incentives may be inversely related to firm size (Appelt et al., 2020).

Over a quarter of the largest 1% of firms in our 16 countries face ETRs below 15%, the minimum rate under the GMT. The distinction between tax havens and high-tax countries is hence murkier than often described. Despite having moderate to high statutory tax rates, non-haven countries may allow low effective tax rates on (specific) firms. These countries would have an incentive to reform their tax expenditures following the GMT implementation. We simulate small to modest revenue gains from the GMT, in contrast to larger gains from a simple domestic minimum tax. These estimates might be the best available for some countries, but can be improved on several margins. First, the tax data by itself typically does not allow the precise identification of which firms fall under the scope of the GMT. Relying on the CbCR micro data, which is hitherto unutilized in our sample countries, could improve the accuracy of the estimation. Second, once tax expenditures are reduced, firms might adjust their economic activity, their tax evasion strategy, and shift profits back to their headquarter countries. These behavioral responses, which our static simulations ignore, could further lower the tax gains from the GMT. Another revenue-reducing response could take the form of increased consolidation of firms into groups to lower overall tax liabilities. Third, several general equilibrium effects could occur. By curbing profit shifting, the GMT could raise revenues in most non-tax-haven countries, and firms with some real activity in

tax havens might relocate to non-haven countries (for real activity to complement profit shifting, see Ferrari et al. (2022) and Davies and Scheuerer (2024)). On the other hand, the GMT could also reduce activity and taxable profits in high tax countries if firms reduce investments at home as a result of increased effective tax rates (Suárez Serrato, 2022). These effects will crucially depend on the uncertain implementation of the GMT, including the number of countries that will ratify it, the quality of enforcement, and the development of tax strategies to escape it.

References

Adhikari, Ajay, Chek Derashid, and Hao Zhang, "Public policy, political connections, and effective tax rates: Longitudinal evidence from Malaysia," *Journal of Accounting and Public policy*, 2006, *25* (5), 574–595.

Appelt, Silvia, Matej Bajgar, Chiara Criscuolo, and Fernando Galindo-Rueda, *The Effects of R&D Tax Incentives and Their Role in the Innovation Policy Mix: Findings from the OECD MicroBeRD Project, 2016-19*, OECD Publishing, 2020.

Bachas, Pierre, Anne Brockmeyer, Pablo Garriga, and Camille Semelet, "The Impact of COVID-19 on Formal Firms: Lessons from Administrative Tax Data," 2024. Working Paper.

_ , Roberto N Fattal Jaef, and Anders Jensen, "Size-dependent tax enforcement and compliance: Global evidence and aggregate implications," *Journal of Development Economics*, 2019, *140*, 203–222.

Badertscher, Brad A., Sharon P. Katz, Sonja Olhoft Rego, and Ryan J. Wilson, "Conforming Tax Avoidance and Capital Market Pressure," *The Accounting Review*, 11 2019, *94* (6), 1–30.

Baraké, Mona, Paul-Emmanuel Chouc, Theresa Neef, and Gabriel Zucman, "Revenue Effects of the Global Minimum Tax Under Pillar Two," *Intertax*, 2022, *50*, 689–710.

Basri, M Chatib, Mayara Felix, Rema Hanna, and Benjamin A Olken, "Tax administration versus tax rates: Evidence from corporate taxation in Indonesia," *American Economic Review*, 2021, *111* (12), 3827–3871.

Beer, Sebastian, Ruud de Mooij, and Li Liu, "International corporate tax avoidance: A review of the channels, magnitudes, and blind spots," *Journal of Economic Surveys*, 2020, *34* (3), 660–688.

Best, Michael, Mazhar Waseem, and Jawad Shah, "Detection Without Deterrence: Long-Run Effects of Tax Audit on Firm Behavior," Technical Report 2022. Working Paper.

Bilicka, Katarzyna, "Comparing UK Tax Returns of Foreign Multinationals to Matched Domestic Firms," *American Economic Review*, August 2019, *109* (8), 2921–53.

Blouin, Jennifer and Leslie A Robinson, "Double counting accounting: How much profit of multinational enterprises is really in tax havens?," *Available at SSRN 3491451*, 2020.

Boukal, Tomáš, Petr Janský, Niels Johannesen, and Miroslav Palanský, "Global Minimum Tax and Profit Shifting: Evidence from Administrative Data," 2024. Working Paper.

Buettner, Thiess, Michael Overesch, Ulrich Schreiber, and Georg Wamser, "The impact of thin-capitalization rules on the capital structure of multinational firms," *Journal of Public Economics*, 2012, *96* (11-12), 930–938.

Carmen, Giselle Del, Santiago Garriga, Wilman Nuñez, and Thiago Scot, "Two decades of top income shares in Honduras," Technical Report, The World Bank 2024.

Clifford, Sarah, "Taxing multinationals beyond borders: Financial and locational responses to CFC rules," *Journal of Public Economics*, 2019, *173*, 44–71.

Cobham, Alex, Tommaso Faccio, Javier Garcia-Bernardo, Petr Janský, Jeffery Kadet, and Sol Picciotto, "A Practical Proposal to end Corporate Tax Abuse: METR, a Minimum Effective Tax Rate for Multinationals," *Global Policy*, 2021, *13*, 18–33.

Cristea, Anca D and Daniel X Nguyen, "Transfer pricing by multinational firms: New evidence from foreign firm ownerships," *American Economic Journal: Economic Policy*, 2016, *8* (3), 170–202.

Davies, Ron and Johannes Scheuerer, "Tax Haven Usage and Employment Reallocations: Evidence from Norway," Technical Report, Mimeo 2024.

Davies, Ronald B., Julien Martin, Mathieu Parenti, and Farid Toubal, "Knocking on Tax Haven's Door: Multinational Firms and Transfer Pricing," *The Review of Economics and Statistics*, 03 2018, *100* (1), 120–134.

Desai, Mihir A, C Fritz Foley, and James R Hines Jr, "A multinational perspective on capital structure choice and internal capital markets," *The Journal of finance*, 2004, *59* (6), 2451–2487.

Devereux, Michael P, "International tax competition and coordination with a global minimum tax," *National Tax Journal*, 2023, *76* (1), 145–166.

_ and Rachel Griffith, "The taxation of discrete investment choices," Technical Report, IFS working papers 1998.

_ and _ , "Evaluating tax policy for location decisions," *International tax and public finance*, 2003, *10*, 107–126.

_ , Francois Bares, Sarah Clifford, Judith Freedman, Irem Güçeri, Martin McCarthy, Martin Simmler, and John Vella, "The OECD Global Anti-Base Erosion Proposal," *PwC report, Oxford University Centre for Business Taxation*, 2020, *1*.

Dischinger, Matthias and Nadine Riedel, "Corporate taxes and the location of intangible assets within multinational firms," *Journal of Public Economics*, 2011, *95* (7-8), 691–707.

Dyreng, Scott D., Michelle Hanlon, Edward L. Maydew, and Jacob R. Thornock, "Changes in corporate effective tax rates over the past 25 years," *Journal of Financial Economics*, 2017, *124* (3), 441–463.

Egger, Peter H and Georg Wamser, "The impact of controlled foreign company legislation on real investments abroad. A multi-dimensional regression discontinuity design," *Journal of Public Economics*, 2015, *129*, 77–91.

_ , Nora M Strecker, and Benedikt Zoller-Rydzek, "Estimating bargaining-related tax advantages of multinational firms," *Journal of International Economics*, 2020, *122*, 103258.

Ferrari, Alessandro, Sébastien Lafitte, Mathieu Parenti, and Farid Toubal, "Profit Shifting Frictions and the Geography of Multinational Activity," 2022.

Fuest, Clemens, Andreas Peichl, and Sebastian Siegloch, "Do higher corporate taxes reduce wages? Micro evidence from Germany," *American Economic Review*, 2018, *108* (2), 393–418.

_ , Florian Hugger, and Florian Neumeier, "Corporate profit shifting and the role of tax havens: Evidence from German country by country reporting data," *Journal of Economic Behavior Organization*, 2022.

Garcia-Bernardo, Javier and Petr Janskỳ, "Profit shifting of multinational corporations worldwide," *World Development*, 2024, *177*, 106527.

_ , **Petr Janský, and Thomas Tørsløv**, "Decomposing Multinational Corporations' Declining Effective Tax Rates," *IMF Economic Review*, 2022, *70* (2), 338–381.

Gauß, Patrick, Michael Kortenhaus, Nadine Riedel, and Martin Simmler, "Leveling the playing field: Constraints on multinational profit shifting and the performance of national firms," *Journal of Public Economics*, 2024, *234*, 105116.

Graham, John R, Jana S Raedy, and Douglas A Shackelford, "Research in accounting for income taxes," *Journal of Accounting and Economics*, 2012, *53* (1-2), 412–434.

Gumpert, Anna, Jr. Hines James R., and Monika Schnitzer, "Multinational Firms and Tax Havens," *The Review of Economics and Statistics*, 10 2016, *98* (4), 713–727.

Hanappi, Tibor and Ana Cinta González Cabral, "The impact of the international tax reforms under Pillar One and Pillar Two on MNE's investment costs," *International Tax and Public Finance*, 2022, *29* (6), 1495–1526.

Haufler, Andreas and Hayato Kato, "A Global Minimum Tax for Large Firms Only: Implications for Tax Competition," *arXiv preprint arXiv:2404.14302*, 2024.

Hebous, Shafik and Michael Keen, "Pareto-improving minimum corporate taxation," *Journal of Public Economics*, 2023, *225*, 104952.

_ **and Niels Johannesen**, "At your service! The role of tax havens in international trade with services," *European Economic Review*, 2021, *135*, 103737.

Hindriks, Jean and Yukihiro Nishimura, "The compliance dilemma of the global minimum tax," Technical Report, Université catholique de Louvain, Center for Operations Research 2022.

Hoppes, Jeffrey, Patrick Langetieg, Edward Maydew, and Michele Mullaney, "Is Tax Planning Best Done in Private?," Technical Report 2020. Working Paper.

Hugger, Felix, Ana Cinta Gonzalez Cabral, and Pierce O'Reilly, "Effective tax rates of MNEs: New evidence on global low-taxed profit," *OECD Taxation Working Papers*, 2023, (67).

_ , _ , **Massimo Bucci, Maria Gesualdo, and Pierce O'Reilly**, "The Global Minimum Tax and the taxation of MNE profit," *OECD Taxation Working Papers*, 2024, (68).

Janeba, Eckhard and Guttorm Schjelderup, "The global minimum tax raises more revenues than you think, or much less," *Journal of International Economics*, 2023, *145*, 103837.

Janský, Petr, "Corporate Effective Tax Rates for Research and Policy," *Public Finance Review*, 2022, *0* (0), 10911421221137203.

Jr, James R Hines, "Evaluating tax harmonization," Technical Report, National Bureau of Economic Research 2024.

Karkinsky, Tom and Nadine Riedel, "Corporate taxation and the choice of patent location within multinational firms," *Journal of international Economics*, 2012, *88* (1), 176–185.

Klemm, Alexander, "Causes, benefits, and risks of business tax incentives," *International Tax and Public Finance*, 2010, *17* (3), 315–336.

Lazăr, Sebastian, "Determinants of the variability of corporate effective tax rates: Evidence from Romanian listed companies," *Emerging Markets Finance and Trade*, 2014, *50* (sup4), 113–131.

Liu, Li, Tim Schmidt-Eisenlohr, and Dongxian Guo, "International transfer pricing and tax avoidance: Evidence from linked trade-tax statistics in the United Kingdom," *Review of Economics and Statistics*, 2020, *102* (4), 766–778.

Martin, Julien, Mathieu Parenti, and Farid Toubal, "Corporate tax avoidance and sales: micro evidence and aggregate implications," 2023.

Mascagni, Giulia, Nara Monkam, and Christopher Nell, "Unlocking the potential of administrative data in Africa: Tax compliance and progressivity in Rwanda," 2016.

Mooij, Ruud De and Li Liu, "At a cost: The real effects of transfer pricing regulations," *IMF Economic Review*, 2020, *68*, 268–306.

_ **and** _ , "At a cost: The real effects of thin capitalization rules," *Economics Letters*, 2021, *200*, 109745.

Nicodème, Gaetan, "Sector and size effects on effective corporate taxation," 2002.

OECD, "Tax challenges arising from digitaliization, economic impact assessment," Technical Report 2020. Report.

_ , *Tax Incentives and the Global Minimum Corporate Tax* 2022.

Pomeranz, Dina and José Vila-Belda, "Taking state-capacity research to the field: Insights from collaborations with tax authorities," *Annual Review of Economics*, 2019, *11*, 755–781.

Redonda, Agustin, Christian von Haldenwang, and Flurim Aliu, "Global Tax Expenditures Database (GTED)," March 2022.

Serrato, Juan Carlos Suárez, "Unintended Consequences of Eliminating Tax Havens,," *R&R, American Economic Review*, 2022.

_ **and Owen Zidar**, "Who benefits from state corporate tax cuts? A local labor markets approach with heterogeneous firms," *American Economic Review*, 2016, *106* (9), 2582–2624.

Slemrod, Joel, "Tax Compliance and Enforcement," *Journal of Economic Literature*, December 2019, *57* (4), 904–54.

Tørsløv, Thomas, Ludvig Wier, and Gabriel Zucman, "The Missing Profits of Nations," *The Review of Economic Studies*, 07 2022, (0), 1–36. rdac049.

Tørsløv, Thomas R, Ludvig S Wier, and Gabriel Zucman, "Externalities in International Tax Enforcement: Theory and Evidence," Technical Report, National Bureau of Economic Research 2020.

Wamser, Georg, "The impact of thin-capitalization rules on external debt usage–a propensity score matching approach," *Oxford Bulletin of Economics and Statistics*, 2014, *76* (5), 764–781.

Wier, Ludvig, "Tax-motivated transfer mispricing in South Africa: Direct evidence using transaction data," *Journal of Public Economics*, 2020, *184*, 104153.

_ **and Hayley Erasmus**, "The dominant role of large firms in profit shifting," *IMF Economic Review*, 2023, *71* (3), 791–816.

Wier, Ludvig S and Gabriel Zucman, "Global profit shifting, 1975-2019," Technical Report, National Bureau of Economic Research 2022.

Wu, Wenfeng, Chongfeng Wu, Chunyang Zhou, and Jun Wu, "Political connections, tax benefits and firm performance: Evidence from China," *Journal of Accounting and Public policy*, 2012, *31* (3), 277–300.

7 Tables and Figures

Table 1: Descriptive Statistics on Countries and Data

(1) Country (ISO Code)	(2) Year	(3) GDP pc (const. 2010 US$)	(4) Nbr. of Firms	(5) Avg. Turnover (Thousand $)	(6) Profits>0 (%)	(7) Max Statutory Tax Rate (%)	(8) Avg. ETR (%) All/Prof. firms
Albania (ALB)	2015-2019	4,543.4	19,237	1,146.5	80.7	15	9.4/11.6
Colombia (COL)	2020-2022	6,836.2	404,062	1,491.7	85.3	35	20.1/23.5
Costa Rica (CRI)	2018-2019	12,662.4	64,438	1,320.4	80.7	30	14.6/18.1
Dominican Rep. (DOM)	2006-2015	6,838.9	38,028	1,785.3	64.8	27	15.5/24
Ecuador (ECU)	2014-2019	5,863.9	48,477	2,107.9	77.0	28	15.8/20.5
Eswatini (ESW)	2013-2018	3,696.4	3,805	1,050.9	66.9	27.5	14.2/21.3
Ethiopia (ETH)	2010-2016	671.3	15,037	2,167.4	70.3	30	17.5/24.9
Greece (GRC)	2012-2018	18,647.5	70,915	3,865.3	58.8	29	12.9/21.9
Guatemala (GTM)	2006-2019	4,263.7	22,994	3,133.0	67.1	25	16.4/24.4
Honduras (HND)	2014-2019	2,443.9	23,706	1,498.2	74.6	25	20.9/25.5
Jamaica (JAM)	2018-2019	5,307.5	10,408	2,635.7	50.9	25	8.8/17.4
Mexico (MEX)	2010-2015	10,098.2	390,043	3,205.6	52.8	30	14.4/26.9
Rwanda (RWA)	2010-2017	769.3	5,306	1,070	74.8	30	20.8/27.8
Senegal (SEN)	2007-2018	1,384.6	5,732	3,641.8	59	30	15.9/26.9
South Africa (ZAF)	2014-2019	6,188.7	237,438	3,178.9	67.7	28	8.1/12.0
Uganda (UGA)	2015-2019	922.0	16,083	587.0	62.6	30	13.8/22.1

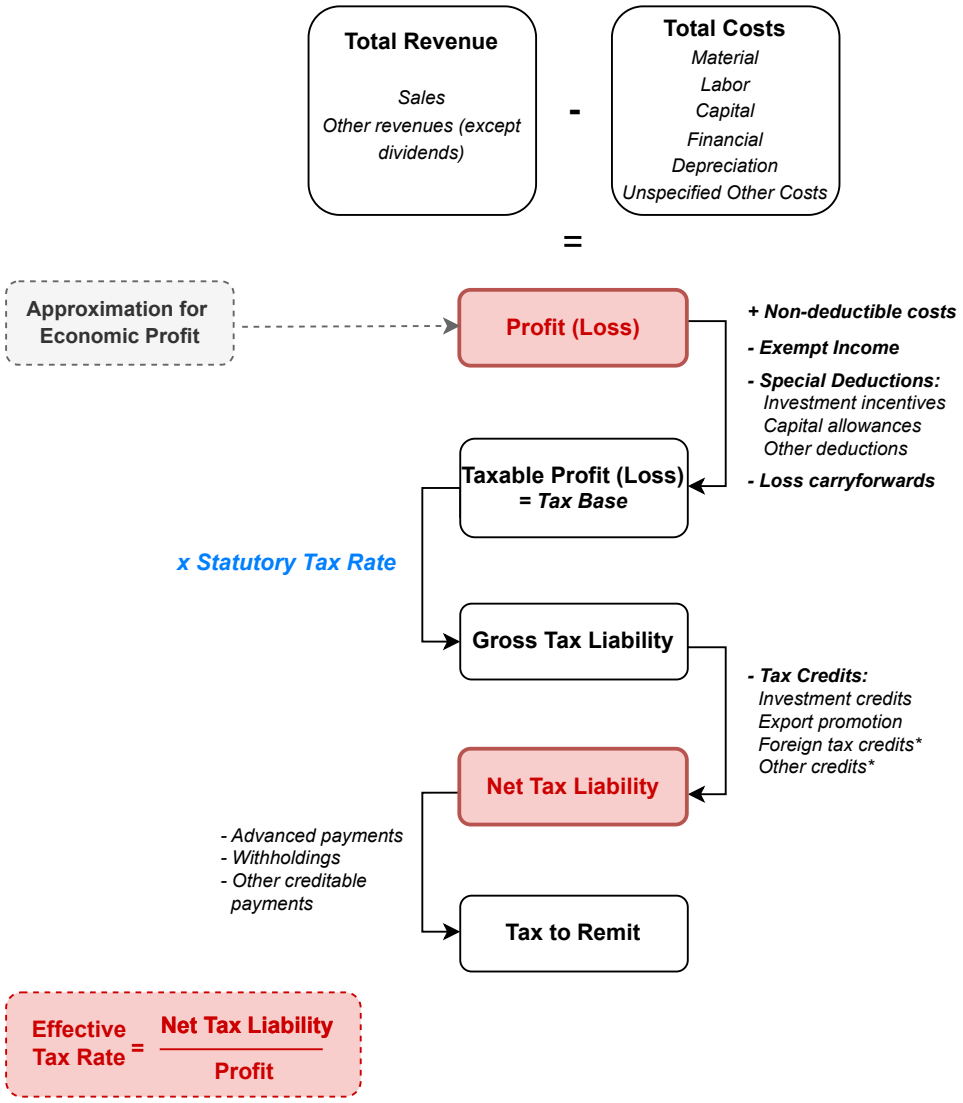
Note: This table presents summary statistics on firms in the 16 countries in our data. All statistics are from administrative corporate tax records, except for the GDP per capita (column 4) which is from the World Development Indicators. Column 2 shows the years available in the data for each country. We use the most recent year to compute metrics shown in columns 3 to 8. The effective tax rate (ETR) can be larger than the statutory tax rate due to the reintegration of non-taxable deductions in the profit definition (see Figure 1). Appendix C provides additional details on each country's corporate tax system. Additional country level data is provided in Table A.2. This table is discussed in Sections 2.1 and 2.2.

Table 2: Explaining the Relationship Between Effective Tax Rates and Firm Size Within the Top Decile of Firm Size

	Outcome: Effective Tax Rate							
	Baseline	+ Controls for firm characteristics	+ Dummies indicating use of tax expenditures					
Specification:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regressor: Dummy Top 1% (unweighted cross-country average of country-specific point estimates)	-2.21	-1.45	-2.17	-1.86	-1.98	-2.00	-1.52	-0.56
N countries with negative point estimate	14	12	14	14	12	12	13	7
N countries where lower one-sided t-test rejects null	10	8	10	10	8	9	8	4
N countries	16	16	16	16	16	16	16	16
Controls:								
Firm characteristics		×						×
Reduced rate dummy			×					×
Exempt income dummy				×				×
Special deduction dummy					×			×
Re-timing dummy						×		×
Tax credits dummy							×	×

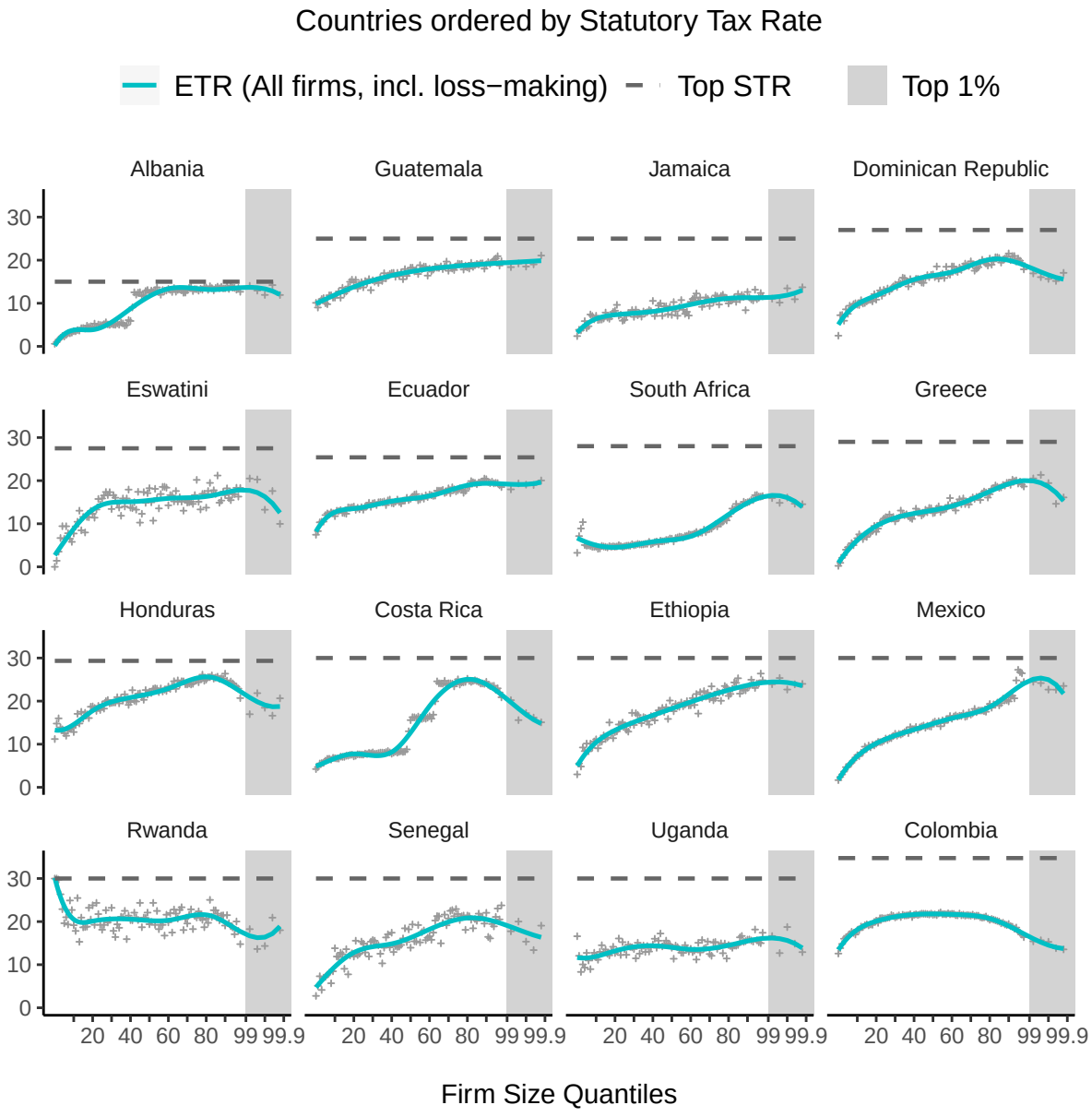
Note: This table presents regression results analyzing the drivers of the ETR-firm-size relationship among firms in the top decile of the firm-size distribution. The sample is restricted to firms within the top size decile only (revenue percentile 90 and above), so we focus on the decreasing part of the relationship between ETR and firm size. We focus on profitable firms, holding the size percentile fixed based on the full sample. We regress the ETR on a dummy tagging firms in the top one percentile of the firm-size distribution (Dummy Top 1%, equation 1). Column 1 only includes the Top 1% dummy. Column 2 controls for firm characteristics (sector dummies, capital city and location dummy, foreign ownership dummy, and firm age) where this information is available. In columns 3 to 7, we control one by one for dummy variables indicating whether or not the firm made use of each of the different tax provisions that can explain the ETR slope. In the first row of the table, we report the unweighted average of the β_1 coefficients on the top 1% dummy across countries. The second row reports the number of countries for which the coefficient is negative, and the third row reports the number of countries for which a one-sided t-test rejects the null hypothesis that the coefficient is zero at a 5% significance level. Table A.5 displays the same results but focusing on firms in deciles 1-9 of the size distribution. Country-specific coefficients are detailed in Table A.7 and robustness to different choices for the main regressor (indicator for largest firms) is shown in Table A.6. See Table A.8 for details on available tax provisions by country. This table is discussed in Section 3.4.

Figure 1: Key Concepts and Variables



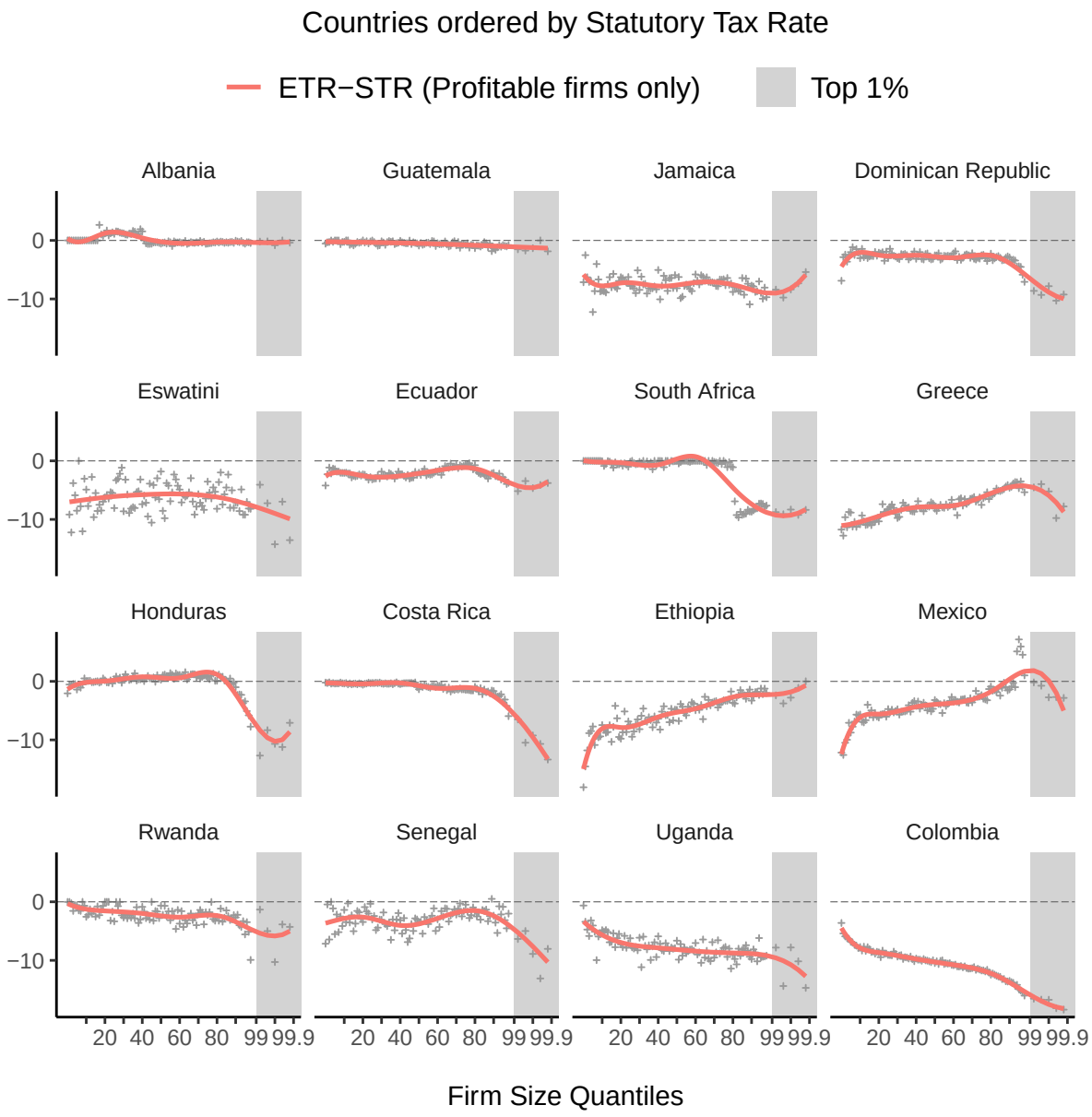
Note: This figure presents the key fiscal concepts and variables used in this study, constructed in a harmonized way in 16 countries. All costs are deducted from revenue to derive the profit/loss concept which we use to compute the effective tax rate. As the denominator in our ETR measure, we use the net tax liability, which is the annual amount in corporate income tax due. For loss-making firms, the ETR is set to zero. This figure is discussed in Section 2.2.
* Foreign tax credits and other credits could be pre-payments instead of tax credits. In Figure A.8 we recompute the ETR without considering them as tax credit, i.e. they are not deducted from the gross tax liability.

Figure 2: Effective Tax Rates and Firm Size, All Firms



Note: This figure shows effective tax rates (ETRs) as a function of firm-size quantiles, for all 16 countries in our data. The gray crosses show the average ETR at each quantile. Loss-making firms are assigned a zero ETR. The blue line is a cubic smoothing spline with six knots, estimated using the R function ggformula::geom_spline. Firm-size quantiles (x-axis) are based on firms' revenue. The quantiles correspond to percentiles between the 1st and 99th percentile (white area), and to 0.2% bins between the 99th and 100th percentiles (gray shaded area). Figure A.3 replicates this figure, focusing on profitable firms only. This figure is discussed in Section 3.2.

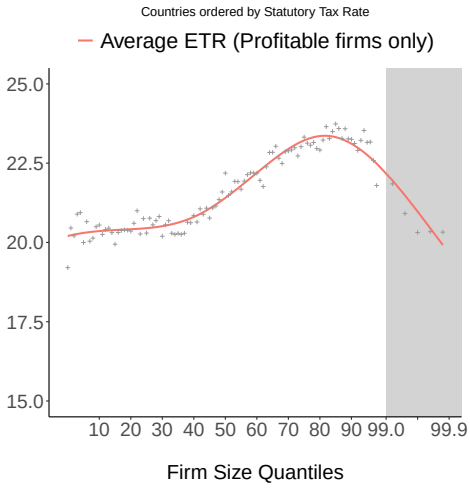
Figure 3: Effective Tax Rate Minus Statutory Tax Rate, Profitable Firms



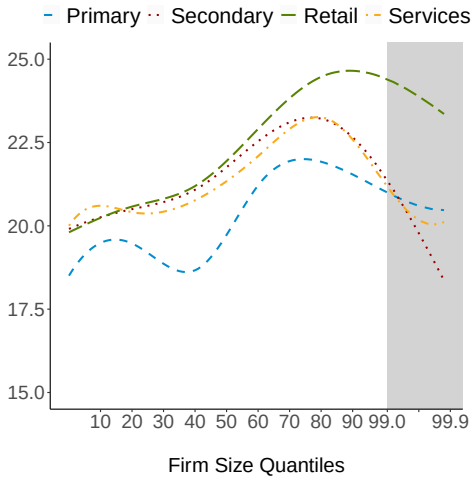
Note: This figure shows the difference between the ETR and the statutory tax rate (STR) as a function of firm-size quantiles, for all 16 countries in our data. The gray crosses show the average ETR-STR difference for each quantile. We include only profitable firms. The orange line is a cubic smoothing spline with six knots, estimated using the R function ggformula::geom_spline. Firm-size quantiles (x-axis) are based on firms' revenue. The quantiles correspond to percentiles between the 1st and 99th percentile (white area), and to 0.2% bins between the 99th and 100th percentiles (gray shaded area). This Figure is discussed in Section 3.2.

Figure 4: Effective Tax Rates and Firm Size: Robustness

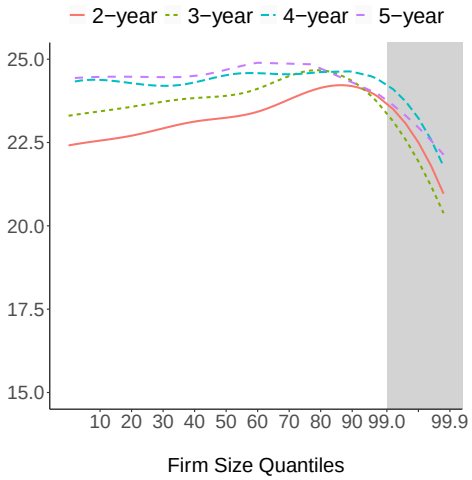
(a) Cross-Country Average ETR



(b) ETR by Sector



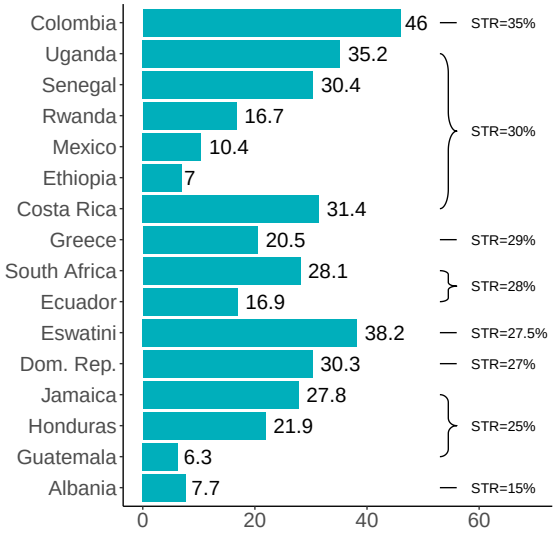
(c) Lifetime ETR



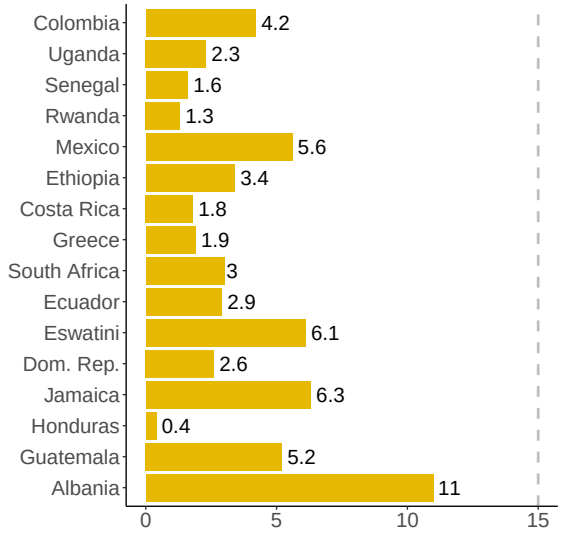
Note: These figures present robustness tests for the ETR-firm-size relationship. Panel (a) serves as a benchmark, presenting the average ETR by firm size for profitable firms. We take the average across countries (in Figure A.3) for each quantile, weighing countries equally, and then obtain the fit over quantiles with a cubic smoothing spline with six knots. Panel (b) shows the average ETR-firm-size relationship across countries for four large sector groups: agriculture (primary), industry and construction (secondary), retail, and services. Panel (c) presents a multi-year measure of the ETR (from $N = 2$ to $N = 5$ years) where the ETR for firm i is $\sum_{n=1}^{N}(CIT_{i,n})/\sum_{n=1}^{N}(NetProfits_{i,n})$. By construction, the different lines in Panel (c) rely on different samples, as we can compute the N-year-ETR only for firms that are in the panel at least N-1 years before the most recent cross-section. All curves are cubic smoothing splines with six knots, estimated using the R function ggformula::geom_spline. The quantiles correspond to percentiles between the 1st and 99th percentile (white area), and to 0.2% bins between the 99th and 100th percentiles (grey shaded area). This figure is discussed in Section 3.3.

Figure 5: Scope and Tax Revenue Potential of a 15% Domestic Minimum Tax on the 1% Largest Firms

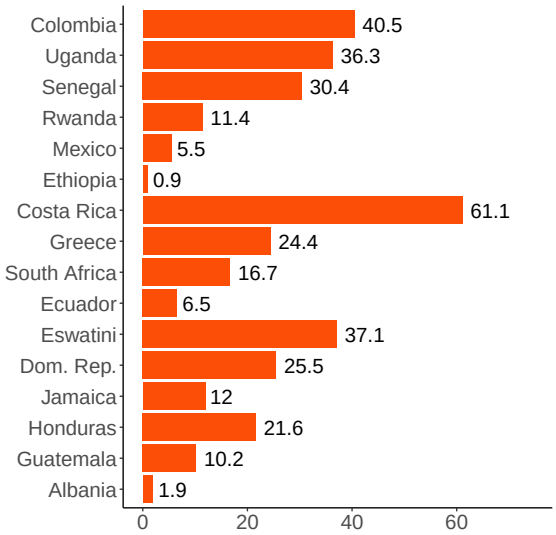
(a) Share of top 1% firms with ETR below 15%



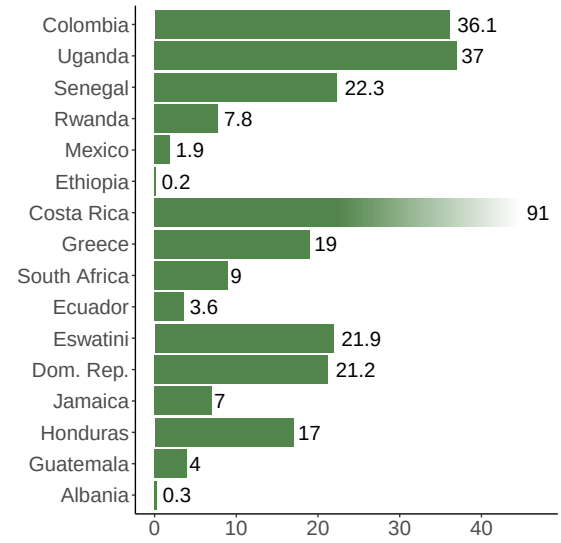
(b) Average ETR among these firms



(c) Profit of these firms (share of total)



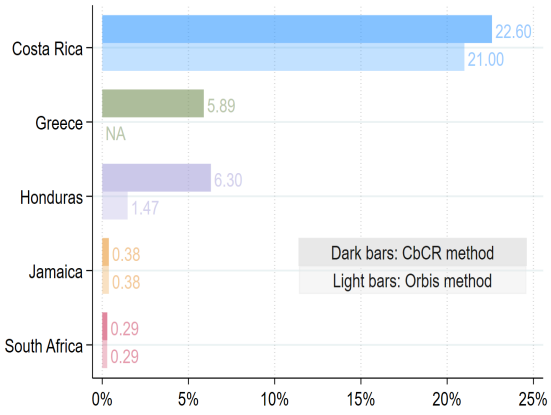
(d) Revenue increase (share of baseline CIT rev.)



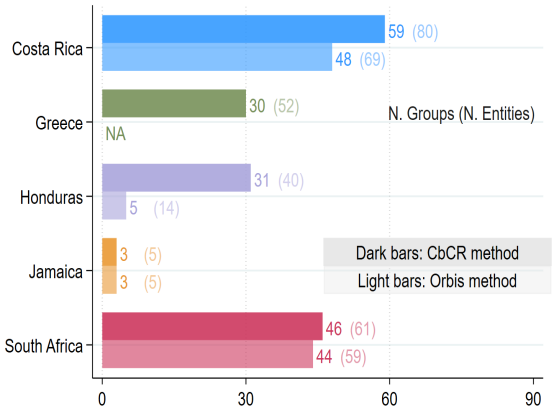
Note: Panel (a) shows the share of firms in the top 1% of the size (revenue) distribution that have an ETR below 15% in the most recent cross-section, focusing on profitable firms. Panel (b) shows the average ETR among profitable firms with an ETR below 15%, within the top 1% of firm size. Panel (c) plots the share of aggregate reported profits accounted for by profitable firms with an ETR below 15% within the top 1% of firm size. Panel (d) shows the hypothetical revenue gains from requiring all firms in the top 1% to pay an ETR of at least 15% (i.e. we simulate an ETR of 15% and the associated tax liability for profitable top 1% firms with an actual ETR below 15%), as a share of current CIT liabilities of all firms in the latest pre-COVID-19 cross-section. Figure A.9 shows the results when deferred tax assets, as defined in the global minimum tax rules, are taken into account. This figure is discussed in Section 4.2.

Figure 6: Global Minimum Top Up Tax Revenue Potential
Year 1 Carve-outs Scenario

(a) Increase in Corporate Tax Liability
(% of Aggregate CIT Revenue)



(b) Number of Entities & Groups
Liable for Top-Up Tax



Note: Dark bars indicate the CbCR method. Light bars indicate the Orbis method. Panel (a) shows the potential revenue gains from requiring the affected firms in each group to pay an ETR of at least 15% in a scenario with 10% payroll carve-outs and 8% tangible assets carve-outs (which are the carve-outs corresponding to the first year of the Global Minimum tax implementation). In Panel (b) bars refer to the number of groups that would be affected under that scenario. The numbers in parenthesis refer to the number of entities associated with such groups. Figure B2 shows that same results for the Year 10 Carve-outs Scenario. This figure is discussed in Section 5.3.

Figure 7: Global Minimum Tax Revenue Potential Under Different Scenarios
CbCR Method, % Increase in Aggregate CIT Revenue

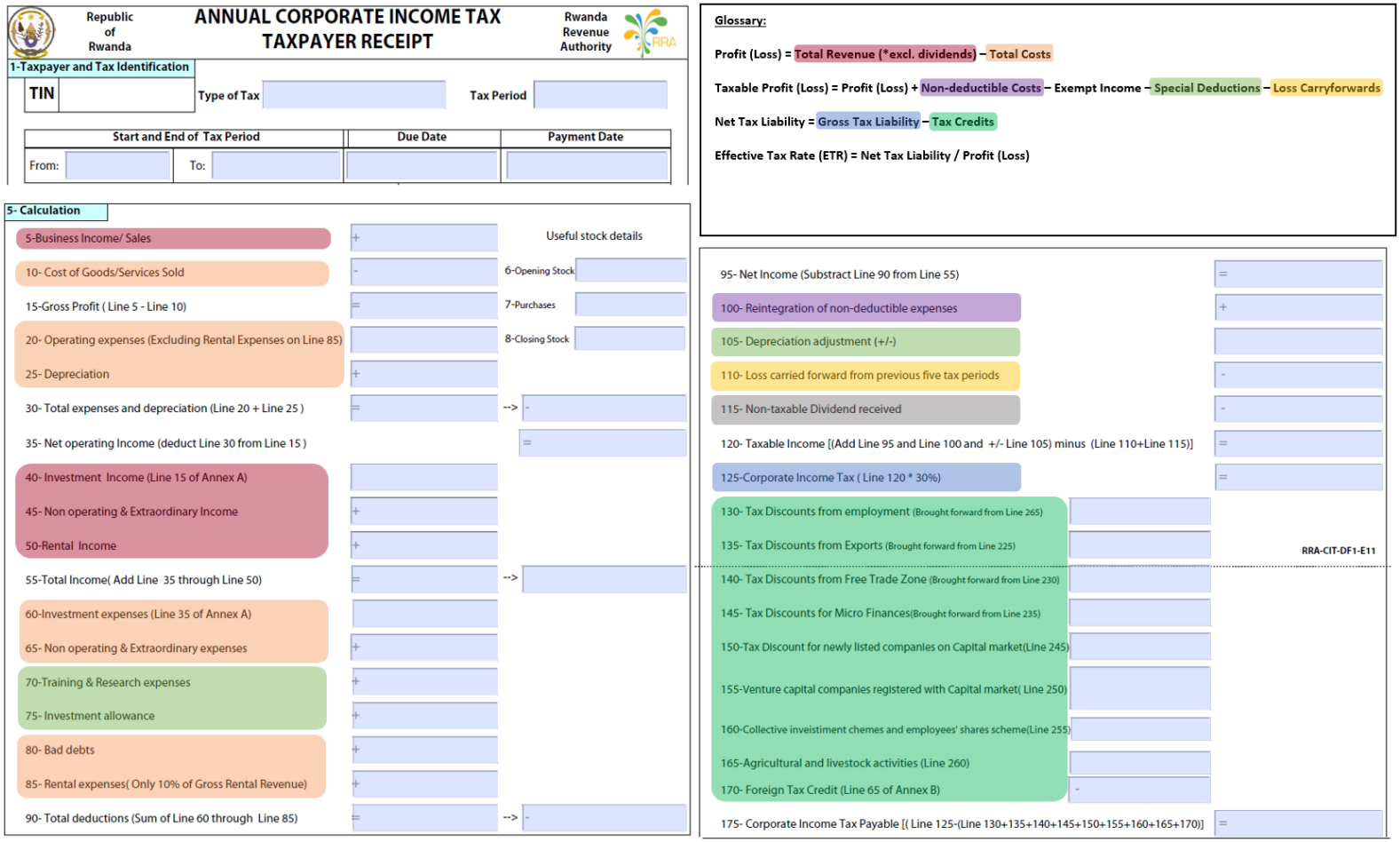
Note: This figure illustrates potential revenue gains from implementing a 15% minimum effective tax rate (ETR) across five scenarios. The first bar shows revenue gains from a scenario with only a de minimis exclusion and no carve-outs. The second one includes year 1 carve-outs (8% for tangible assets, 10% for payroll), while the third one uses year 10 carve-outs (5% for both). The fourth bar combines year 10 carve-outs with the possibility of using refundable credits to reduce tax liability. Finally, the last bar assumes a 20% minimum tax rate and year 10 carve-outs. This figure relies on the CbCR aggregate method to calculate the top-up tax, yielding an upper-bound on the revenue gains. See Figure B1, for the equivalent figure which relies on the Orbis lower-bound method. This figure is discussed in Section 5.3.

Appendix

Table of Contents

Appendix A: Effective Tax Rates Analysis - Additional Results

Figure A.1: Example of a Corporate Tax Return Form: Rwanda

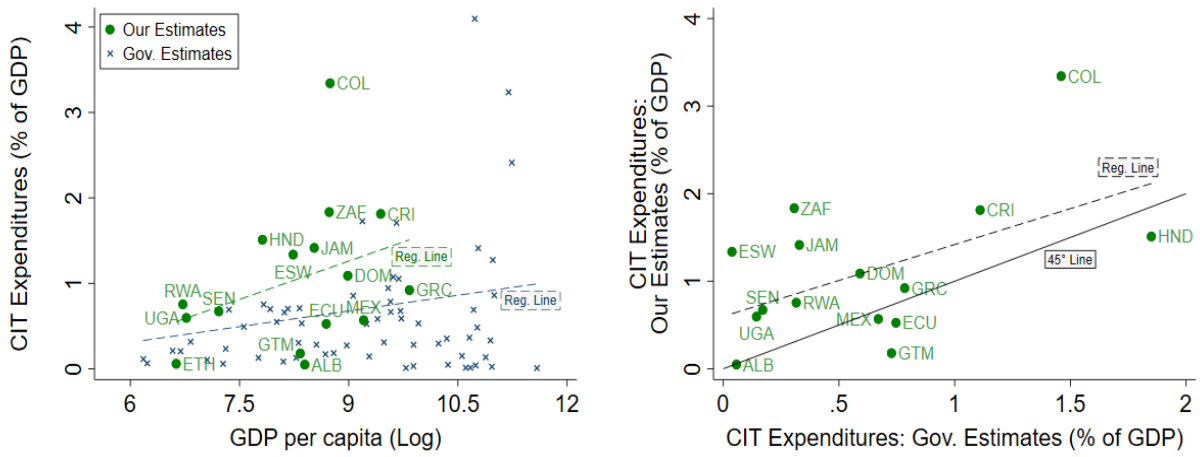


Note: This figure presents an example of the corporate tax return for Rwanda. Circled in color are the general concepts we use across countries, as described in Figure 1. We already exclude dividend income from total revenue, so we do not consider exempt dividend in our calculations (here line 115). This figure is discussed in Section 2.2.

Figure A.2: Corporate Tax Expenditures as a Share of GDP

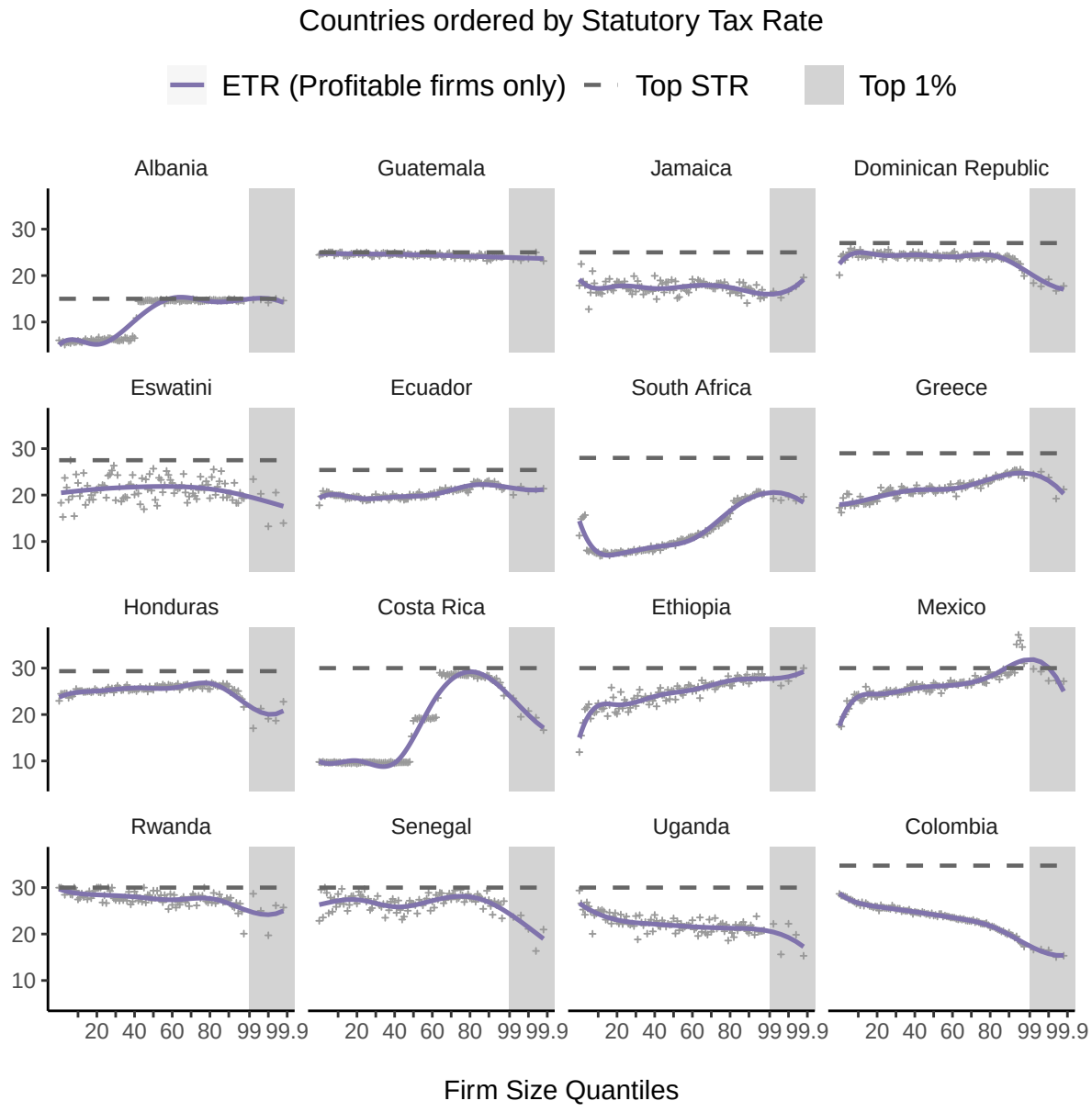
(a) Global Comparison:
CIT Expenditures vs. GDP per capita

(b) In-sample Comparison:
Our Estimates vs. Government Estimates



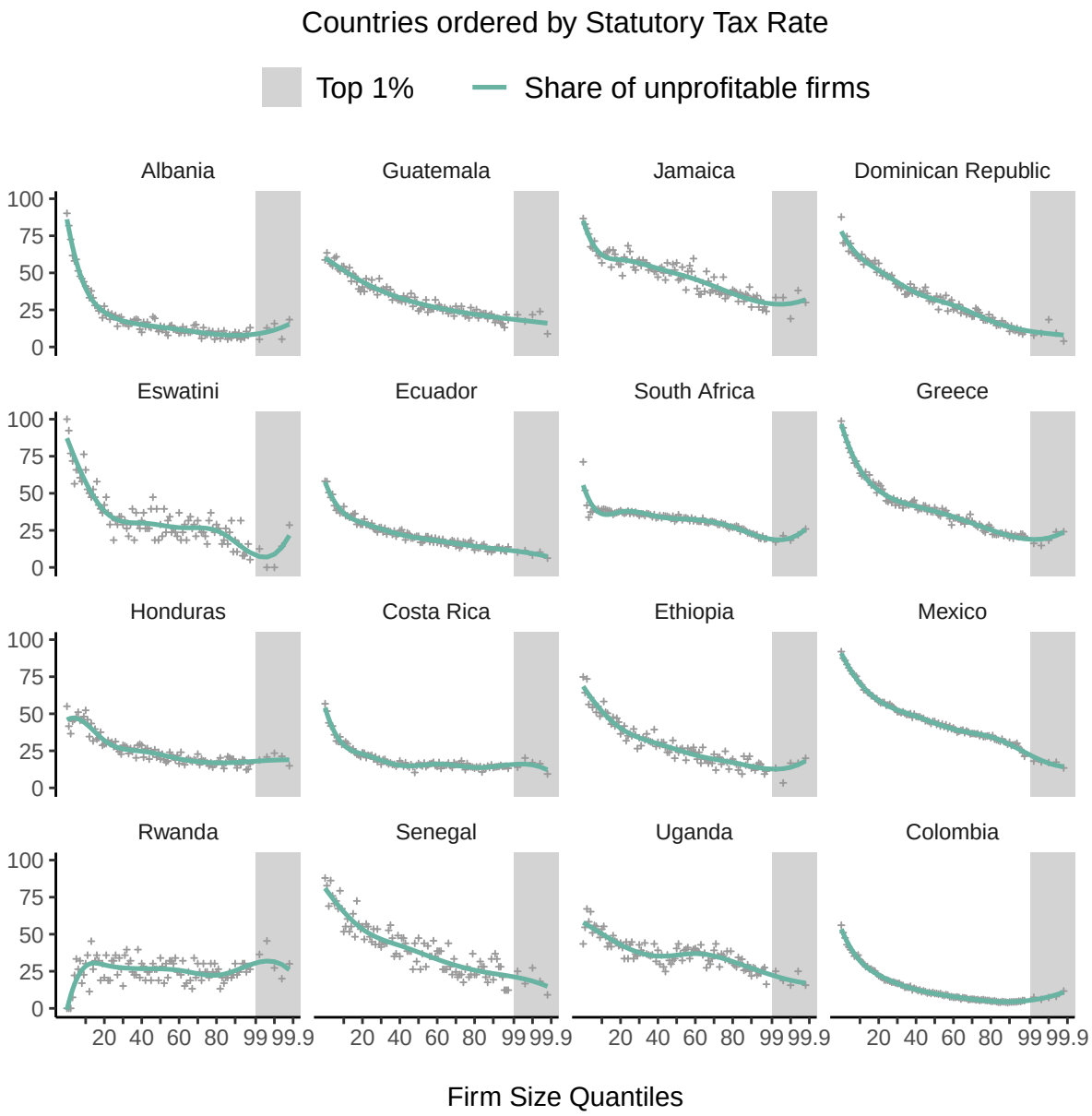
Note: This figure shows estimates for the size of corporate income tax expenditures as a share of countries' GDP per capita (2015 constant USD from the World Bank). Panel (a) shows our estimates for the 16 sample countries and estimates of CIT expenditures from 64 additional countries, available in the Global Tax Expenditure Dataset (GTED), for a total sample size of 80 countries. The latter comes from countries' official tax expenditure reports, which are based on international standards and should be completed yearly. In practice, countries do not systematically produce tax expenditure reports, and when they do, the methods vary significantly depending on each country's definition and statistical capacity. Panel (a) also includes two regression lines, one for each set of data points. The green dashed line results from regressing the CIT expenditure on the GDP per capita (slope 0.30, intercept -1.43) for the 16 countries in our sample. The navy dashed line represents the expanded estimate sample, including 64 additional countries (slope 0.12, intercept -0.43). For our sample countries, tax expenditures represent on average 1.04% of their GDP, compared to an average tax expenditure of 0.68% for the extended sample of 80 countries. Panel (b) shows the correlation between our estimates of tax expenditures, and government estimates, for the 15 sample countries where both are available (we miss government tax expenditure data for Ethiopia). The solid line is the 45-degree line. The dashed line represents the regression of our estimated CIT expenditures against the government's estimates (slope 0.82, intercept 0.60). The government estimates are based on GTED, with manual adjustments based on the country's original tax expenditure report where necessary, to include all relevant tax expenditures. To compute aggregate tax expenditures from our microdata, we first use the difference between the top statutory tax rate and the firm-specific ETRs multiplied by their profits to compute firm-level tax expenditures. We then aggregate these tax expenditures across firms, within country, and divide it by the sum of corporate tax liabilities, yielding a ratio of foregone CIT revenue to actual tax revenue. We multiply this ratio by the CIT collection as a share of GDP (using tax revenue data from Bachas et al. 2022) to obtain total tax expenditure as a share of GDP. This figure is discussed in Section 3.1.

Figure A.3: Effective Tax Rates and Firm Size, Profitable Firms



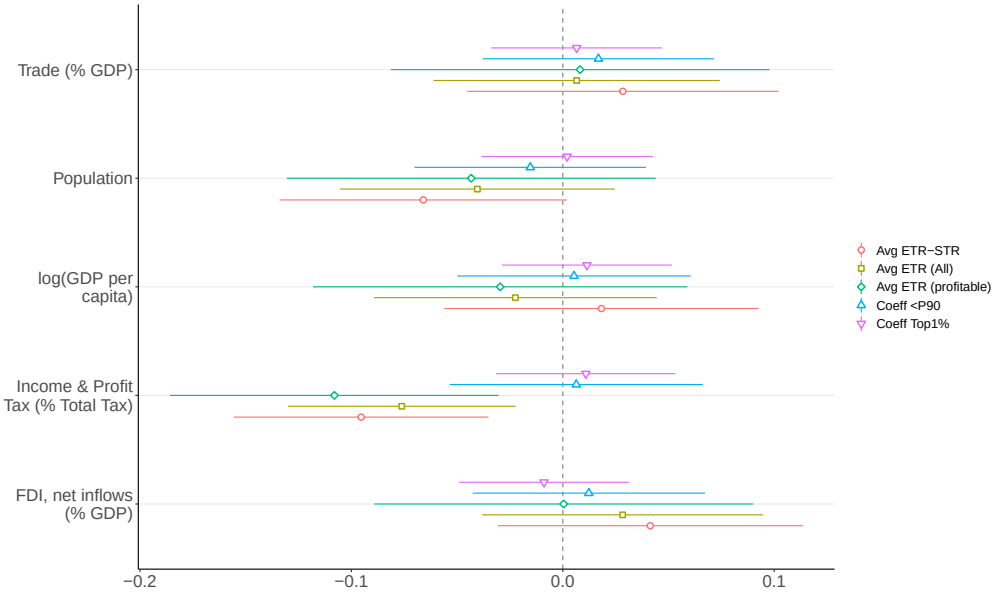
Note: This figure is identical to Figure 2 but focuses on profitable firms only. The figure shows effective tax rates (ETRs) as a function of firm-size quantiles, for all 16 countries in our data. Size quantiles are determined based on revenue in the full population of firms (including zero-profit and loss-making firms). The gray crosses show the average ETR at each quantile. The purple line is a cubic smoothing spline with six knots, estimated using the R function ggformula::geom spline. The quantiles correspond to percentiles between the 1st and 99th (white area), and to 0.2% bins between the 99th and 100th percentiles (gray shaded area). This figure is discussed in Section 3.2.

Figure A.4: Share of unprofitable firms



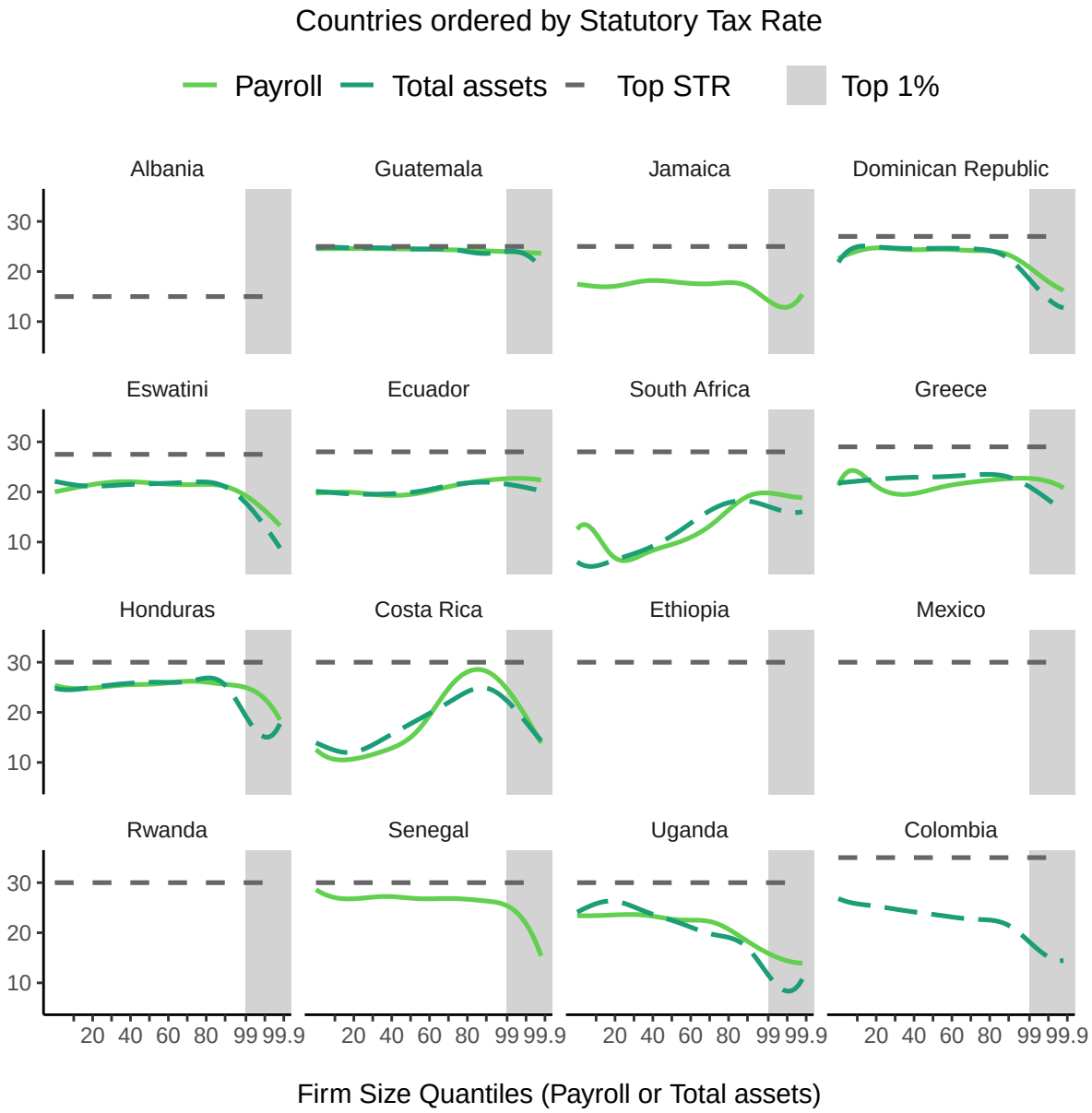
Note: This figure displays the share of unprofitable firms at each quantile, for all 16 countries in our data. The gray crosses show the share at each quantile, while the blue lines are cubic smoothing splines with six knots, estimated using the R function ggformula::geom spline. Firm-size quantiles(x-axis) are based on firms' revenue. The quantiles correspond to percentiles between the 1st and 99th percentile(white area), and to 0.2% bins between the 99th and 100th percentiles (gray shaded area). This figure is discussed in Section 3.2.

Figure A.5: Correlation of tax gaps and macro variables



Note: This figure displays the correlations across countries between selected economic variables and either the ETR or the regression coefficients on the dummy for the top 1% tax advantage or the slope of the firm-size-ETR relation for the bottomo 90% (from Tables 2 and A.5). We use macroeconomic indicators from World Development Indicators for each country, corresponding to the year of the data. The variables include: 1) total trade (% of GDP), 2) population, 3) logarithm of GDP per capita, 4) Taxes on income, profits and capital gains (% total taxes), and 5) Foreign direct investment, net inflows (% of GDP). To compare different measures, we first create standardized scores for each macroeconomic indicator across all countries in our sample: $(indicator - mean(indicator))/sd(indicator)$. We then regress those standardized scores on average ETRs (or on our regression coefficients) and plot the coefficients of interest. This figure is discussed in Section 3.2.

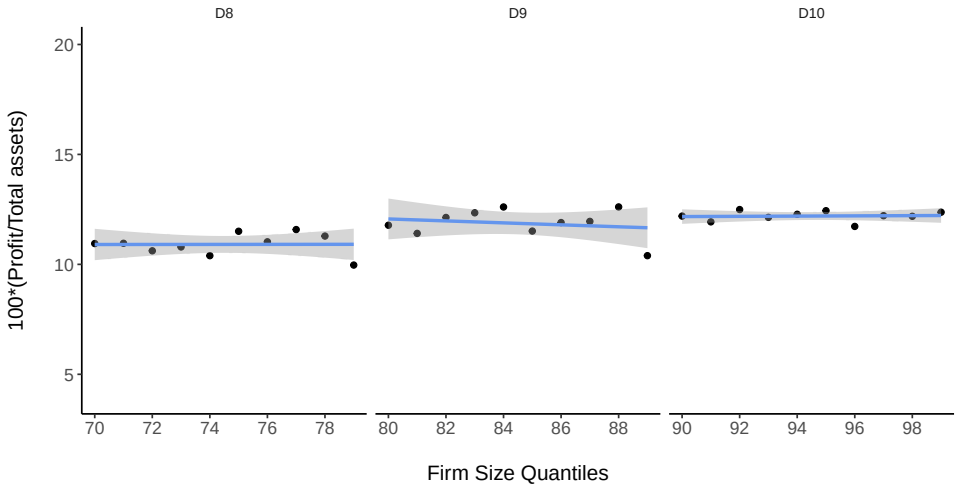
Figure A.6: Alternative Firm Size Measures: ETR by Percentiles of Payroll and Total Assets



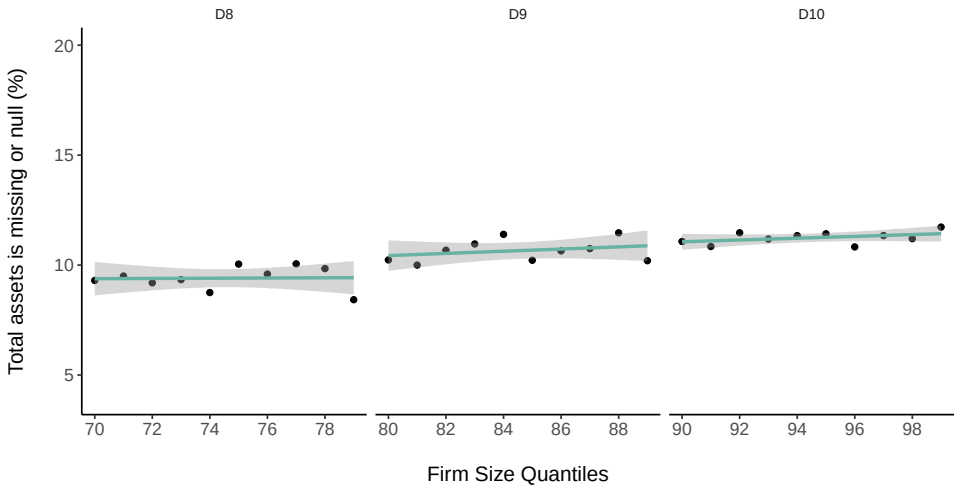
Note: This figure shows the effective tax rate by firm size (similar to Figure A.3), but uses firms' annual payroll (solid line) and total assets (dashed line) instead of revenue to construct firm-size quantiles (x-axis). Given the limited availability of those data, this can only be done for a sub-sample of countries. Across all firms, the average country correlation coefficient between revenue and payroll percentiles is 0.8, and the correlation coefficient between revenue and total assets percentiles is 0.7. The green lines are cubic smoothing splines with six knots, estimated using the R function ggformula::geom spline. The quantiles correspond to percentiles between the 1st and 99th (white area), and to 0.2% bins between the 99th and 100th percentiles (gray shaded area). This figure is discussed in Section 3.3.

Figure A.7: Correlation of Assets and Profits for the Top Deciles

(a) Correlation of Assets and Profits

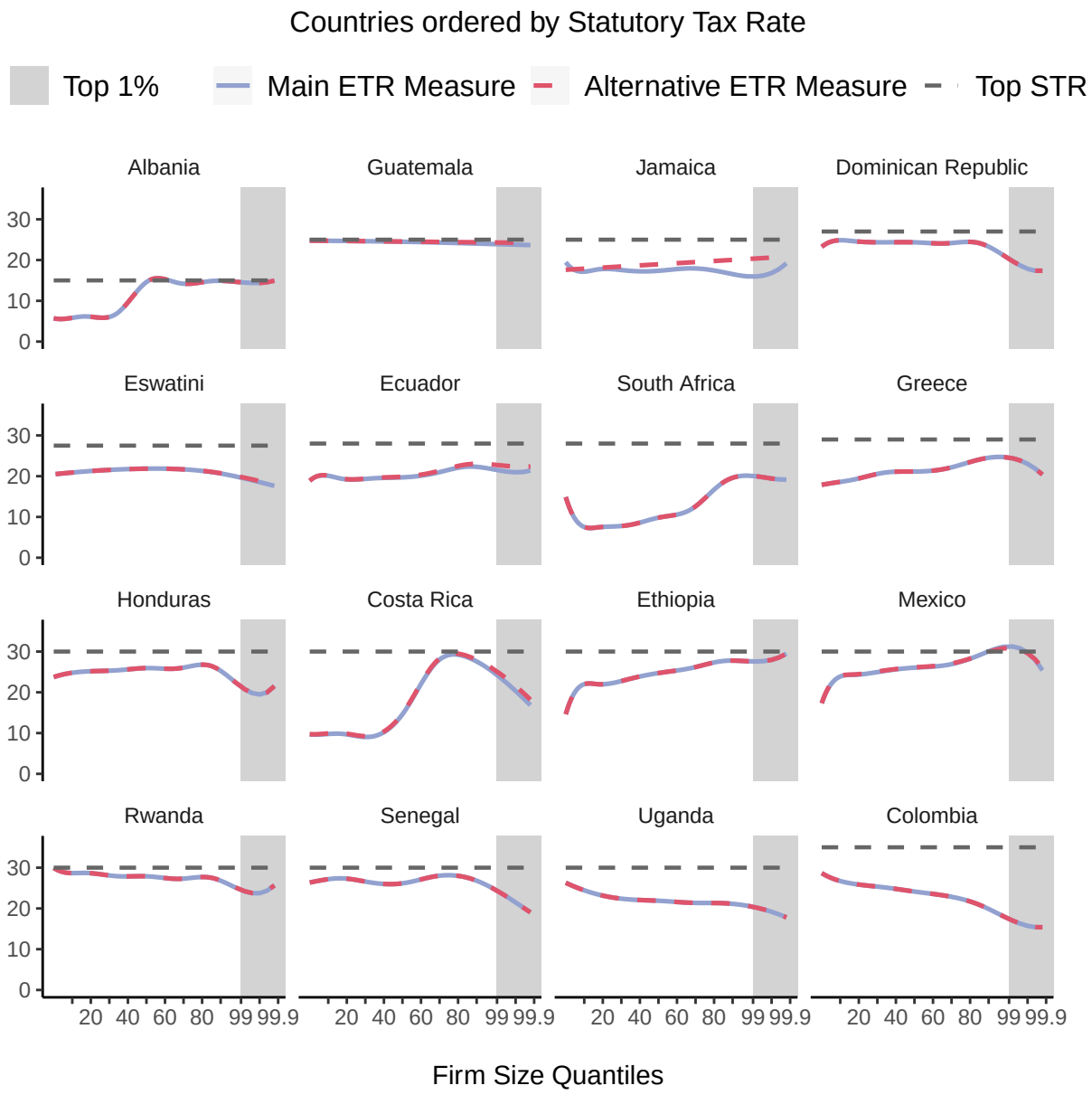


(b) Share of Firms with 0 or Missing Assets



Note: Panel (a) displays the mean ratio of profit over total assets for the percentiles of the top deciles (8, 9, and 10) of the firm size (revenue) distribution for all 16 sample countries. Panel (b) plots the mean share of firms for which assets is null or missing in the data, across our sample countries. Each panel includes a linear regression line that best fits to the data. This figure is discussed in Section 3.3.

Figure A.8: Effective Tax Rates and Firm Size
Alternative ETR Measure in Which Foreign Tax Credits Are Not Deducted from Net Tax Liability

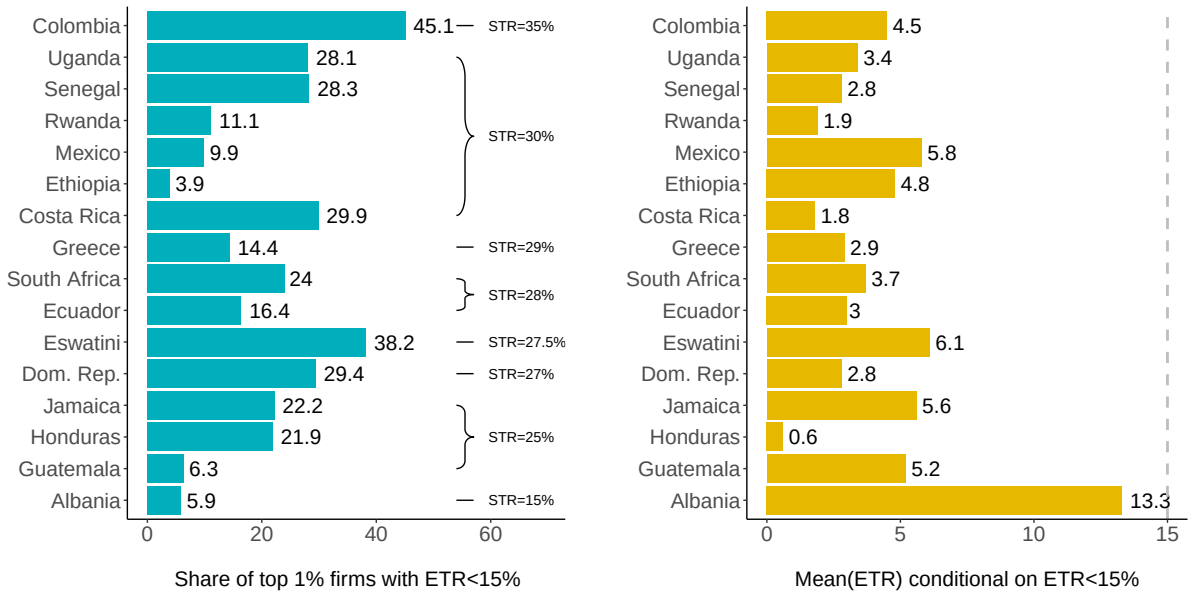


Note: This figure shows the effective tax rate by firm size (similar to Figure A.3), comparing our main ETR measure (dashed line) with an alternative measure (solid line). When constructing this alternative measure, we do not deduct foreign tax credits from a firm's net tax liability, nor do we deduct credits labeled as "Other", which may be foreign tax credits. The blue and red lines are cubic smoothing splines with six knots, estimated using the R function ggformula::geom spline. The quantiles correspond to percentiles between the 1st and 99th percentile (white area), and to 0.2% bins between the 99th and 100th percentiles (grey shaded area). This figure is discussed in Section 3.4.

Figure A.9: Scope and Tax Revenue Potential of a 15% Domestic Minimum Tax on the 1% Largest Firms with Deferred Tax Assets Taken Into Account

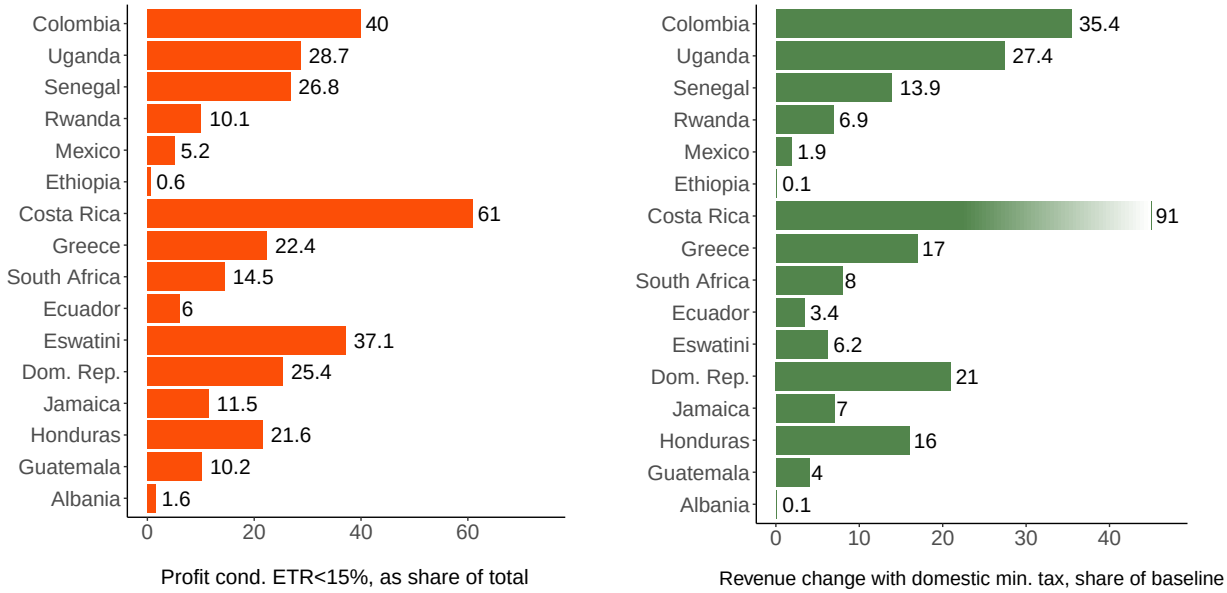
(a) Share of top 1% firms with ETR below 15%

(b) Average ETR among these firms



(c) Profit of these firms (share of total)

(d) Revenue increase (share of baseline CIT rev.)



Note: This figure replicates Figure 5, but shows the result when deferred tax assets, as defined under the global minimum tax rules, are taken into account. Panel (a) shows the share of firms in the top 1% of the size (revenue) distribution that have an ETR below 15% in the most recent cross-section, focusing on profitable firms. Panel (b) shows the average ETR among profitable firms with an ETR below 15%, within the top 1% of firm size. Panel (c) plots the share of aggregate reported profits accounted for by profitable firms with an ETR below 15% within the top 1% of firm size. Panel (d) shows the hypothetical revenue gains from requiring all firms in the top 1% to pay an ETR of at least 15% (i.e. we simulate an ETR of 15% and the associated tax liability for profitable top 1% firms with an actual ETR below 15%), as a share of current CIT liabilities of all firms in the latest pre-COVID-19 cross-section. This figure is discussed in Section 5.4.

Table A.1: A Summary of the Literature on Effective Tax Rates and Firm Size

(1) Reference	(2) Data	(3) Country	(4) Numerator	(5) Denominator	(6) Firm Size Measure	(7) ETR & Firm Size
Yuzhu et al. (2022)	US	Financial data	Cash taxes paid	Pre-tax income	Total asset	Negative
Gaertner et al. (2021)	US	Financial data	Cash taxes paid	Pre-tax income	Total asset	Negative
Bach et al. (2019)	France	Tax return data	Tax expenses	Net profit	Turnover Number of employees	Negative
Lazăr (2014)	Financial data	Romania	Income tax expense	Net profit Turnover	Total assets	No relationship
Wu et al. (2012)	Financial data	China	Tax expenses	Net profit	Total assets	Positive
Guha (2007)	Financial data	India	Income tax expense	Net income	Total assets	Negative
Richardson and Lanis (2007)	Financial data	Australia	Income tax expense	Net profit Turnover	Total assets	Negative
Adhikari et al. (2006)	Financial data	Malaysia	Tax expenses	Operating income Turnover	Total assets	Negative
Janssen (2005)	Financial data	The Netherlands	Tax expenses	Operating income Turnover	Total assets	Negative
Rego (2003)	US	Financial data	Income tax	Pre-tax income	Turnover	Negative
Nicodème (2002)	Financial data	OECD	Tax expenses	Net income	Turnover Capital Total assets	Negative
Kim and Limpaphayom (1998)	Financial data	Hong Kong Korea Malaysia Taiwan Thailand	Income tax liability	Gross profits Net income	Turnover	Negative
Gupta and Newberry (1997)	Financial data	USA	Income tax expense	Net income Turnover	Total assets	No relationship
Kern and Morris (1992)	Financial data	USA	Income tax expense	Net income Gross profits	Turnover	No relationship
Wang (1991)	Financial data	USA	Tax expenses	Net income Gross profits	Turnover Total assets	Positive
Porcano (1986)	Financial data	USA	Income tax expense	Net income		Negative
Zimmerman (1983)	Financial data	USA	Tax expenses	Gross profits	Turnover	Positive
Stickney and McGee (1982)	Financial data	USA	Tax expenses	Net income	Turnover Total assets	No relationship
Gauthier and Reinikka (2006)	Survey data	Uganda	Tax expenses	Turnover	Number of employees	Inverse U-shape
Gauthier and Gersovitz (1997)	Survey data	Cameroon	Tax expenses	Turnover	Number of employees	Inverse U-shape
Mascagni and Mengistu (2019)	Tax return data	Ethiopia	Income tax expense	Gross profits	Turnover	U-shape
Carreras et al. (2017)	Tax return data	South Africa	Tax expenses	Gross profits	Turnover	U-shape
Mascagni et al. (2016)	Tax return data	Rwanda	Income tax expense	Gross profits	Turnover	Negative
Halleux and Valenduc (2007)	Tax return data Financial data	Belgium	Income tax expense	Net income	Total assets Value added Number of employees	Depends on size measure
Clark (2004)	Tax return data	Canada Belgium	Income tax liability	Gross profits Net income	Total assets Gross taxable income	Inverse U-Shape

Note: This table summarizes the key papers studying the relationship between effective tax rates and firm size. We do not include papers that estimate effective tax rates but do not relate them to firm size. The denominators used to estimate effective tax rates in the original studies were relabeled to match one of the four concepts used in this paper: we add 'net' insofar as this measure accounts for all standard deductions, in contrast to other measures of profit that are used in the literature), operating profit, gross profit, and revenue. This table is discussed in Section 1.1

Table A.2: Coverage of Tax Data by Country

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country (Ordered by GDP pc)	**Year**	**GDP per capita (USD)**	**Share of firms vs. Entrepreneurship Database**	**Ratio of total revenue to GDP**	**Ratio of turnover to total production**	**Population**
Ethiopia	2016	671.3	0.23	0.42	–	105,293,228
Rwanda	2017	769.3	0.08	0.59	–	12,230,339
Uganda	2019	922.0	0.06	0.26	–	42,949,080
Senegal	2018	1,384.6	0.07	0.89	–	15,574,909
Honduras	2019	2,443.9	–	1.43	0.77	9,958,829
Eswatini	2018	3,696.4	–	0.84	–	1,160,428
Guatemala	2019	4,263.7	0.15	0.93	0.60	16,604,026
Albania	2019	4,543.4	0.80	1.43	0.92	2,854,191
Jamaica	2019	5,307.5	0.11	1.73	–	2,813,773
Ecuador	2019	5,970.1	0.16	0.95	0.57	17,343,740
South Africa	2019	6,188.7	–	1.94	0.99	58,087,055
Colombia	2022	6,836.2	0.78	2.00	1.10	51,874,024
Dominican Republic	2015	6,838.9	–	0.88	0.56	10,405,832
Mexico	2015	10,098.2	0.35	0.96	0.55	120,149,897
Costa Rica	2019	12,662.4	0.19	1.32	0.83	5,084,532
Greece	2018	18,647.5	0.78	1.27	0.77	10,732,882

Note: This table uses external datasets to assess the coverage of the administrative tax dataset relative, ranking countries by their per capita GDP. Per capita GDP and population is drawn from World Development Indicators. Column 4 displays the ratio of firms in our dataset to those in the Entrepreneurship Database. Note that no data on the number of firms is available for Honduras, the Dominican Republic, Eswatini, or South Africa. For some countries, the Entrepreneurship Database does not provide data for the same year as our dataset, so we use the closest available year: Ecuador (2015), Guatemala (2021), Mexico (2017), and Uganda (2018). Column 5 reports the ratio of total revenue reported by the firms in our dataset to the GDP of the country. Since total turnover includes both value-added and intermediate consumption, we also calculate the ratio of turnover to total production (column 6). Total production data was obtained from the official statistical offices and central bank websites for each country. For Eswatini, we were only able to find total production data for 2011, for Jamaica from 2007, and for Mexico from 2018. Additional country level data is provided in Table 1. This table is discussed in Section 3.4.

Table A.3: Number of Observations by Country and Quantile Bin

Percentiles	(1) ALB	(2) COL	(3) CRI	(4) DOM	(5) ECU	(6) ESW	(7) ETH	(8) GRC	(9) GTM	(10) HND	(11) JAM	(12) MEX	(13) RWA	(14) SEN	(15) UGA	(16) ZAF
Panel A: All Firms																
90	192	4040	821	380	484	38	150	709	230	237	104	3703	53	57	160	2454
98	192	4040	820	380	484	38	150	709	229	237	104	3703	53	57	160	2454
99	192	4040	820	380	484	38	150	709	229	237	104	3703	53	57	160	2454
Panel B: Profitable Firms																
90	173	3868	710	340	427	31	130	566	185	197	76	2591	37	46	125	1901
98	167	3829	709	341	417	36	133	559	187	199	79	2929	39	50	134	1977
99	170	3713	695	343	439	34	129	571	186	190	72	3083	36	46	128	1940

Note: This table presents the number of observations for each revenue percentile bin, by samples and by countries, for the most recent cross-section available. We display the number of firms for the percentiles 90th, 98th, and 99th, both for the full sample of firms in panel (a) and the subsample of profitable firms in panel (b). This table is referred to in Section 3.4.

Table A.4: The Top 1% Firms as a Share of the Total Distribution

	Year	Revenue (%)	Profit (%)	CIT (%)	Payroll (%)
Average		**55.4**	**59.4**	**56.1**	**40.5**
Albania	2019	47.9	38.1	41.8	NA
Colombia	2022	75.1	76.2	74.3	NA
Costa Rica	2019	63.4	78.6	56	47.2
Dominican Republic	2015	60	67.3	65	45.9
Ecuador	2019	55.2	63	63.6	38.3
Eswatini	2018	55	60.5	49.8	54.8
Ethiopia	2016	60.5	63.8	64.7	NA
Greece	2018	63.7	60.8	52.4	7.6
Guatemala	2019	49	55.3	53.7	33.4
Honduras	2019	55.6	58.8	55.6	39.2
Jamaica	2019	51.8	48.1	54.8	40.4
Mexico	2015	47.5	57.6	57.4	NA
Rwanda	2017	37.4	48.9	54.8	NA
Senegal	2018	48.8	58	50.8	35.5
South Africa	2019	62.9	62.9	64.6	50
Uganda	2019	52.8	53	38	52.6

Note: This table presents summary statistics on the top 1 percent of the firm-size distribution for all countries. We compute revenue for the top 1 percent, as a share of total revenue in our full sample. We do the same for profits, corporate income liability, and payroll. Payroll information is only available in selected countries. This table is discussed in Section 3.4.

Table A.5: Explaining the Relationship Between Effective Tax Rates & Firm Size: Deciles 1 to 9

	Outcome: Effective Tax Rate							
	Baseline	+ Controls for firm characteristics	+ Dummies indicating use of tax expenditures					
Specification:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regressor: Percentile (1-89) (unweighted cross-country average of country-specific point estimates)	0.05	0.04	0.02	0.05	0.05	0.04	0.05	0.02
N countries with positive point estimate	11	10	10	13	12	13	12	15
N countries where upper one-sided t-test rejects null	10	10	9	12	11	10	11	12
N country	16	16	16	16	16	16	16	16
Controls:								
Firm characteristics		×						×
Reduced rate dummy			×					×
Exempt income dummy				×				×
Special deduction dummy					×			×
Re-timing dummy						×		×
Tax credits dummy							×	×

Note: This table is similar to Table 2, but focuses on firms in deciles 1-9 of the size distribution. Instead of a dummy indicating firms in the top 1 percent of the size distribution, the main right-hand-side variable in the regressions displayed here is the firm-size (revenue) percentile. Column 1 only includes the main regressor used in each panel. Column 2 controls for firm characteristics (sector dummies, capital city and location dummy, foreign ownership dummy, and firm age). In columns 3 to 7, we control one by one for dummy variables indicating whether or not the firm made use of each of the different tax provisions that can explain the ETR slope. Everything else is as in Table 2. Country-specific coefficients are detailed in Table A.7. This table is referred to in Section 3.4.

Table A.6: Explaining the Effective Tax Rates & Firm Size Relation at the Top: Robustness

	"Panel A: Sample is Top 10% of Firm Size					Panel B: Sample is Top 20% of Firm Size				
Regressor:	Top 1% dummy (1)	Top 2% dummy (2)	Top 3% dummy (3)	Top 0.1% dummy (4)	Percentiles (5)	Top 1% dummy (6)	Top 2% dummy (7)	Top 3% dummy (8)	Top 0.1% dummy (9)	Percentiles (10)
Unweighted cross-country average of country-specific point estimates	-2.21	-1.80	-1.45	-2.63	-0.20	-2.41	-1.93	-1.54	-2.92	-0.07
N countries with negative point estimate	14	14	14	11	12	12	13	12	11	11
N countries where lower one-sided t-test rejects null	10	8	9	8	9	9	9	9	8	8
N countries	16	16	16	16	16	16	16	16	16	16

Note: This table shows the robustness of our regression results from Table 2, column 1, to different choices for the regressor and sample. Panel A restricts the sample to the top 10 percent of the size distribution (as in our main specifications), while panel B restricts to the top 20 percent. We regress the ETR on a dummy tagging the largest firms, where the largest firms are either in the top one percent of the firm-size distribution (as in our main specification in Table 2, column 1), or in the top 2 percent, top 3 percent or top 0.1 percent. In columns 5 and 10 regress the ETR on a continuous percentile variable. This table is referred to in Section 3.4.

Table A.7: Explaining the Relationship Between Effective Tax Rates and Firm Size
Regression Table with Country-Specific Coefficients

Sample:	Profitable Firms							
	Baseline	Firm Characteristics	Reduced Tax Rates	Exempt Income	Special deductions	Re-timing	Tax Credits	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regression A – Coefficient is Top 1% Dummy (Within Decile 10 Only)								
Top 1%	**-2.37**	**-1.59**	**-2.33**	**-2.02**	**-2.14**	**-2.17**	**-1.68**	**-0.7**
Albania	-0.01	0.1	-0.01	-0.01	-0.01	-0.03	-0.01	0.03
Colombia	-2.9 ***	-2.74 ***	-2.8 ***	-2.7 ***	-2.9 ***	-2.29 ***	-3.69 ***	-2.24 ***
Costa Rica	-6.43 ***	-3.02 ***	-6.43 ***	-4.18 ***	-6.43 ***	-6.43 ***	-2.5 ***	0.38
Dominican Republic	-4.63 ***	-2.6 ***	-4.63 ***	-4.63 ***	-4.44 ***	-4.62 ***	-4.72 ***	-2.84 ***
Ecuador	-1.13 ***	-1.09 ***	-1.11 ***	-0.7 *	-0.83 **	-1.13 ***	-0.41	0.02
Eswatini	-1.52	-0.99	-1.52	-0.23	-1.48	-1.69	-0.97	-0.05
Ethiopia	-0.03	-0.33	-0.04	-0.03	-0.03	0.08	-0.03	0.1
Greece	-1.92 ***	-1.08 **	-1.92 ***	-1.52 ***	-1.92 ***	-1.12 ***	-1.91 ***	-0.38
Guatemala	0.21	0.43	0.21	0.33	0.21	0.21	0.33	0.75 **
Honduras	-4.57 ***	-3.19 ***	-3.93 ***	-5.36 ***	-4.57 ***	-4.57 ***	1.92 ***	0.89
Jamaica	0.66	0.51	0.66	1.13	0.66	0.4	0.65	0.7
Mexico	-7.29 ***	-5.83 ***	-7.29 ***	-7.29 ***	-7.29 ***	-7.19 ***	-6.69 ***	-5.21 ***
Rwanda	-0.57	1.04	-0.57	-0.58	0.82	0.51	-1.06	0.87
Senegal	-4.77 ***	-5.37 ***	-4.9 ***	-3.51 **	-4.47 ***	-4.72 ***	-4.77 ***	-3.96 ***
Uganda	-2.15 *	-0.89	-2.15 *	-2.23 **	-1.71	-1.11	-2.15 *	-0.45
South Africa	-0.89 ***	-0.44	-0.89 ***	-0.79 ***	0.09	-0.94 ***	-0.88 ***	0.17
Regression B – Coefficient is Turnover Percentile (1 to 89)								
Percentile (1-89)	**0.05**	**0.04**	**0.02**	**0.05**	**0.05**	**0.04**	**0.05**	**0.02**
Albania	0.15 ***	0.14 ***	0 *	0.15 ***	0.15 ***	0.14 ***	0.15 ***	0
Colombia	-0.07 ***	-0.1 ***	-0.07 ***	0.03 ***	-0.07 ***	-0.07 ***	-0.07 ***	0.01 ***
Costa Rica	0.31 ***	0.27 ***	0.08 ***	0.32 ***	0.31 ***	0.31 ***	0.31 ***	0.04 ***
Dominican Republic	0	-0.01 ***	0	0	0	0 **	0	0 *
Ecuador	0.03 ***	0.04 ***	0.02 ***	0.04 ***	0.03 ***	0.03 ***	0.04 ***	0.03 ***
Eswatini	0.01	0.02 *	0.01	0.02 *	0.02 *	0	0.01	0.01 **
Ethiopia	0.09 ***	0.07 ***	0.09 ***	0.09 ***	0.09 ***	0.05 ***	0.09 ***	0.03 ***
Greece	0.06 ***	0.08 ***	0.06 ***	0.06 ***	0.06 ***	0.02 ***	0.06 ***	0.02 ***
Guatemala	0.01 ***	0.01 ***	0.01 ***	0.02 ***	0.01 ***	0.01 ***	0.01 ***	0.02 ***
Honduras	0.04 ***	0.02 ***	0.04 ***	0.04 ***	0.04 ***	0.04 ***	0.05 ***	0.03 ***
Jamaica	0	0	0	0	0	-0.01 **	0.01 **	0.01
Mexico	0.03 ***	0.03 ***	0.03 ***	0.03 ***	0.03 ***	0.02 ***	0.03 ***	0.02 ***
Rwanda	-0.02 ***	-0.02 ***	-0.02 ***	-0.02 ***	-0.02 ***	0	-0.02 ***	0
Senegal	0.02 ***	-0.03 ***	0.02 ***	0.02 ***	0.02 ***	0	0.02 ***	-0.02 ***
Uganda	-0.04 ***	-0.04 ***	-0.04 ***	-0.04 ***	0.01	-0.02 ***	-0.04 ***	0.02 ***
South Africa	0.12 ***	0.14 ***	0.09 ***	0.12 ***	0.12 ***	0.13 ***	0.12 ***	0.14 ***

Levels: $^{***}p < .01$, $^{**}p < .05$, $^{*}p < .1$

Note: This table presents detailed results for the country-specific regressions which are summarized in Tables 2 and A.5. In the Regression A panel, we restrict the sample to firms within the top size decile only (revenue percentile 90 and above) and focus on profitable firms, regressing the ETR on a dummy tagging firms in the top one percentile of the firm-size distribution. In the Regression B panel, we focus on firms in deciles 1-9 of the size distribution, using as main regressor the firm-size (revenue) percentile instead of a dummy tagging firms in the top one percentile. Column 1 only includes the main regressor used in each panel. Column 2 controls for firm characteristics (sector dummies, capital city and location dummy, foreign ownership dummy, and firm age). In columns 3 to 7, we control one by one for dummy variables indicating whether or not the firm made use of each of the different tax provisions that can explain the ETR slope. The rest of the structure of the table and regression specifications are as described in the respective Tables 2 and A.5 footnotes. This table is referred to in Section 3.4.

Table A.8: List of Available Tax Provisions by Country

Country	Exempt Income	Non-Deductible Costs	Re-timing	Special deductions	Tax Credits
Albania	No	Yes	Yes	No	No
Colombia	Yes	Yes	Yes	Yes	Yes
Costa Rica	Yes	Yes	No	Yes	Yes
Dominican Republic	No	No	Yes	Yes	Yes
Ecuador	Yes	Yes	Yes	Yes	Yes
Eswatini	Yes	Yes	Yes	Yes	Yes
Ethiopia	No	No	Yes	No	No
Greece	Yes	Yes	Yes	No	Yes
Guatemala	Yes	Yes	No	Yes	No
Honduras	Yes	Yes	No	Yes	Yes
Jamaica	Yes	Yes	Yes	Yes	Yes
Mexico	No	No	Yes	Yes	Yes
Rwanda	Yes	Yes	Yes	No	Yes
Senegal	Yes	Yes	Yes	Yes	Yes
South Africa	Yes	Yes	Yes	Yes	No
Uganda	Yes	Yes	Yes	Yes	No
Count	**12**	**13**	**13**	**12**	**11**

Note: This table presents the list of tax provisions and exemptions that exist in each country. We harmonize the concepts under categories and detail whether these concepts appear in the country's tax form and hence in our data (Yes) or not (No). Non-deductible costs are costs that firms incur but cannot deduct from their tax base, so they are typically added back to profits. Re-timing refers to loss carry-forward or loss carry-backward provisions. Special deductions include all tax provisions that can be claimed to lower the tax *base* (e.g. R&D expenses, capital, and investment allowances). Tax credits are applied directly to lower the tax *liability* (e.g. sector-specific incentives, green investments, export promotion or Free Economic Zones, foreign tax credits). This does do not include withholding or prepayments as they do not reduce the annual liability. This table is mentioned in Section 3.4.

Table A.9: Top 1% Firms, MNEs and Firms in Special Economic Zones

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Top Firms and MNEs					SEZs			
Country	Year	N. of Firms in the Top 1% All (Prof.)	Prof. Firms in the Top 1% w/ETR Below 15%	Share of Foreign Firms in the Top 1%	N. of Firms Liable for the Top-up Tax (CbCR)	Share of Firms Liable for the Top-up Tax in the Top 1%	N. of Firms in SEZ	N. of SEZ Firms in the Top 1%	N. of SEZ Firms in the Bottom 50%	Mean ETR of SEZ Firms All (Prof.)
Albania	2019	192 (170)	13	NA	NA	NA	NA	NA	NA	NA
Colombia	2022	4040 (3713)	1686	NA	NA	NA	NA	NA	NA	NA
Costa Rica	2019	644 (545)	171	24.69	80	65	351	105	10	3.7 (4.9)
Dom. Rep.	2015	380 (343)	104	NA	NA	NA	400	45	37	0.3 (0.4)
Ecuador	2019	484 (439)	74	NA	NA	NA	63	1	25	14.6 (16.7)
Eswatini	2018	38 (34)	13	NA	NA	NA	NA	NA	NA	NA
Ethiopia	2016	150 (129)	9	NA	NA	NA	NA	NA	NA	NA
Greece	2018	709 (571)	117	33.15	52	25	NA	NA	NA	NA
Guatemala	2019	229 (186)	12	NA	NA	NA	94	4	2	2.9 (3.1)
Honduras	2019	237 (190)	39	42.19	40	37.5	1772	92	727	4.7 (7.1)
Jamaica	2019	104 (72)	20	19.23	5	0	12	0	1	11.8 (15.8)
Mexico	2015	3900 (3250)	320	NA	NA	NA	0	0	0	-
Rwanda	2017	53 (36)	6	NA	NA	NA	12	0	0	12.8 (12.8)
Senegal	2018	57 (46)	14	NA	NA	NA	110	0	13	12.6 (20.3)
S. Africa	2019	2454 (1940)	532	25.18	61	NA	1525	11	819	5.3 (7.3)
Uganda	2019	160 (128)	45	NA	NA	NA	NA	NA	NA	NA

Note: Column 1 displays the total number of firms and the number of profitable firms in the top 1% of the distribution (which is based on the total income of all the firms in the sample). Column 2 indicates how many profitable firms in the top 1% have effective tax rates under 15%. Column 3 displays the share of foreign firms within the top 1%. Column 4 shows the number of firms liable for a top-up tax using the CbCR method in a 15% tax rate scenario, with year 1 carve-outs and the de minimis exemption. We only include here firms that would be subject to additional taxation in the described scenario, that is, firms that are in scope of the global minimum tax and would pay a positive amount of top-up tax if such rules were applied. Column 5 shows the share of firms liable for a top-up tax that belong to the top 1% of the distribution. Firms liable for top-up tax are identified with the CbCR method (15% tax rate scenario, with year 1 carve-outs and the de minimis exemption). Column 6 shows the number of firms that belong to Special Economic Zones (SEZs). Column 7 displays the number of firms in the SEZs that are in the top 1% of the distribution. Column 8 displays the number of firms in the SEZs that are in the bottom 50% of the distribution. Column 9 displays the mean effective tax rate (ETR) for all firms and profitable firms in SEZs. A SEZ is defined if there is a variable indicating that the firm operates in a free trade zone, or if it is taxed under a special tax regime (e.g., an export-oriented tax regime). This table is discussed in Section 4.2 and in Section 5.4.

Table A.10: Pillar 2 Implementation Around the World

Final legislation				Draft legislation		Intention to implement
Jurisdiction	Rules covered	Jurisdiction	Rules covered	Jurisdiction	Rules covered	Jurisdiction
Austria	QDMTT, IIR, UTPR	Lithuania	Filing Obligation	Australia	QDMTT, IIR, UTPR	Gibraltar
Bahrain	QDMTT	Luxembourg	QDMTT, IIR, UTPR	Bahamas	QDMTT	Guernsey
Barbados	QDMTT	Malaysia	QDMTT, IIR	Brazil	QDMTT	Hong Kong
Belgium	QDMTT, IIR, UTPR	Malta	Filing Obligation	Canada	UTPR	Indonesia
Bulgaria	QDMTT, IIR, UTPR	Mauritius	QDMTT	Cyprus	QDMTT, IIR, UTPR	Isle of Man
Canada	QDMTT, IIR	Netherlands	QDMTT, IIR, UTPR	Jersey	QDMTT, IIR	Israel
Croatia	QDMTT, IIR, UTPR	New Zealand	IIR, UTPR	Kenya	QDMTT	Taiwan
Czech Republic	QDMTT, IIR, UTPR	Norway	QDMTT, IIR	Lithuania	QDMTT, IIR, UTPR	Thailand
Denmark	QDMTT, IIR, UTPR	Qatar	Unclear	Norway	UTPR	
Estonia	Filing Obligation	Romania	QDMTT, IIR, UTPR	Poland	QDMTT, IIR, UTPR	
Finland	QDMTT, IIR, UTPR	Slovakia	QDMTT	Portugal	QDMTT, IIR, UTPR	
France	QDMTT, IIR, UTPR	Slovenia	QDMTT, IIR, UTPR	Singapore	QDMTT, IIR	
Germany	QDMTT, IIR, UTPR	South Korea	IIR, UTPR	South Africa	QDMTT, IIR	
Greece	QDMTT, IIR, UTPR	Sweden	QDMTT, IIR, UTPR	Spain	QDMTT, IIR, UTPR	
Hungary	QDMTT, IIR, UTPR	Switzerland	QDMTT	Switzerland	IIR, UTPR	
Ireland	QDMTT, IIR, UTPR	Turkey	QDMTT, IIR, UTPR	United Kingdom	UTPR	
Italy	QDMTT, IIR, UTPR	UAE	Unclear			
Japan	IIR	United Kingdom	QDMTT, IIR			
Latvia	Filing Obligation	Vietnam	QDMTT, IIR			
Liechtenstein	QDMTT, IIR, UTPR					

Note: This table summarizes key administrative and legislative actions taken worldwide to implement the Pillar Two global minimum tax rules, as of November 2024. *IIR* means Income Inclusion rule. *UTPR* means Undertaxed Profit Rule. *QDMTT* means Qualified Domestic Top-up Tax. Qatar and the UAE have established preliminary legislation for Pillar Two implementation, with detailed regulations expected to follow. The table was built following the BEPS 2.0 - Pillar 2 Developments Tracker. We discuss this table in Section 5.1.

Table A.11: Orbis Ownership Network Data for LMICs is Good

	Total # Firms	HQ in country		Subsidiaries					CbCR	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Country	Firms	Firms	Scope	Firms	Rev >500 M	Rev >750 M	Scope	>750 M - Groups	Firms	Groups
Albania	293147	79	0	5036	221	177	169	121	56	50
Colombia	4176803	436	13	10665	3403	3226	3171	1008	1926	887
Costa Rica	415281	135	1	1474	794	774	763	388	703	386
Dominican Republic	155716	65	2	1208	503	457	448	252	410	277
Ecuador	169088	40	2	11237	847	848	824	444	469	298
Eswatini	54707	20	0	395	162	147	143	84	106	54
Ethiopia	1448155	5	1	425	133	120	106	80	53	45
Greece	1047354	1075	20	8716	2644	2453	2392	680	1764	578
Guatemala	354048	32	0	1010	588	524	520	262	438	284
Honduras	1954	15	0	1138	304	300	295	158	216	175
Jamaica	288663	48	0	8707	187	152	151	102	117	89
Mexico	2906576	663	55	22153	11130	9937	9558	1997	11209	2093
Panama	0	0	9	0	0	0	0	0	2478	507
Rwanda	51265	8	0	298	100	86	83	66	11	10
Senegal	14088	21	1	863	300	247	232	155	198	118
South Africa	3264746	1187	82	25629	10500	9238	8895	1223	6998	1111
Uganda	554171	27	0	608	247	229	225	142	163	86

Note: This table provides information on the ownership network data availability in Orbis for the sample of countries included in the study. Column 1 shows the total number of firms existing in Orbis for each country. Column 2 indicates the total number of firms identified as headquarters of a multinational group in each country. Column 3 shows how many firms from the previous column are in the scope of the global minimum tax. Columns 4 to 8 display information in terms of firms identified as subsidiaries of multinational groups. Column 4 shows how many multinational subsidiaries are present in each country. Columns 5 and 6 present how many of these firms are subsidiaries of multinational corporations with revenues exceeding 500 million euros and 750 million euros, respectively. Column 7 shows the number of firms in scope of the global minimum tax. Column 8 shows the number of multinational groups with revenues exceeding 750 million euros operating in that country. Finally, columns 9 and 10 detail the number of subsidiaries of multinational groups and the number of multinational groups with revenues over 750 million euros, as indicated by the CbCR database. This table is discusssed in Section 5.2.

Table A.12: Orbis Data on Firms' Economic Activity in LMICs is Poor

Country	(1) Number of Subsidiaries with Turnover data	(2) Number of Subsidiaries	(3) Number of Firms with Turnover data	(4) Number of Firms	(5) Share of Subsidiaries with Turnover data	(6) Share of Firms with Turnover data
Albania	712	5036	13612	293147	14.10%	4.60%
Colombia	5864	10665	1681849	4176803	55.00%	40.30%
Costa Rica	55	1474	167	415281	3.70%	0.00%
Dominican Republic	37	1208	122	155716	3.10%	0.10%
Ecuador	6422	11237	86825	169088	57.20%	51.30%
Eswatini	28	395	183	54707	7.10%	0.30%
Ethiopia	21	425	215	1448155	4.90%	0.00%
Greece	3245	8716	100160	1047354	37.20%	9.60%
Guatemala	41	1010	96	354048	4.10%	0.00%
Honduras	25	1138	54	1954	2.20%	2.80%
Jamaica	92	8707	113	288663	1.10%	0.00%
Mexico	5717	22153	225698	2906576	25.80%	7.80%
Rwanda	24	298	53	51265	8.10%	0.10%
Senegal	53	863	694	14088	6.10%	4.90%
South Africa	2926	25629	16280	3264746	11.40%	0.50%
Uganda	45	608	63	554171	7.40%	0.00%

Note: This table provides information on the economic activity data availability in Orbis for the sample of countries included in the study, based on data checked in October 2024. For each country, column 1 shows the number of firms identified as subsidiaries with available turnover data. Column 2 shows the total number of subsidiaries. Column 3 displays the total number of firms existing in Orbis at the country level with turnover data. Column 4 shows the total number of firms. Columns 5 and 6 are built based on the previous columns and show the share of subsidiaries and firms with available turnover data out of the total number of existing subsidiaries and firms, respectively. This table is discusssed in Section 5.2.

Appendix B: Simulating the Global Minimum Tax

B.1 Additional Figures and Tables

Table B1: Descriptive Statistics on Firms in Scope of the Global Minimum Tax

	(1)	(2)	(3)	(4)	(5)	(6)
	Orbis Method			CbCR Method		
Country	Mean Effective Tax Rate	Percentage of Filers	Percentage of Profits	Mean Effective Tax Rate	Percentage of Filers	Percentage of Profits
Costa Rica	2.14	0.11	17.10	1.83	0.12	18.39
Greece	NA	NA	NA	1.25	0.07	13.74
Honduras	1.02	0.06	4.36	.38	0.18	13.25
Jamaica	2.84	0.05	1.57	2.84	0.05	1.76
South Africa	.42	0.03	3.67	.52	0.03	3.74

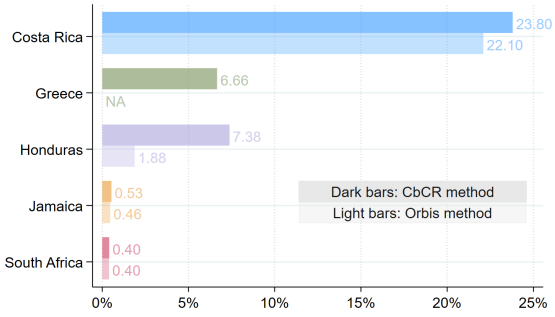
Notes: This table provides key statistics on firms in scope of the GMT, to understand the differences in simulated revenue gains across countries. Columns display information for the sample of firms liable for top-up tax under a scenario with a 15% minimum tax rate, year 1 carve-outs, and de minimis exclusion criteria, using the Orbis method in columns 1 to 3 and the CbCR method in columns 4 to 6. Columns 1 and 4 display the mean effective tax rate. Columns 2 and 5 show the percentage of firms subject to the minimum tax relative to the total number of firms. Columns 3 and 6 display the share of profits represented by these firms relative to the total aggregate profits of all firms, in percent. This table is discussed in Section 5.3.

Figure B1: Global Minimum Tax Revenue Potential Under Different Scenarios
Orbis Method, % Increase in Aggregate CIT Revenue

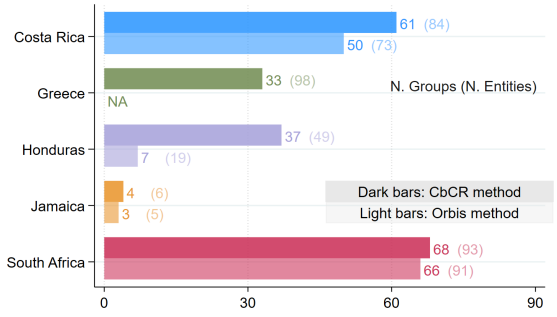
Note: This figure illustrates potential revenue gains from implementing a 15% minimum effective tax rate (ETR) across five scenarios. The first bar shows revenue gains from a scenario with only a de minimis exclusion and no carve-outs. The second one includes year 1 carve-outs (8% for tangible assets, 10% for payroll), while the third one uses year 10 carve-outs (5% for both). The fourth bar combines year 10 carve-outs with the possibility of using qualified refundable credits to reduce tax liability. Finally, the last bar assumes a 20% minimum tax rate and year 10 carve-outs. All the revenue gains are estimated using the Orbis method. Figure 7 shows the same results when using the CbCR method. This figure is discussed in Section 5.3.

Figure B2: Global Minimum Top Up Tax Revenue Potential
Year 10 Carve-outs Scenario

(a) Share of Corporate Tax Liability (%)

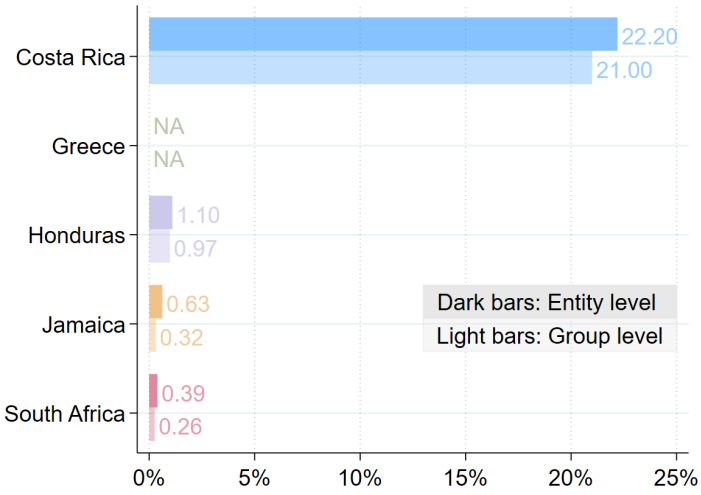


(b) Number of Groups & Entities



Note: Dark bars indicate the CbCR method. Light bars indicate the Orbis method. Panel (a) shows the potential revenue gains from requiring the affected firms in each group to pay an ETR of at least 15% in a scenario with 10% payroll carve-outs and 8% tangible assets carve-outs (which are the carve-outs corresponding to the first year of the Global Minimum tax implementation). In Panel (b) bars refer to the number of groups that would be affected under that scenario. The numbers in parenthesis refer to the number of entities associated with such groups. This figure is identical to Figure 6, except that the carve-out rates for year 10 after GMT adoption are applied.

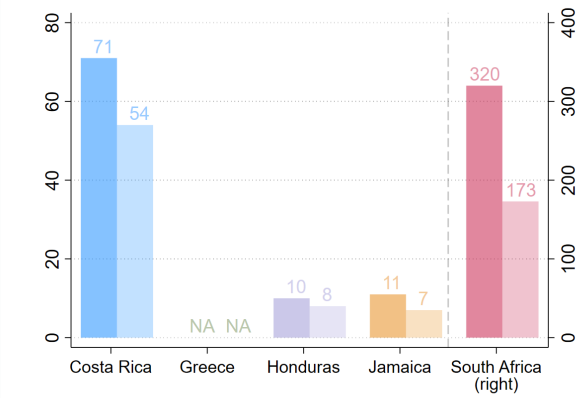
Figure B3: Increase in Corporate Tax Liability (% of Aggregate CIT Revenue)
Orbis Method with Year 1 Carve-Outs



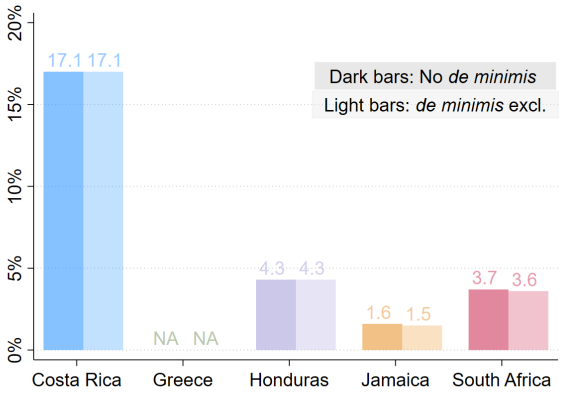
Note: This figure examines the role of groups (light) vs entities (dark) in generating the estimates using the Orbis method. Mechanically, the estimates are always larger when the top-up tax is calculated at the entity level rather than the group level. In Jamaica and South Africa, which have a larger average number of entities per group, the difference in the aggregate revenue gain between the entity-level and the group-level calculation is larger. The estimates assume a scenario with a 15% minimum tax rate, the application of the de minimis exclusion criteria, and year 1 (10% payroll, 5% tangible assets) carve-outs. This figure is discussed in Section 5.4.

Figure B4: The Role of the De Minimis Exclusion for the Number of Groups and Share of Profits Affected by Top-up Tax

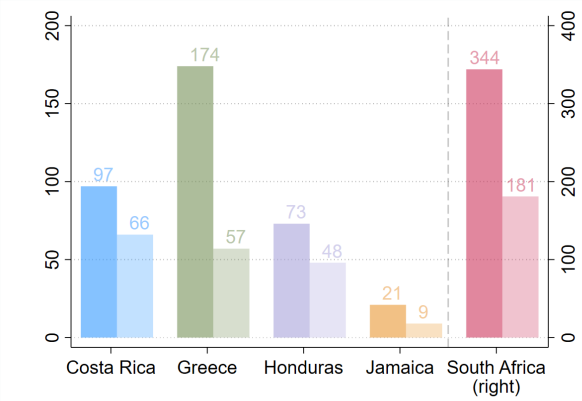
(a) Orbis Method: Number of Groups



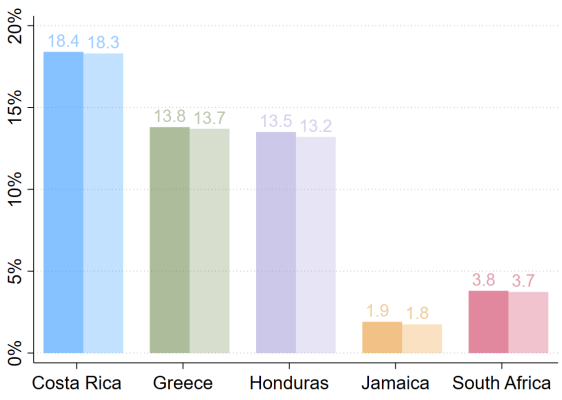
(b) Orbis Method: Share of Profits



(c) CbCR Method: Number of Groups



(d) CbCR Method: Share of Profits



Note: This figure shows the number of groups liable for top-up tax and the importance of these groups in terms of their share in aggregate profits. The dark bars are for our central scenario, without applying the de minimis exclusion. The light bars are for the scenario with the de minimis exclusion. No carve-outs are assumed in any case. Panels (a) and (b) display the results obtained by applying the Orbis method, while panels (c) and (d) are the result of implementing the CbCR method.

B.2 Data availability per Country and Definitions

Table B2: Data Availability for Global Minimum Tax Simulations

(1) Country	(2) Orbis Merge	(3) MNE Indicator	(4) Orbis & MNE Overlap	(5) Tangible Assets	(6) Payroll	(7) Tax Credits	(8) Refundable Tax Credits
Costa Rica	763 firms were identified as multinationals in Orbis. Of these, 422 were matched with the tax records.	The MNE indicator was obtained from the National Registry of Costa Rica and indicates whether the parent company associated with each firm is a foreign company. 342 firms were identified as multinationals through this source.	There are no firms identified as multinationals in Orbis that are also classified as foreign companies in the administrative data.	Our measure of tangible assets is based on items visible in the D101 tax form. For Costa Rica we use the fixed assets line.	Payroll is directly observable for only a small subsample of firms. We use this data and other items from the D101 form and the D152 form to predict the payroll for the rest of the sample.	Tax credits for specific tax treatments, such as franc zones and export incentives, are visible on the tax form.	There are no clear indicators to separately identify refundable tax credits.
South Africa	8,895 firms were identified as multinationals in Orbis. Though we were not allowed to match Orbis with the tax data. Instead, we used consolidated turnover amount of groups available in the tax data to identify firms in scope. 2,415 firms are part of foreign groups above the EUR 750 million threshold.	The MNE indicator is directly obtained from the tax return where firms indicate if they are part of foreign MNE. 3,413 firms were identified.	We were not allowed to match Orbis with the tax data. However, we identified 2,415 firms in scope thanks to the tax data, against 8,895 in Orbis.	Our measure of tangible assets is based on items visible in the tax form, including cash holdings, inventory, land properties, and loans.	The payroll measure was obtained from the tax form, which displays the total aggregate amount of wages and salaries paid.	A list of tax credits is present in the tax form, but not identifiable in the data. Thus we compute an aggregate amount of tax credits but we are not able to distinguish them.	No refundable tax credits are identifiable in the tax form.
Honduras	295 firms were identified as multinationals in Orbis. Of these, 214 were matched with the tax records.	626 firms were identified as multinationals through this source.	A total of 68 firms are identified as multinationals in Orbis, matching their identification as multinational companies in the administrative data.	Our measure of tangible assets is based on items visible in the tax form, including cash holdings, investments, biological assets, and accounts receivable.	The payroll measure was constructed by aggregating subitems related to labor costs, such as wages and salaries, all of which are directly visible in the tax data.	Tax credits for investments and other credits are recognizable in the tax data.	There are no clear indicators to separately identify refundable tax credits.
Jamaica	151 firms were identified as multinationals in Orbis. Of these, 106 were matched with the tax records.	The MNE indicator was obtained from the AT01 and AT02 Forms, in which firms must indicate if they are either local or overseas companies. 78 firms were identified as multinationals through this source.	A total of 5 firms are identified as multinationals in Orbis, matching their identification as multinational companies in the administrative data.	We build our measure of tangible assets based on the information available on AT01 and AT02 forms. We aggregate three subitems from the annual declarations of assets: estate in land, equipment and machinery, and other fixed assets. When no assets data is available, we impute the values following the procedure detailed below.	The payroll measure was obtained from the IT02 form, which displays the total aggregate amount of wages and salaries paid.	Tax credits are processed separately in Section F of the IT02 form, and include employment tax credits, corporate tax credits, and double taxation relief credits, among others.	Refundable tax credits are clearly distinguished within the IT02 form within Section F.
Greece	2,392 firms were identified as multinationals in Orbis. Of these, 948 were matched with the tax records.	9,094 firms were identified as multinationals through the admin data.	A total of 9 firms are identified as multinationals in Orbis, matching their identification as multinational companies in the administrative data.	Tangible assets is missing for a considerable part of the data. We predict it using Lasso for missing data.	Payroll is not directly observable. We impute payroll data by assuming an annual minimum wage (EUR 20,000) multiplied by the number of employees. Number of employees are predicted for the missing values using Lasso.	Tax credits for investments and other credits are recognizable in the tax data.	There are no clear indicators to separately identify refundable tax credits.

Note: This table summarizes country-level data used for global minimum tax simulations. Column 2 shows the number of multinational firms identified in Orbis and matched with tax records. Columns 3 indicates how many firms were identified as multinationals through the administrative data. Column 4 indicates how many firms were identified as multinationals both in Orbis and in the tax records. Columns 5 and 6 explain how tangible assets and payroll measures were constructed, respectively. Columns 7 and 8 indicate the visibility of tax credits and refundable tax credits in tax forms. This table is discussed in Section 5.2.

This section supplements Table B2 by detailing how key variables used in global minimum tax simulations are constructed and sourced from administrative data. We first discuss the firm-level foreign ownership indicator, which is crucial for the CbCR method as it combines with Orbis data to better identify multinational firms. We later address payroll expenses and tangible assets, and their coverage in tax records. We build these variables according to Pillar 2 definitions.

Costa Rica

- *Administrative data MNE indicator.* We identified 342 multinational firms in the administrative data via a binary indicator created by the National Registry of Costa Rica, a public entity responsible for registration and geospatial operations. This indicator enabled us to categorize firms as multinationals based on whether their parent company was local or foreign.
- *Tangible assets.* We build our measure of tangible assets from the items available on Form D101. To do so, we select those items that are considered tangible assets within the framework of the GloBE rules. According to these rules, tangible assets usable for the computation of carve-outs include property, plant, and equipment, natural resources and the right to exploit them, and the lessee's right of use of tangible assets located in that jurisdiction. In the case of Costa Rica, we use the fixed assets item available on Form D101.
- *Payroll*. Payroll data is directly accessible only for a subset of large firms that submitted a more specific tax form until 2018. To address this missing information, we combine two approaches. First, we employ a Lasso methodology to estimate payroll for the remainder of the sample, combining data from D101 and D152 sources. The D152 form (*Declaración Anual de Retenciones Impuestos Únicos y Definitivos*) is an annual informative declaration entities must complete when withholding taxes for various reasons. Among these, employers must withhold the corresponding income tax amount for wages above a certain threshold. The aggregate amount of the tax base for these withheld at source amounts (wages and salaries) provides a proxy measure of the real payroll at the firm level, which we use as input in a Lasso linear regression model together with other independent variables from the D101 form. We proceed as follows. For years with detailed corporate tax and D152 data, we run a regression of the real payroll on a series of regressors previously selected through a Lasso procedure. These variables include economic sector, our measure of profits, depreciation, and tax liability. Using the estimated coefficients for the subsample where we observe the real payroll, we estimate the payroll for the rest of the sample with missing data. Second, for firms lacking D152 data, we estimate payroll costs as 30% of total administrative and sales costs reported in the D101 form. This percentage is derived from the average share of wages and salaries in total administrative and sales costs for large firms that completed the more detailed tax form until 2018. These firms are the only subset with directly observable disaggregated variables, including wages and salaries expenses. Notably, the proportion of wage and salary costs relative to total sales and administrative costs remains consistent across income deciles for this sample.

Greece

- *Administrative data MNE indicator.* The tax data includes a binary variable indicating whether the firm is foreign-owned or not.
- *Tangible assets.* Tangible assets is only available for a small part of the sample. We estimate it for the rest of the firms with Lasso using log of turnover, sector categories, our measure of profits and foreign ownership status.
- *Payroll.* Due to the lack of information on this item, we estimate it. We assume that firms pay workers the annual minimum wage (EUR 20,000) and multiply this amount by the number of employees. Number of employees is drawn from the data. For missing information, we also use Lasso estimation using log of turnover, sector categories, our measure of profits and foreign ownership status.

Honduras

- *Administrative data MNE indicator.* The tax data identifies foreign-owned firms with a binary indicator.
- *Tangible assets.* Honduras's tax data includes disaggregated items on assets. We include in our measure of tangible assets equipment, machinery, properties used as part of the firm business activity, and other assets directly involved in the economic cycle of firm.
- *Payroll.* We build a measure of payroll costs by aggregating several wage and salary subitems directly visible in the tax data.

Jamaica

- *Administrative data MNE indicator.* The AT01 and AT02 forms were valid until 2018 and served as annual asset declarations. These forms incorporated a binary variable indicating whether a company was foreign-owned or domestic. By merging the asset data with the corporate income dataset, we identified multinationals within our data.
- *Tangible assets.* We used data from forms AT01 and AT02 to compute tangible assets. These annual asset declarations provide disaggregated data on current and fixed assets. Despite the latest available declarations dating from 2018 and 2017, we could match 80% of the Orbis sample, totaling 403 firm-year pairs over the period. To measure tangible assets, we aggregate three sub-items from the annual declarations of assets: estate in land, equipment and machinery, and other fixed assets. To address the remaining missing data, we first calculate the tangible assets to income ratio and its mean value across income quartiles for the sample with available data. We then use this ratio to impute the unobserved values. By integrating this quartile-based mean to the missing data, we reconstruct the missing tangible asset values.

- *Payroll*. We gather salary and wage cost data from three sources: the IT02 corporate income tax form, the Schedule 1 annex form, and the S02 form. The IT02 and Schedule 1 forms provide aggregate payroll expenses, while the S02 form offers a detailed breakdown of employee-level expenses. Due to occasional discrepancies between these sources, we use the highest reported amount as the company's total payroll expense.

South Africa

- *Administrative data MNE indicator.* We identify foreign-owned firms through the administrative data using indicators on headquarters firm location.
- *Tangible assets.* The South African data includes several lines of assets. Following the GloBE rules, we include in our measure of tangible assets property assets, vehicles, and fixed assets.
- *Payroll.* We realy on an aggregate measure of payroll expenses that includes all the costs related to wages and salaries.

B.3 Comparison to Other Studies

Our GMT simulations complement other studies that have used aggregate data, e.g. Country-by-Country Reporting (CbCR) data, to estimate GMT revenue effects (Baraké et al., 2022; Cobham et al., 2021; Devereux et al., 2020; OECD, 2020; Hugger et al., 2024). For all countries except Costa Rica, our revenue gain estimates are lower than those from other studies. For instance, Baraké et al. (2022) estimate that European countries could gain about 16% of CIT revenue from the introduction of a top-up tax. The OECD study by Hugger et al. (2024) suggests revenue gains could reach 6.5% to 8.1% of CIT revenue. Higher gains are projected for both high- and low-income countries compared to middle-income countries. Approximately two-thirds of the GMT revenue gains can be attributed to direct top-up taxation (4.3% to 5.4% of CIT revenue), and the remaining third to reduced profit shifting. Our estimates, ranging from 0.2% to 6% of CIT revenue for Greece, Honduras, Jamaica and South Africa indicate that even the OECD projections might be overly optimistic. We now discuss the main methodological differences between the studies.

Identifying In-Scope Firms

The use of micro-level data enables us to precisely identify firms in scope of the GMT. Identifying in-scope firms is more complicated when working with macro data. CbCR data, which underpins both the Baraké et al. (2022) and Hugger et al. (2024) studies, is organized into bilateral matrices on a UPE-affiliate basis (where UPE stands for ultimate parent entity), containing jurisdictional-level information on MNE activity, profits, and taxes. Filing a CbCR report is mandatory for MNE groups with consolidated revenues of EUR 750 million or above. Thus, CbCR data, in principle, allows for convenient identification of in-scope firms, whereas relying solely on administrative tax data can pose challenges, as discussed in Section 5.2.

However, CbCR data is often incomplete, requiring Baraké et al. (2022) and Hugger et al. (2024) to impute missing data using third-party sources like ORBIS or through ad hoc extrapolations. This is especially true for lower-income countries where robust data is scarce. In contrast, we utilize administrative records containing the universe of CIT filers in each country.

Furthermore, the semi-aggregate nature of the CbCR data precludes identifying MNE affiliates that fall below the de minimis threshold and should hence be excluded from the GMT revenue estimation. This potentially inflates estimated revenue gains from a top-up tax. Baraké et al. (2022) attempt to address this by setting the top-up taxes to zero for country pairs with aggregate revenue and profits below the de minimis threshold. Nevertheless, they acknowledge that this correction changes their estimates only marginally and that it likely under-corrects for the de minimis exemption. Conversely, the detailed nature of our administrative tax data allows us to assess whether the de minimis exclusion applies to each firm.

Calculating the Effective Tax Rate (ETR)

Determining ETRs with macro-data such as aggregate CbCR, presents challenges, notably to correctly assess profits. We highlight two well-known issues: inter-temporal adjustments, such as dealing with prior period losses, and double-counting profits. If not addressed, these issues can bias ETRs downward and overstate the revenue gains from a GMT (Blouin and Robinson, 2020).

Baraké et al. (2022) manage inter-temporal adjustments by averaging ETRs over their sample period (2016-2017). The Hugger et al. (2024) applies a more sophisticated loss adjustment to each cell of their profit matrix based on the typical share of losses in positive profits observed in aggregated CbCR data at the affiliate jurisdiction level. However, in our data we observe significant heterogeneity across firms regarding the importance of prior period losses in determining ETRs. Accounting for this heterogeneity at the firm level, which our granular data allows, enhances the precision of our revenue gain estimates.

The issue of double-counting profits, particularly intra-group dividends, is addressed similarly. Baraké et al. (2022) admit that their data does not fully allow for systematic correction of this issue. They estimate, using information from a few tax administrations, that accounting for dividend payments could reduce pre-tax profits by about 40%, lowering their estimated revenue gains for the European Union by 25%. The Hugger et al. (2024) also relies on information from tax administrations where available. In the absence of such data, they base their double-counting correction on comparing ETRs of domestic MNEs with those of foreign MNEs in the same jurisdiction, assuming that foreign entities are less impacted by double counting as intra-company dividends are more prevalent in the UPE's jurisdiction. They apply a downward correction to domestic affiliates' profits to align with the average ETR of foreign-owned affiliates. However, this approach is not fully satisfactory as affiliate-to-affiliate dividend payments in tiered MNE structures would still lead to double counting. Our granular administrative data, on the other hand, is not affected by the double-counting issue.

We conclude that, although our study is more narrowly focused than previous studies — conducting only QDMTT simulations and for a select set of countries — the granular nature of our data allows us to conduct a nuanced and precise estimation of QDMTT revenue gains.

Appendix C: Corporate Tax Data: Context and Cleaning

Some countries supplement their main corporate tax with additional taxes which are levied in place or in addition to the corporate tax. Given the country-specific nature of these tax regimes, we deal with them on a case-by-case basis. Broadly, we include in our analysis firms that belong to the main regime. We typically drop firms paying a minimum tax, and firms in simplified tax regime, which usually concern small firms and requires a different tax form. We restrict the analysis to firms whose revenue is larger than 1 to avoid distortions in the ETR computation procedure.

- **Albania**. The statutory corporate tax rate (STR) was 15 percent during the years covered by our data (2015 to 2019). In 2019, smaller firms with revenue below 14 million ALL benefited from a 5 percent reduced tax rate, and firms with revenue below 5 million ALL were fully exempt. The relevant revenue thresholds for the rate reduction and exemption have changed over the years.
- **Colombia**. The statutory corporate tax rate was 32 percent in 2020, 31 percent in 2021, and 35 percent in 2022. Entities located in Free Trade Zones enjoy a reduced rate of 20%.
- **Costa Rica**.
  - The highest statutory corporate tax rate was 30 percent during the years covered by our data (2006 to 2019). The tax system includes two other tax brackets for smaller firms with tax rates at 10 and 20 percent. The tax rate is applied to profit, but the tax brackets are based on firms' revenue. The tax bracket thresholds are inflation-adjusted annually.
  - We restrict the sample to firms that are clearly labeled as legal entities. To do so, we rely on an entity type indicator that classifies firms as either legal or natural persons. This indicator contains missing values in several cases, which are also dropped from the sample to avoid including natural persons accidentally.
- **The Dominican Republic**. The statutory corporate tax rate was 27 percent for all firms in 2015. Over the span of our panel, the statutory rate changed several times: it was 28 percent in 2014, 29 percent from 2011 to 2013, 25 percent from 2007 to 2010, and 30 percent in 2006.
- **Ecuador**. The STR was 22 percent from 2013 to 2017, and increased to 25% percent in 2018. In 2018, micro-firm with revenue below 1,000,000 LCU are still subject to the 22% rate, as well as firms in the mining and extractive industry. The STR can also be 28%, depending on the company's shareholders structure (a corporate structure where at least 50% of the firms is owned by tax haven residents) and disclosure compliance (at least 50% of undisclosed shareholders).
- **Eswatini**. The STR was 27.5 percent from 2014 to 2018, and 30 percent in 2013.
- **Ethiopia**. The STR was 30 percent over the span of our data (2011 to 2016). We remove from the sample legal entities classified as NGOs, cooperatives, government institutions, joint ventures, micro and small enterprises, sole proprietors, and individuals. We filter these observations by relying on legal status indicator.

- **Greece**. The statutory corporate tax rate was 26 percent until 2014 and 29 percent between 2015 and 2018.
- **Guatemala**. The STR was 25 percent over the span of our panel (2006 to 2019). Firms with a profit rate below a threshold are taxed on turnover. We do not include these firms in our analysis. Firms without a defined legal status (*unclassified*) are removed from the sample.
- **Honduras**.
  - The STR is 25% since 2017 and was 30% from 2014 to 2016. A Solidarity Contribution tax is also applied on top for firms with a taxable income over HNL 1 million. The Solidarity Contribution tax rate is 5%. A minimum tax on turnover at a rate of 1.5 percent was applied to firms above a turnover threshold. These firms pay either the corporate income tax on profits or the tax on turnover, whichever is larger. The threshold for the minimum tax application has been gradually raised over time. As result, only 0.3 percent of firms in our sample (within the very largest firms) paid the minimum tax in 2019. We hence exclude minimum tax payers from the sample. In addition, some firms in Honduras are subject to the asset tax in lieu of the CIT: firms pay 1 percent on the excess above L3 million of their total assets.
  - We keep firms paying the asset tax in the sample because these firms are subject to whichever tax liability is greater–between the CIT and the Asset Tax–and we would drop a large share of the largest firms from the sample if we dropped asset tax payers. Those firms are not subject to an STR of 25%, so we compute an STR that firms are subject to in the following fashion:$STR_i = (SolidarityTaxBase_i * 0.05 + NetTaxBase_i * 0.25)/(NetTaxBase_i)$. In that sense, the maximum STR for Honduras can reach 34%. The tax liability we take into account for the ETR calculation is the greater of the two tax liabilities. In the ETR calculation, if the denominator (e.g. profit) is smaller or equal to zero, but taxes paid is greater than zero (due to the asset tax), we set the ETR to the maximum STR.[33]
- **Jamaica**. The statutory corporate tax rate was 25 percent during the period covered by our data, which is the rate applicable for most of the firms. Building societies pay a tax rate of 30%. Regulated companies (companies regulated by the Bank of Jamaica or other government institutions) pay tax rate of $33\frac{1}{3}\%$.
- **Mexico**.
  - The STR was 30 percent for all firms during the span of our panel (2010 to 2015). The data we use for Mexico are open source and have been altered before release by the tax administration (SAT) to ensure the data are fully anonymized. First, they added an error term to all reported amounts, drawn from a mean-zero normal distribution. Then, they dropped observations for

[33] Finally, in Honduras, we also drop the 11 percent of firms filing manually in 2019 (instead of online), because we do not observe profits for them. Other papers working with Honduras data do the same (Lobel et al. 2021).

which total income was larger than three standard deviations above the median, which means in practice that the data do not contain the very top firms.[34]

  - Firms with a turnover smaller than MXN 1,000 were removed from the sample due to inconsistent amounts displayed in the data.
  - Although Mexico's statutory tax rate was 30 percent during our study period, several firms showed effective tax rates exceeding 100% in our non-winsorized data. Therefore, we set the upper bound for winsorized ETR measures at 100% rather than 30% in order to capture this behavior in our data.

- **Rwanda**. Rwanda's statutory corporate tax was 30 percent during the period covered by our data (2010 to 2017). There are specific regimes for smaller firms, such as a flat tax and a lump sum tax, but we do not include these firms in the analysis. Only firms taxed under the standard CIT regime are kept in the analysis sample.
- **Senegal**. During the period covered by our data (2010 to 2018), Senegal applied a corporate tax of 30 percent on positive taxable profits, and an alternative minimum tax of 0.5 percent of turnover on firms with negative taxable profits. The maximum amount cannot be more than XOF 5 million.
- **Uganda**. The STR was 30 percent over the span of our data (2015 to 2019). Small firms with revenue below certain thresholds pay a simplified tax. We do not include these firms in our analysis.
- **South Africa**.
  - During the analyzed period, the maximum statutory corporate tax rate was 28 percent. Eligible small businesses were subject to a graduated tax rate system, ranging from 0% to 28%.
  - Only legal entities are part of the analysis sample, which are identified through an entity type variable. Dormant companies are removed from the sample. We remove outlier firms from the bottom of the income distribution, i.e. firms in the first size deciles that face a STR above 10%.

[34] For details on how the data have been altered, see here.

Supplementary References

Adhikari, Ajay, Chek Derashid, and Hao Zhang, "Public policy, political connections, and effective tax rates: Longitudinal evidence from Malaysia," *Journal of Accounting and Public policy*, 2006, *25* (5), 574–595.

Bach, Laurent, Antoine Bozio, and Clément Malgouyres, "L'hétérogénéité des taux d'imposition implicites des profits en France: constats et facteurs explicatifs." PhD dissertation, Institut des politiques publiques (IPP) 2019.

Bachas, Pierre, Matthew H Fisher-Post, Anders Jensen, and Gabriel Zucman, "Globalization and Factor Income Taxation," March 2022, (29819).

Carreras, Marco, Chandu Dachapalli, and Giulia Mascagni, "Effective corporate tax burden and firm size in South Africa: A firm-level analysis," Technical Report, United Nations University 2017.

Clark, W. Steven, "Using Micro Data to Assess Average Tax Rates," in P.B. Sorenson, ed., *Measuring the Tax Burden on Capital and Labor*, MIT Press, 2004, pp. 319–358.

Gaertner, Fabio B, Brent Glover, and Oliver Levine, "A Re-examination of Firm Size and Taxes," *Available at SSRN 3928145*, 2021.

Gauthier, Bernard and Mark Gersovitz, "Revenue erosion through exemption and evasion in Cameroon, 1993," *Journal of Public economics*, 1997, *64* (3), 407–424.

_ **and Ritva Reinikka**, "Shifting tax burdens through exemptions and evasion: An empirical investigation of Uganda," *Journal of African economies*, 2006, *15* (3), 373–398.

Guha, Atulan, "Company size and effective corporate tax rate: study on Indian private manufacturing companies," *Economic and political weekly*, 2007, pp. 1869–1874.

Gupta, Sanjay and Kaye Newberry, "Determinants of the variability in corporate effective tax rates: Evidence from longitudinal data," *Journal of accounting and public policy*, 1997, *16* (1), 1–34.

Halleux, Frederic and Christian Valenduc, "Effective tax rate and the size of the company in Belgium an empirical investigation on micro-data," Technical Report 2007.

Janssen, Boudewijn, "Corporate effective tax rates in the Netherlands," *De Economist*, 2005, *153* (1), 47–66.

Kern, Beth B and Michael H Morris, "Taxes and firm size: the effect of tax legislation during the 1980s," *The Journal of the American Taxation Association*, 1992, *14* (1), 80.

Kim, Kenneth A and Piman Limpaphayom, "Taxes and firm size in Pacific-Basin emerging economies," *Journal of international accounting, auditing and taxation*, 1998, *7* (1), 47–68.

Lazăr, Sebastian, "Determinants of the variability of corporate effective tax rates: Evidence from Romanian listed companies," *Emerging Markets Finance and Trade*, 2014, *50* (sup4), 113–131.

Lobel, Felipe, Thiago Scot, and Pedro Zuniga, "Corporate Taxation and Evasion Responses: Evidence from a Minimum Tax in Honduras," Technical Report, Job Market Paper 2021.

Mascagni, Giulia and Andualem Mengistu, "Effective tax rates and firm size in Ethiopia," *Development Policy Review*, 2019, *37*, O248–O273.

_ , Nara Monkam, and Christopher Nell, "Unlocking the potential of administrative data in Africa: Tax compliance and progressivity in Rwanda," 2016.

Nicodème, Gaetan, "Sector and size effects on effective corporate taxation," 2002.

Porcano, Thomas, "Corporate tax rates: Progressive, proportional, or regressive," *Journal of the American Taxation Association*, 1986, *7* (2), 17–31.

Rego, Sonja Olhoft, "Tax-avoidance activities of US multinational corporations," *Contemporary Accounting Research*, 2003, *20* (4), 805–833.

Richardson, Grant and Roman Lanis, "Determinants of the variability in corporate effective tax rates and tax reform: Evidence from Australia," *Journal of accounting and public policy*, 2007, *26* (6), 689–704.

Stickney, Clyde P and Victor E McGee, "Effective corporate tax rates the effect of size, capital intensity, leverage, and other factors," *Journal of accounting and public policy*, 1982, *1* (2), 125–152.

wu Wang, Shiing, "The relation between firm size and effective tax rates: A test of firms' political success," *Accounting Review*, 1991, pp. 158–169.

Wu, Wenfeng, Chongfeng Wu, Chunyang Zhou, and Jun Wu, "Political connections, tax benefits and firm performance: Evidence from China," *Journal of Accounting and Public policy*, 2012, *31* (3), 277–300.

Yuzhu, Lu, Shao Liang, and Yue Zhang, "Growing "political power" of large frms and the downward cash ETR trend," in "Proceedings of the Appalachian Research in Business Symposium: 9th Annual Conference, March 24-25 2022" The Appalachian Research in Business Symposium (ARBS) 2022, pp. 117–124.

Zimmerman, Jerold L, "Taxes and firm size," *Journal of accounting and economics*, 1983, *5*, 119–149.