

Is the Global Minimum Tax on Multinational Enterprise Profits Well-Targeted?

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Overview:

BEPS Pillar Two institutes a common set of tax rules across countries amounting to a global minimum tax on the profits of large multinational enterprises (MNEs). This paper estimates the share of the FDI subject to additional tax, by country, covering more than 90% of global FDI stock. First, it considers the scope of the new tax rules. The minimum tax only applies to the low-tax affiliates of MNEs above certain revenue thresholds. The results indicate (i) MNEs above the Pillar Two revenue threshold account for most international investment and (ii) their low-tax affiliates often hold a disproportionate share of the FDI stock, even in countries where average or statutory tax rates are high. Second, this paper estimates the share of FDI subject to additional tax based on the reform's current implementation status, as of mid-2024. While more than 95% of the global FDI stock originates from countries agreeing to the reform, actual legislation has lagged. Low-tax affiliates are subject to the minimum tax if any part of the MNE ownership chain falls within a country implementing Pillar Two. Since this is not observed, we use a probabilistic approach to reconstruct ownership chains, following Casella (2019). Finally, we combine information on the scope and implementation to assess the preliminary impact. Offshore financial centers and developed regions account for most of the tax base; however, a large share of the FDI stock in developing countries is potentially subject to additional tax over coming years – around 20% to 25% in the typical case.

1. Introduction

The Inclusive Framework (IF) on Base Erosion and Profit Shifting (BEPS) is an initiative by 147 countries to apply a consistent set of tax rules to multinational enterprises (MNEs) amounting to a global minimum tax on their profits. De Backer and Miroudot (2018) find multinational groups account for around one-third of global economic activity, highlighting the large potential impact of the reform. The BEPS model rules are designed around a ‘two pillar’ approach. Pillar One addresses cross-border digital transactions and related issues with tax collection. It redistributes tax revenue from countries where online platforms operate to where they make sales. Pillar Two is the focus of this study. Essentially, it applies a minimum tax regime to large MNEs.¹ It does this by coordinating a minimum tax on MNE profits, putting a floor on tax competition between countries, and harmonizing national legislation to reduce the incentive for profit shifting. Unlike the typical corporate tax, the Pillar Two rules consider the operations of the entire MNE group, both domestic and foreign. Additional taxes may apply to a group whenever its foreign affiliates pay taxes below the minimum threshold. Our goal is to estimate the relevant tax base and look at its distribution across countries.

This study engages with the policy community working on investment promotion. Pillar Two interacts with existing tax incentives and will change the global investment landscape. The scope of reform is poorly understood at this point in time and this study aims to both validate existing OECD assessments and provide more granularity. We use project- and affiliate-level data to estimate the share of FDI subject to additional tax by country. We also investigate how a gradual and uneven implementation of Pillar Two affects the share of FDI subject to additional tax. We do this by (i) estimating the FDI stock within the scope of the reform by country and (ii) the share of FDI originating from countries currently implementing the reform or transiting through them.² The outcome is time-dependent. While countries in the Inclusive Framework account for more than 95% of global FDI, actual legislation has lagged. Only Canada, European Union members, Japan,

¹We use ‘large MNE’ to denote any group above the €750 million threshold. The term affiliate is used to denote any ‘constituent entity’ where the MNE group is the majority owner. The reform is expected to increase the tax burden for MNEs, which will act on the intensive and extensive margins of investment. Still, since the tax is coordinated across countries, MNEs are less likely to divert investment (a typical behavior) and some countries may benefit from higher investment as tax rate differentials close.

²The OECD collects and publishes aggregated data for MNEs within the scope of the reform, but reporting remains limited and only applies to MNEs headquartered in countries within the Inclusive Framework.

South Korea, Switzerland, and the United Kingdom have signaled they will implement the reform in 2024. These countries are a small subset of the Inclusive Framework membership, but they are large outward investors and account for more than one-half of the FDI stock in developing regions. While Pillar Two gives priority to qualifying domestic taxes, in their absence, the countries initially implementing the reform may tax the global profits of MNEs operating in their jurisdictions. Accordingly, these initial adopters may realize some windfall tax gains. A large share of FDI will be affected and investment promotion agencies will have to revisit existing incentives to ensure they harmonize with Pillar Two legislation.

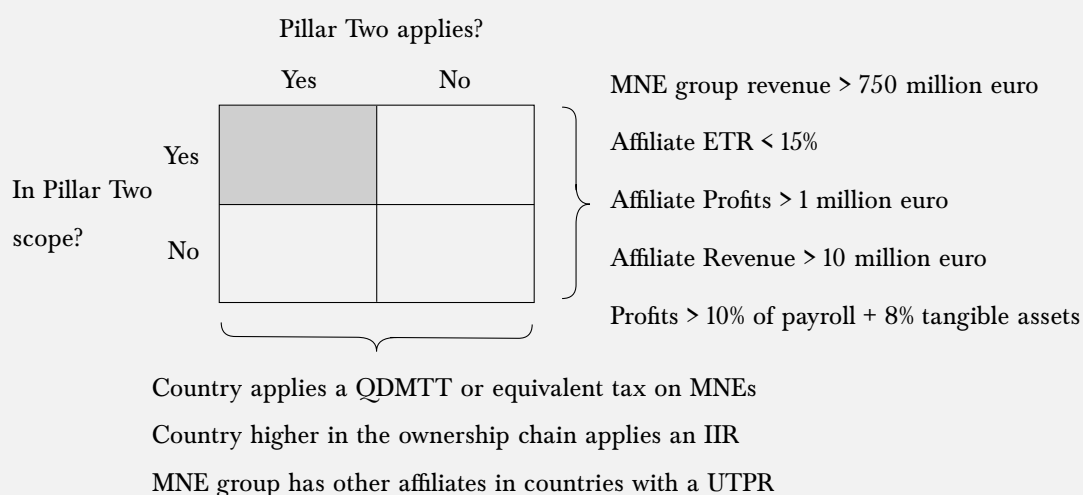
Estimating the share of FDI subject to the minimum tax is not straightforward and the data constraints are severe. Box 1 provides an overview of the main components underlying the analysis.³ We rely on several imputations: First, we use project-level data to infer the contribution of large MNEs to cross-border greenfield projects, mergers and acquisitions (M&A), and international project finance deals. These three components explain the majority of new FDI. The project-level data only cover announcements (as opposed to realized investments) and we use local projections to infer the final impact on FDI inflows. Next, using Orbis, we look at tax rates across individual MNE affiliates by country. A large share of affiliates pay little or no tax in some countries despite relatively high statutory tax rates. Since information on the tax distribution is missing for most countries, we connect the average effective tax rate (which is observed) to the expected low-tax share of FDI and confirm the results using the methodology of Hugger et al. (2024). Having established the share of FDI within the scope of the minimum tax, we turn to its implementation status and use an absorbing Markov chain approach to reconstruct MNE ownership structures. This allows us to estimate the share of the FDI stock originating from countries currently applying the new tax rules as well as FDI transiting these countries. Top-up taxes may apply in either case. This final step allows us to look at the impact of the minimum tax given the intersection of its scope and current implementation. In particular, we assess how the reform will affect developing and low-income countries where implementation has lagged.

This study helps fill several information gaps. For example, we find low-tax pockets are prevalent in high-tax countries, similar to Hugger et al. (2024). Orbis provides detailed information on firm balance sheets and we find these low-tax affiliates also account for a large share of tangible investment,

³A companion paper, Casella and Souillard (2022), looks at profit shifting and changes in the tax rate.

Box 1: Analytical Framework for Assessing BEPS Pillar Two

Affiliates in the scope of Pillar Two are a subset of FDI. The final estimates are therefore scaled by the FDI stock and the analysis combines three imputations: First, we consider the scope of BEPS and estimate the contribution of large MNEs to total FDI. Second, we look at the tax distribution of large MNE affiliates and the relative share of investment allocated to these affiliates. The rules are designed to target profit shifting across countries and put a floor on tax competition; however, low-tax pockets frequently appear in countries where average (or statutory) tax rates are high and a large share of FDI is potentially subject to additional tax. Once we establish the share of FDI in the scope of the reform, we test the share of FDI subject to additional tax given the initial adoption of Pillar Two. This requires reconstructing ownership chains in the case of the Income Inclusion Rule (the Undertaxed Payments Rule is omitted from the analysis). The tax distribution in offshore financial centers (OFCs) is treated separately given the lack of affiliate-level data and their weak comparability with other countries. The tax distribution in OFCs is less of a concern since their average effective tax rates are usually near zero.



The final part of the analysis combines the scope and application of the rules to assess the overall impact of Pillar Two on FDI. The shaded region in the diagram above gives the intersection of the two main inputs needed to assess the impact in each country. In addition, the Pillar Two rules also allow for loss carry-forward.

suggesting allowances for capital depreciation and similar tax breaks could explain low-tax pockets. We also test whether the ‘carve-out’ provisions embedded in the Pillar Two rules – deductions for tangible assets and payroll costs – will exempt affiliates that are labor- or capital-intensive from additional tax. We find the carve-out provisions rarely grant a full exemption, although they lower the top-up tax amount. On this point, a higher carve-out amount would better preserve existing tax incentives (at the cost of intensifying tax competition across countries). Recognizing the limitations of the data, we do not estimate the tax revenue gains from Pillar Two. Multinationals will change the locations where they report profits and recent FDI data indicate large restructurings and divestments are currently taking place. The main contribution of this paper is therefore a simplified methodology to assess the tax base for Pillar Two along with several stylized facts on the tax distribution of MNE affiliates and the role of large MNEs in FDI.

The analysis compares two implementation scenarios: In the baseline, a limited set of countries implement the reform (Canada, European Union members, Japan, South Korea, Switzerland, and the United Kingdom).⁴ A second scenario looks at implementation by all 147 countries within the Inclusive Framework. The analysis proceeds as follows: Section 2 synthesizes information on the contribution of large MNEs to overall FDI. Section 3 covers the tax distribution of affiliates. Section 4 looks at ownership structures and investment positions on a country-by-country basis.⁵ Section 5 combines these elements to assess the share of FDI subject to Pillar Two and its distribution across countries and regions. Section 6 concludes.

1.1. The Mechanics of Pillar Two

Before moving to the estimates, it is helpful to outline the proposed rules for clarity and how Country-by-Country Reports (CbCRs) are used to determine if top-up taxes apply. As part of the groundwork for Pillar Two implementation, most countries now require MNEs disclose information on their affiliates’ activities. This allows tax administrations to track their international profits and taxes paid. The Pillar Two tax rules incorporate four main elements: (i) thresholds delimiting which MNEs are subject to the rules, (ii) the calculation of their effective tax rate, referred to as the ‘GloBE’

⁴For simplicity, we assume these countries adopt all rules, although some may only comply with the minimum tax requirement.

⁵Under the BEPS rules, MNEs may consolidate the financial statements of their establishments within a country. Accordingly, firms with multiple establishments may report their operations as a single constituent entity. We use the term ‘affiliate’ to denote a constituent entity under BEPS.

ratio, (iii) the amount of additional tax charged, and (iv) the allocation of tax revenues among countries.

- (i) **BEPS Pillar Two Scope:** the affiliate is part of a multinational group with consolidated revenues of at least €750 million.⁶ The parent entity must have a controlling interest in the affiliate, meaning it is required to consolidate its financial statements on a line-by-line basis.⁷ If an MNE group owns multiple ‘constituent entities’ in a country, it is generally required to aggregate its financial statements at the country level for the purpose of CbCR reporting (excluding intra-group dividends). If an MNE group has revenues less than €10 million and profits less than €1 million in a country, its affiliates there not subject to the top-up tax. In addition to the *de minimis* exclusion, there is also a two-year exclusion for newly established affiliates when the MNE group has no other presence in a jurisdiction.
- (ii) **Global anti-base erosion (GloBE) ratio:** this is an effective tax rate calculation for in-scope constituent entities, defined as the ratio of covered taxes to accounting profit. Covered taxes are essentially any tax charged on income. This includes taxes on distributed profits (i.e. dividends) and taxes on income from resource extraction. Taxes related to turnover (e.g. royalties) are excluded, as are withholding taxes. Generally, the sale of assets and subsidiaries are counted as GloBE income while mergers via the exchange of equity are excluded. Losses from previous years may be carried forward and deducted from the GloBE tax base.
- (iii) **Top-up tax:** a tax surcharge (or ‘top-up’) applies whenever the GloBE ratio is less than 15% and the accounting profit of the constituent exceeds the ‘carve-out’ amount. Formally, the carve-out is called the *Substance-Based Income Exclusion* and is initially set at 8% of tangible assets and 10% of payroll. Both deductions gradually transition to 5% by 2033. Algebraically, the top-up tax can be written

$$\underbrace{T^* - T}_{\text{top-up tax}} = \left(0.15 - \frac{T}{P}\right) \underbrace{(P - C)}_{\text{excess profit}} \quad \text{given} \quad 0.15 > \frac{T}{P} \quad \text{and} \quad P > C \quad (1)$$

⁶We denote firms meeting this criterion as ‘large MNEs.’ For the formal definition, see the Pillar Two [model rules](#).

⁷The accounting standards of the parent jurisdiction apply. In the case of joint ventures, a controlling interest is defined by a 50% or greater equity stake. We apply the *de minimis* threshold for profits (but not revenues) to affiliates in the Orbis sample. MNEs that normally consolidate their affiliates within a country for tax purposes are temporarily allowed to consolidate their CbCR reporting. The OECD issued guidance in 2019 to exclude intra-company dividends from CbCRs to prevent the double counting of profits.

where T^* is the total tax payable, T covered taxes paid, P accounting profits, and C the carve out. Clearly, the carve-out reduces the top-up tax when applicable. Both effective tax rates (ETRs) and the carve-out amount are unknowns at the affiliate level, which motivates a large part of the subsequent analysis. A loss carry-forward mechanism may also reduce the top-up tax amount.

- (iv) **Tax rights:** three different rules may apply depending on the situation – the Income Inclusion Rule (IIR), the Under-Taxed Payments Rule (UTPR), and the Qualified Domestic Minimum Top-Up Tax (QDMTT). The IIR states the country where the ultimate parent is located can collect the top-up tax. If the MNE ultimate parent resides in a jurisdiction that does not apply Pillar Two, tax rights devolve to the highest link in the ownership chain of the MNE. If the entire ownership chain between the MNE parent and low-tax affiliate falls outside Pillar Two, then the UTPR applies as a backstop. Under this regime, countries adopting Pillar Two eliminate tax deductions on intragroup payments by affiliates in their jurisdiction, recouping underpayments by the MNE group. A formula assigns priority for the UTPR and allocates the amount each country can collect. Finally, the QDMTT is a domestic tax structured to match the IIR and is fully creditable against it. Countries with a QDMTT have first priority and collect and retain all revenue from the top-up tax. Examples of each tax regime are included in section A.3 of the appendix.

In terms of implementation, countries with low-tax affiliates forgo revenue whenever the top-up tax is applied elsewhere.⁸ Most are expected to eventually implement the BEPS rules. Pillar Two compliance could be achieved by raising statutory tax rates and/or eliminating tax breaks, but such steps may prove cumbersome. Instead, most countries are expected to implement a QDMTT. Affiliates outside the scope of Pillar Two are not affected in this case, meaning the tax burden for smaller MNEs and domestic firms remains unchanged. It is also likely many countries will implement a QDMTT alone and not the other tax rules.

Since profit shifting generates transaction and reputation costs for MNEs, incentives for profit shifting

⁸We define the threshold for a low-tax country or affiliate as an effective tax rate below 15%. High-tax indicates a country or affiliate above this threshold. If the GloBE ratio for an MNE affiliate in a country is below the minimum, a top-up tax is applied to other parts of the group through the income inclusion rule (IIR) and undertaxed payments rule (UTPR). Since MNEs face a minimum tax irrespective of where they report profits, the reform is expected to reduce profit shifting.

become much weaker with the tax floor. Flows to OFCs will likely decrease, if not stop altogether. Large outflows from OFCs are also possible. As a result, Pillar Two could expand the tax base in many countries, unlike the typical tax increase.⁹ Prior research indicates developing countries could be the largest beneficiaries of the reform given relatively high corporate tax rates and issues with base erosion (UNCTAD 2022).

1.2. Overview of Previous Studies

This section surveys the literature on international profit shifting and tax competition and then moves to other studies estimating the revenue impact of Pillar Two.

1.2.1. International Profit Shifting and Tax Competition

As mentioned, BEPS Pillar Two addresses two key issues with the current international tax system: the race to the bottom in corporate tax rates and tax avoidance through profit shifting to low-tax jurisdictions. Profit shifting is prevalent in both the US and EU and also affects developing regions (UNCTAD 2015; Janský and Palanský 2019). Most countries have a territorial tax system where the international profits of MNEs are exempt from domestic taxes.¹⁰ Therefore, MNEs have the incentive to report profits wherever taxes are the lowest, at least whenever the difference in tax rates is large enough to offset associated costs. On the other hand, several countries have maintained worldwide tax regimes. Until the 2017 Tax Cut and Jobs Act, the US maintained a worldwide tax on the foreign-earned profits of its MNEs, applicable whenever earnings were repatriated. However, this regime incentivized US MNEs to accumulate offshore holdings in low-tax havens (either in anticipation of a tax holiday or for reinvestment abroad) instead of repatriating funds (Laplante and Nesbitt 2017). Following the 2017 legislation, the US shifted to a territorial tax system and offered a tax holiday on repatriated profits. While this solved the immediate problem of ‘trapped’ profits abroad, the shift to territorial taxation has likely spurred new profit-shifting activity. For

⁹The revenue impact for each undertaxed affiliate is $\Delta(\tau B) = B_0\Delta\tau + \tau\Delta B$ where τ is the effective tax rate and B is the tax base. The first identity ($B_0\Delta\tau$) gives the static revenue gains given the initial tax base and distance to the minimum tax rate. The second ($\tau\Delta B$) gives the dynamic losses or gains as the tax base changes, multiplied by the minimum tax rate. Unlike a typical tax increase, Pillar Two will add to the tax base of many countries by reducing profit shifting.

¹⁰There is an ongoing debate on the relative merits of territorial versus worldwide corporate tax systems. For instance, Desai, Foley, and Hines Jr. (2004) argue a territorial tax system is optimal if foreign production complements domestic production. In contrast, Devereux, Fuest, and Lockwood (2015) find a cash-flow tax and a worldwide tax ensure both the optimal allocation of mobile factors and efficient foreign investment.

example, Langenmayr and Liu (2023) find UK multinationals engaged in more aggressive profit shifting after the UK moved from a worldwide to a territorial tax system.¹¹ The rules governing the European single market also incentivize internal profit shifting and many multinationals have located their headquarters in low-tax countries within the EU such as Ireland (Crivelli, Mooij, and Vrijer 2021).¹² The tax losses from base erosion are also significant for developing countries. They are more dependent on corporate taxes than their US and EU counterparts, but often lack enforcement capacity (Johannesen, Tørsløv, and Wier 2019; Abramovsky, Klemm, and Phillips 2014). Since most have relatively high statutory corporate tax rates, multinational firms often shift profits elsewhere (R. A. de Mooij, Matheson, and Schatan 2015; UNCTAD 2022).

The expansion of global multinational activity and the emergence of low-tax offshore centers has spurred interest among academics and policymakers on the scale and scope of global profit shifting. Despite the wide attention the topic has received over the past several decades, there remains uncertainty on the basic facts. Data limitations remain severe and different methodological approaches and data sources have yielded a wide range of estimates (Blouin and Robinson 2020; Clausing 2020; Dowd, Landefeld, and Moore 2017; Garcia-Bernardo, Janský, and Tørsløv 2021; Guvenen et al. 2022; Tørsløv, Wier, and Zucman 2018a). Still, most studies find the scale of international profit shifting is economically significant even if there is some uncertainty on the exact magnitude. Tørsløv, Wier, and Zucman (2018a) estimates around \$620 billion in profits were shifted in 2018, representing around 0.8% of global GDP.¹³ Another literature examines tax competition across countries. Statutory corporate tax rates have generally fallen over the past several decades and competition over globally mobile capital may explain part of this drop (Rincke and Overesch 2011). Several studies show a tax cut in one country will elicit similar cuts among its main competitors (Devereux, Fuest, and Lockwood 2015; Álvarez-Martínez et al. 2019). At the same time, the prediction that international tax competition could eventually drive tax rates to zero has not born out. This reflects that some capital is immobile and the tax revenue-maximizing corporate tax rate in most countries is well above zero (Mendoza and Tesar 2005).¹⁴ On this point, there is some debate as to

¹¹As a backstop, the US implemented a minimum tax on the intangible income of US MNEs. While similar to the BEPS rules in many respects, the US GILTI regime is distinct.

¹²Internal profit shifting evident in the US, Switzerland, and a number of other countries with sub-federal taxes on corporates.

¹³Excluding tax havens.

¹⁴Furthermore, the drops in statutory rates were often accompanied by measures to broaden the tax base.

whether Pillar Two might intensify tax competition rather than relax it. With less profit shifting, the revenue gains from an inward investment are larger. Ironically, this may push high-tax countries to cut tax rates (Janeba and Schjelderup 2023). As a final concern, the BEPS rules may offer countries leeway for offsetting subsidies and some may indirectly rebate the top-up taxes they collect (Den Ridder, Ruige, and Wilde 2023).¹⁵

The global minimum tax is expected to affect international investment, particularly efficiency-seeking FDI (OECD 2020; UNCTAD 2022). There are numerous assessments of the elasticity of international investment to corporate tax rates, but there are several challenges with FDI data since it has a strong financial component (e.g. reinvested earnings and intracompany loans) and changes in tax rates may be measured using statutory rates, average/marginal effective rates, or tax rate differentials between countries. Most empirical studies find significant real effects from corporate tax reforms on international investment (Grubert and Slemrod 1998; Egger, Merlo, and Wamser 2014; Fuest and Neumeier 2023; R. de Mooij and Liu 2020; Becker, Fuest, and Riedel 2012; Mintz and Smart 2004). As might be expected, tax increases generally appear to reduce the rate of investment. A metastudy in UNCTAD (2022) places the semi-elasticity of FDI flows to changes in tax rates in the range of -0.6 to -1.4 when looking at the average effective rate. In the case of Pillar Two, the elasticity of investment to changes in corporate taxes may be smaller. Few studies separate the intensive and extensive margin of investment. Pillar Two operates differently from a typical tax increase since it is coordinated across countries, which reduces the incentive for MNEs to divert investment (Hebous and Keen 2023). In this sense, Pillar Two may act similarly to a tax increase on domestic firms. Again, the literature points to negative effects on investment and activity, although the magnitudes are typically smaller since diversion is less of an issue. For example, the semi-elasticity of investment to the effective marginal tax rate is around -0.3 in Hanappi, Millot, and Turban (2023), which includes both MNEs and smaller domestic firms.¹⁶

Several papers look at the potential welfare gains from higher corporate taxes and reduced profit shifting. For example, Dyreng et al. (2022) look at the tax pass-through, i.e. whether the tax burden

¹⁵The ‘No Benefit Requirement’ is an anticipated anti-abuse rule in Pillar Two that prohibits countries from giving benefits to multinationals related to Pillar Two implementation. Therefore, a country that simultaneously implements a minimum tax along with subsidies or tax offsets may not qualify as compliant. Still, this requirement may be difficult to enforce in practice.

¹⁶The investment rate is defined as firm-level investment to value-added. Both R. A. de Mooij and Ederveen (2008) and Feld, Heckemeyer, and Overesch (2013) provide useful overviews of the literature looking at tax and investment.

falls on firm owners, workers, or consumers. They empirically document a positive relation between the tax burden for shareholders and tax avoidance. Johannesen (2022) finds a global minimum tax leads to positive welfare gains for non-havens when the minimum tax rate is high enough to eliminate profit-shifting. Hebous and Keen (2023) show conditions under which the reform might benefit low-tax countries. In their setup, both low- and high-tax countries gain welfare from higher taxes, but the gains are asymmetric and non-linear in the case of offshore havens. Under a baseline scenario, they show the Pareto dominant tax rate reasonably falls between 12.5 and 20 percent. Both models abstract from the investment response of multinationals to higher taxes, which is addressed in Bilicka, Qi, and Xing (2022).

1.2.2. Initial Assessments of Revenue Collection Through Pillar Two

Prior to the BEPS project, the European Commission proposed a unitary MNE group-level tax within the EU. An evaluation of the proposal by Devereux, Lockwood, and Redoano (2008) find a potential net revenue gain. Cobham and Loretz (2014) perform a similar analysis looking at a worldwide unitary tax and find such a tax will decrease revenue collection overall, but also reallocate tax revenues from low- to high-tax countries.¹⁷

Following several years of consultations, the the OECD released the initial plan for the Pillar Two minimum tax in 2019. A number of studies assessed the proposals (UNCTAD 2022; IMF 2023; Hanappi and Cabral 2020; Baraké et al. 2022; Johannesen, Tørsløv, and Wier 2019). Devereux et al. (2020) was the first to estimate the revenue effects of Pillar Two, incorporating the parameters of the initial plan and found the overall revenue gain would be around \$30 billion. The following year, the OECD released an updated blueprint for Pillar Two, which established most of the current rules, including carve-outs and the QDMTT. The accompanying OECD Economic Impact Assessment (EIA) suggested the global tax revenue gains from Pillar Two would be in the range of \$60-\$100 billion and was also the first study to incorporate information from CbCRs (OECD 2020).

In January 2024, the OECD provided its most recent assessment of the Pillar Two revenue gains, accounting for certain design and parameter changes since the publication of the first EIA (Hugger et al. 2024). The more recent assessment indicates the expected corporate income tax revenue gains

¹⁷In its final form, Pillar Two is not a unitary tax. Rather, the minimum tax is based on the profit/loss across affiliates in each country.

from Pillar Two are around \$175 billion per year. The strong increase compared to the EIA from 2020 is driven by two main developments: The new estimates draw on more recent CbCR data to simulate top-up tax payments, with corporate profitability generally higher in the 2018 CbCRs compared to the earlier 2016 data. Also, the 2024 EIA accounts for tax heterogeneity within countries and low-tax pockets in high-tax jurisdictions. The contribution of the latter element appears large, although there is no definitive statement on the exact amount. A related analysis by Hugger, Cabral, and O'Reilly (2023) finds jurisdictions with average ETRs above 15% account for more than half of global profits taxed below 15%. Furthermore, 10% of global profits with an ETR below 5% are located in countries with average ETRs above 15%.

2. Assessing the €750 Million Threshold for MNE Revenue

To determine the share of MNE investment potentially subject to Pillar Two, we turn to comprehensive project-level data on greenfield investment, cross-border M&A, and international project finance deal announcements, which include expected capital expenditures. While these data do not include the revenue of the project sponsors, we locate balance sheet information for around 10% of companies within the sample (or 8,000 firms) and check if their revenues are above the €750 million threshold. Several imputations are then necessary. First, we estimate the probability the firm is above the €750 million revenue threshold using a logit regression based on observables in the project data. We then make an out-of-sample prediction for the remaining firms and impute, by country, the probability-weighted sum of project expenditures announced by large MNEs. Since the project-level data only cover announcements, we use local projections on FDI to find the average execution rate. The imputed large MNE expenditure shares for each project category are then weighted by their overall execution rate to assess the overall contribution of large MNEs to FDI.¹⁸

For most countries, the pool of greenfield and international project finance deal announcements is large enough to individually infer large MNEs share of investment. Greenfield investment accounts for the majority of cross-border activity and is the dominant component in developing countries. We restrict the analysis of international project finance deals to projects with private (as opposed to official) sponsors. The official component is large, explaining 60% of total project expenditures.

¹⁸There are still gaps using this approach. We do not have sufficient information on individual affiliates to look at the de minimis thresholds for profits or revenues and cannot test their long-term presence.

For M&A activity, we can only infer the overall (i.e. global) large MNE share due to data limitations. For developing countries, the resulting bias should be minimal since M&A activity corresponds to a small share of FDI inflows.

2.1. Project-Level Data

Greenfield projects: Between 2003 and 2023 the fDi Markets database provides information on over 300,000 greenfield (GF) investment project announcements. Each observation includes the name of the firm, its ultimate parent country, the destination of the project, its sector, and the expected capital expenditure. Within this dataset, there are around 80,000 distinct firms. We identify total revenue for 8,000 of these using Refinitiv Datastream and online searches for annual financial reports. Table 1 below provides basic descriptive statistics for greenfield investment projects tabulated by firm. The median firm in the sample announces just one international project and its capital expenditure totals \$10 million USD. As might be expected, the distribution is highly right-skewed. Arranging firms by total capital expenditure on greenfield projects, the top quartile of firms explains around 95% of the total and the top percentile explains around 55%.

Table 1: Summary Statistics for the fDi Markets Greenfield Database by Firm (N = 79,455)

	mean	sd	pl	p25	p50	p75	p99
Number of greenfield projects	3.84	17.80	1	1	1	3	45
Total capital expenditure (millions USD)	202.68	1820.914	.09	3.72	13.15	52.09	3212.67
Capital expenditure on largest project	74.63	548.91	.09	3.33	9.9	34.91	1043.66

Source: fDi Markets.

Table 2 shows the distribution of annual revenue across firms when data are available. The most recent values for revenue are reported, typically the 2023 fiscal year. Roughly speaking, Pillar Two rules apply to the median firm making an international investment, the 53rd percentile being the exact point where revenues exceed €750 million in the subsample. Firms above this threshold account for more than 90% of total capital expenditures in the subsample.¹⁹

Mergers and acquisitions: UNCTAD compiles a database for M&A announcements and provides country-level data from the 1990s onward. However, we only have individual M&A announcements

¹⁹Large firms in the subsample also account for almost 50% of total capital expenditure in the full sample assuming all firms with missing data are below the €750 million threshold.

Table 2: Revenue for Firms in fDi Markets Greenfield Database in Millions USD (N = 8,000)

mean	sd	p1	p25	p50	p75	p99
6156.31	23366.15	.07	110.68	670.68	3628.72	93125.62

Source: fDi Markets and Refinativ.

for 2023. Each observation provides the value of the M&A transaction, whether it is a sale or merger, the names of the acquirer and target, and their locations. We identify the revenue of the acquiring firm using either Datastream or annual reports, matching 92% of the sample. Almost all firms without matches are private equity groups or special purpose acquisition companies (SPACs). Table 3 provides an overview of the results:

Table 3: Cross-Border Mergers and Acquisitions in Millions USD (N = 182)

	obs.	mean	sd	p1	p25	p50	p75	p99
Merger value	182	2814.44	3189.79	1000	1284.99	1687.50	2974.99	20719.81
Revenue of acquirer	170	39331.35	93124.42	24.9	1860	7100	36926.62	371600

Source: UNCTAD.

Based on this information, we find that 90% of the total value of mergers and acquisitions is explained by large MNEs, assuming unmatched firms are below the €750 million threshold. This share is applied uniformly to all country-level observations.

International project finance deals: Finally, we look at a database covering project finance (IPF) deals, compiled by UNCTAD based on information from Refinativ, covering the period from 2011 to 2023. Observations (around 18,000) include information on the name of the project, its sector, whether it is government-sponsored, the main participants, and the name and home country of the primary sponsor. In this case, government-sponsored projects account for around 60% of the total, which we exclude from the sample, leaving around 8,000 observations and 5,400 distinct firms. We identify revenue for around 600. While multiple firms are often involved in projects through joint ventures, we attribute all capital expenditures to the primary sponsor. Table 4 summarizes the activity of these firms. The size of the typical project finance deal is an order of magnitude larger than the typical greenfield investment. The median IPF deal has an estimated cost of \$162 million USD compared to \$11 million USD for the median greenfield project announcement.

Table 4: Summary Statistics for the UNCTAD Project Finance Database by Firm (N = 5400)

	mean	sd	p1	p25	p50	p75	p99
Number of IPF deals	1.55	2.50	1	1	1	1	11
Total capital expenditure (millions USD)	827.53	2788.35	4.38	89.60	215.48	530.88	10783.83
Capital expenditure on largest project	695.26	2517.87	4.34	85.08	200	465.33	8724.52

Source: Refinativ.

To find the revenue of the ultimate parent company, we again use Refinativ and research annual reports online. As might be expected, the subsample skews towards larger firms and summary statistics are presented in table 5. It is notable that more than 75% of firms are above the €750 million threshold, although large firms are likely over-represented. The subsample explains 21% of capital expenditures in the full sample.²⁰

Table 5: Revenue for Firms in the UNCTAD Project Finance Database in Millions USD (N = 629)

mean	sd	p1	p25	p50	p75	p99
26752.25	57912.45	0.44	896.17	6480.04	23890.00	307394.00

Source: Refinativ.

2.2. Imputation of the Large MNE Share of Cross-Border Projects

For both greenfield investment and international project finance deals, we lack revenue data for most firms in the sample. Accordingly, we infer the probability a firm is above the €750 million threshold using a logit regression and apply an out-of-sample prediction to firms where information on revenue is missing. The regression takes the form

$$\mathbb{1}(\text{revenue}(i) > \text{€750m}) = \alpha_k + \beta X_i + \epsilon_i$$

where the dependent variable takes a value of 0 or 1 depending on whether the firm is above or below the revenue threshold, α_k captures sector fixed effects, and the covariates X are the number of projects by firm and capital expenditure on its largest project. The results are reported in table 6.²¹

²⁰Firms above the €750 million threshold account for 19% of capital expenditure in the full sample, assuming all firms missing revenue data are below the €750 million threshold.

²¹When a firm sponsors projects in different sectors, we use the sector of the largest project. While capital expenditures and the number of projects are correlated, a penalized logistic regression matches the baseline model.

Table 6: Logistic Regression with Sector Fixed Effects

	<i>Dependent variable:</i>	
	$\mathbb{1}(\text{revenue} > \text{€750m})$	
	GF Projects (1)	IPF Deals (2)
log(projects)	0.707*** (0.028)	
log(max capex)	0.098*** (0.018)	0.238*** (0.064)
Constant	−1.501*** (0.324)	0.389 (0.431)
Observations	8,000	625
Log Likelihood	−4,628.056	−315.287
Akaike Inf. Crit.	9,334.112	650.574
Notes:	*p<0.1; **p<0.05; ***p<0.01	

Using this, we predict the probability a firm is above the Pillar Two revenue threshold for the remaining sample and aggregate the results by country. The large MNE share of total capital expenditures within each country is estimated using a weighted sum of capital expenditures across firms:

$$k_j^* = \sum_i p_i^* k_{ij} \quad \text{and} \quad s_j^* = \frac{k_j^*}{\sum_i k_{ij}}$$

where k denotes announced capital expenditure for a project, i is the firm index and j the country index, p^* is the estimated probability the firm is large (if unobserved), and s^* is the estimated share of announced capital expenditures undertaken by large firms.

The results are summarized in table 7 below.²² Between 2011 and 2023, \$8.7 trillion in greenfield investment was announced with \$4.8 trillion going to developing countries. Project finance deals with private sponsors had a similar split with \$4.4 trillion in spending announced and \$2.4 trillion for projects in developing countries. In all cases, large MNEs accounted for around 80% of total project values. M&A activity was heavily skewed toward developed countries with \$6.9 trillion in total sales announced over this period.²³

²²Totals for three components are reported in table 16 by country in the appendix, including the large MNE shares.

²³Note that global FDI flows totaled \$17.9 trillion over this period and the sum of cross-border project announcements exceeds this amount.

Table 7: Project Totals by Country of the Ultimate Parent, 2011-23

Billions 2011 USD						
	Greenfield Projects		M&A Sales		IPF Deals	
	Total Capex	Large Firms	Total Capex	Large Firms	Total Capex	Large Firms
Full sample	8726.04	6795.62	7708.15	6937.34	4408.97	3439.98
Initial P2 adopters	3722.96	3019.14	3570.45	3213.41	1189.43	866.09
Other countries	3881.06	2953.01	2906.67	2616.00	2675.18	2129.60
OFCs	1122.02	823.47	1231.04	1107.93	544.37	444.28

Source: UNCTAD and Refinitiv.

Notes: Countries classified as OFC are not included among the initial Pillar Two adopters.

2.3. Relating Cross-Border Project Announcements to FDI Inflows

We note the project data we previously analyzed may not translate directly into FDI. We only cover announcements and the execution rates for projects may differ across the three categories. In addition to projects falling through, some announcements may overstate spending and local contractors may capture a large share of spending. For project finance deals, domestic firms often play a significant role as well and project horizons can be very long – completion dates 20 years in the future are not uncommon. Accordingly, we use local projections to estimate how a project announcement or merger affects FDI at different horizons using a country-year panel. Due to the financialized nature of FDI among developed countries, the sample is limited to developing countries. The specification takes the form

$$\Delta_h y_{jt} = \alpha_j + \gamma_t + \beta_h \Delta_0 s_{jt} + \epsilon_{jt+h} \quad \text{where} \quad \Delta_h x_t = x_{t+h} - x_{t-1}$$

where y denotes FDI inflows and s is the sum of project announcements in a country for a given year, both in constant 2011 dollars. The left-hand side measures the change in FDI from the time of the announcement where h gives the interval. The right-hand side includes country and year fixed effects. The main coefficient β gives the response of FDI to the project announcements at interval h . We estimate the impact of an announcement over a horizon of six periods, starting with $h = 0$. The initial period gives the contemporaneous impact of the shock, whereas $h = 1$ gives the impact after one year and so on. The cumulative effect of the announcement on FDI inflows is given by the sum of the individual coefficients

$$\Theta = \sum_h \beta_h$$

The baseline estimates results and the confidence bands are included in section A.2.1 in the appendix. Generally, we find the execution rate for mergers and acquisitions is high, where $\Theta \approx 1$. Project finance deals have a relatively small impact on FDI over six years following an announcement, with FDI increasing by \$0.2 for every \$1 announced. Greenfield projects lie between these extremes and FDI increases around \$0.55 for every \$1 announced. We apply these shares to the project totals in table 7 in the previous section (as well as the underlying country-level estimates) to make a best guess at the large MNE contribution to FDI overall. After determining the large MNE contribution to cross-border project announcements and their execution rates, we turn to the tax distribution across affiliates.

3. What Share of Affiliates Are Low-Tax?

The BEPS Pillar Two minimum tax applies at the affiliate level. The tax impact cannot be fully anticipated since pre-tax profits and tax payments across individual affiliates are largely unknown, at least outside national tax administrations.²⁴ Even when the country average ETR is above the BEPS minimum, pockets of low-tax affiliates may still be present.²⁵ The OECD collects CbCRs from national authorities and publishes aggregates for each ultimate parent jurisdiction and affiliate location, given there are enough affiliates to anonymize the data. Since CbCRs only include the subset of affiliates within the scope of Pillar Two, they are an important resource and a primary input. However, CbCRs are not directly comparable with FDI.²⁶ Section A.4 of the appendix overviews some of the main challenges. Therefore, we attempt a bottom-up approach using the financial statements of individual affiliates in the scope of Pillar Two to infer the tax distribution. The Bureau van Dijk Orbis database allows us to trace ownership structures and identify the affiliates of large MNEs. This provides a sufficient basis to infer the tax distribution along with the joint distribution of tax rates and large MNE assets for around 30 countries. There appears a strong relationship between the average tax rate and the low-tax asset share. Accordingly, we impute shares when data

²⁴Tax administrations may also lack information on international affiliates. Not all countries in the Inclusive Framework have activated CbCR exchange relationships. The OECD indicates 4300 pairs are active at the time of writing. A total of 10730 bilateral pairs are possible given 147 countries.

²⁵Take the case of two affiliates, one paying zero tax and the other paying a 30 percent tax. They are otherwise identical and their average tax rate is 15 percent. This is equal to the BEPS Pillar Two minimum, so any estimate using the average would find no top-up tax applies. However, a top-up tax of 15% applies to the low-tax affiliate and the total tax burden increases by 50% once heterogeneity is observed. Also see Baraké et al. (2022) for a useful overview.

²⁶The IMF Committee on Balance of Payments Statistics provides a detailed overview of the differences.

are missing.

3.1. Affiliate-Level Tax Data

As mentioned, this analysis primarily relies on the Bureau van Dijk Orbis database, which provides unconsolidated financial statements for almost 50,000 foreign affiliates worldwide linked to MNE groups with more than €750 million in revenue. We start the analysis with an overview of the OECD CbCR tables, which include taxes paid and profits for some country pairs along with breakdowns by major tax bracket.²⁷ This is sufficient to establish the low-tax share of profits, but issues with consolidation prevent us from looking at carve-out provisions and the low-tax share of total capital. We then turn to Orbis, which gives a more complete view.²⁸ We discuss data cleaning, sources, and validation in section A.5 of the appendix.

3.1.1. OECD CbCR Tables

We compare statutory tax rates from the OECD corporate tax database with average effective tax rates in the CbCR tables. Figure 1a shows the correlation across countries. Effective tax rates in the CbCR tables tend to be lower than statutory rates – much lower in some cases. In part, this is because statutory rates are a summary measure and cannot capture many salient features of the tax code, including deductions, surcharges, deferrals, tax progressivity, etc. Tax incentives also explain some of the observed dispersion, i.e. tax breaks for investment in strategic sectors or certain regions. These features make it extremely difficult to infer the legal tax burden of MNEs, even before tax avoidance is taken into account. As a further caveat, some countries included intracompany dividends in their initial CbCR reports, which inflated profits and pushed down ETRs.²⁹

²⁷The OECD [disclaimer](#) cautions against using ETRs from the CbCR tables given various issues with the data. We use the ETRs to impute the low-tax share of assets but do not use them otherwise. We employ some judgment about whether to use taxes paid or taxes accrued. Taxes paid are the default. Accrued taxes are used when estimates are above the statutory rate.

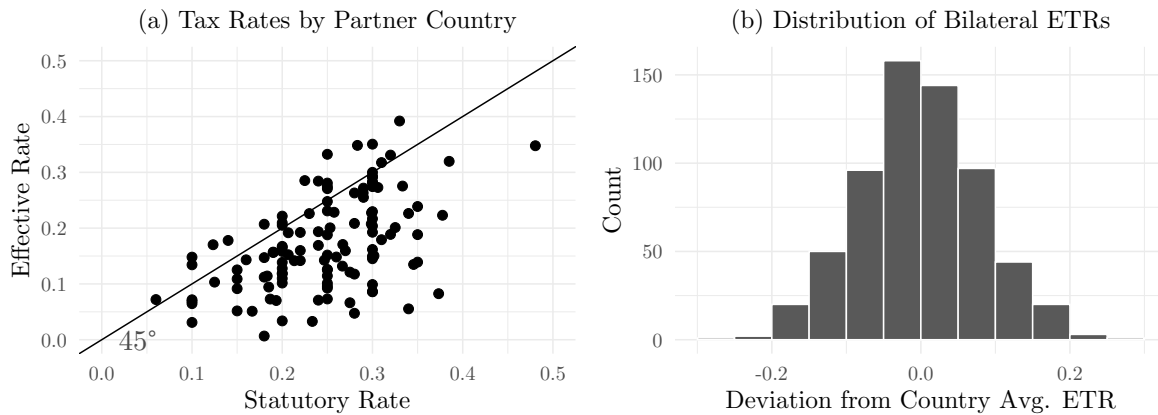
²⁸Furthermore, accounting rules may differ across firms in the sample.

²⁹On the other hand, the OECD tables for subgroups with positive profits combine both loss- and profit-making constituent entities together. Only net profits at the subgroup level are positive. This can inflate the tax burden relative to profits since taxes are usually positive (i.e. firms with losses normally pay no tax).

Tax heterogeneity:

A partial disaggregation of effective tax rates in the CbCR tables indicates a high amount of dispersion. Figure 1b shows the variation of bilateral ETRs (i.e. those reported for country pairs) around country average ETRs. As might be expected, they appear normally distributed. The standard deviation is around 10 percentage points. Assuming normality, the 90% confidence interval is quite large with a 33 percentage point range around the mean.³⁰ Bilateral ETRs still average multiple affiliates together, which suggests affiliate ETRs are quite heterogeneous. Accordingly, low-tax pockets may occur even when average effective tax rates are high. With the exception of Hugger et al. (2024), most estimates for the revenue impact of Pillar Two incorporate average ETRs and face a downward bias due to tax heterogeneity. That is not to say they are completely inaccurate. Tax rates vary less in OFCs since most firms pay little or no tax. Due to profit shifting and the concentration of low-tax profits in these countries, they account for a large share of the revenue impact of Pillar Two.

Figure 1: Affiliate ETRs in the OECD CbCR Tables, 2016-19



Sources: OECD Tax Database and CbCR Tables.

Notes: Excludes OFCs. Subgroups with positive profits excluding headquarters countries and 'stateless' subgroups. Several additional countries are excluded and are listed in section efsec:groups of the appendix. The distribution in Panel (b) is given by the difference between bilateral rates and the average ETR for a recipient. For example, a value of 0.05 indicates the ETR for a parent-recipient dyad is 5 percentage points greater than the average ETR.

Low-Tax Shares:

The CbCR tables also provide a disaggregation by major tax bracket. We use data from 2019 as the OECD had clarified the treatment of intra-company dividends by that point. We calculate the total low-tax share of profits and tangible assets by the MNE ultimate parent jurisdiction, with 41 countries providing a breakdown by tax bracket. The results in table 8 reflect totals for reporting

³⁰In Orbis, the standard deviation is 12 percentage points within the median country.

MNE groups, but do not provide further country-level granularity. Only the United States and Spain provide detailed breakdowns including both affiliate location and tax bracket. The appendix (section A.6) provides an overview for these countries. Looking at the totals, it is notable that a large share of profits are reported by affiliates with tax rates below 15%. This holds for both the countries initially adopting the Pillar Two rules as well as other non-OFCs. A large share of tangible fixed assets are also held by low-tax affiliates – around 45% globally. For non-OFCs, the gap in the low-tax share of profits and tangible assets could result from internal profit shifting, but may also arise from the continued double counting of intra-company dividends, which was not fully phased out until 2020.

Table 8: CbCR Totals by Ultimate Parent Jurisdiction, 2019 (N = 41)

(Billions USD and Percent)

	Profits			Tangible Fixed Assets		
	Total	Low-Tax	Low-Tax Share	Total	Low-Tax	Low-Tax Share
Full sample	7003.1	4155.8	59.3	26474.4	11787.9	44.5
Initial adopters	2630.5	1375.1	52.3	12296.5	5019.0	40.8
Other countries	3380.6	2058.8	60.9	10279.3	5284.3	51.4
OFCs	992.0	721.9	72.8	3898.6	1484.6	38.1

Source: OECD.

Notes: Totals are for all jurisdictions, including the MNE headquarters country.

Next, we turn to Orbis to get an affiliate-level view of totals assets, profits, and tax rates.

3.1.2. The Tax Distribution in Orbis

Affiliate-level data in Orbis allow us to explore the joint distribution of MNE assets and tax rates in greater detail along with the impact of the carve-out provisions. As mentioned, a disproportionate share of profits are reported by low-tax affiliates. This could be a sign of profit shifting within countries, but could also result from tax deductions on capital-intensive investments, deferrals, and loss carry-forward. We address the latter two issues by averaging multiple years together when we calculate ETRs in Orbis. This is a simple way to control for negative profits and loss carry-forward.

Table 9 summarizes the distribution of total assets, profits, and tax rates across each country group. There is strong evidence for profit shifting across countries in the Orbis sample. Affiliates in OFCs report substantially higher total assets and profits than affiliates elsewhere. Although just 16% of affiliates are located in OFCs, they account for around 40% of total assets and profits – the majority

held by affiliates paying an ETR less than 5% (table 9).³¹ While the sample is limited and cannot be generalized, there is a well-developed literature on international profit shifting (e.g. Janský and Palanský 2019; Tørsløv, Wier, and Zucman 2023). As Pillar Two takes effect, many MNE groups will change their capital structure and where they report income, which makes it difficult to fully anticipate its long-term effects on investment or the tax revenue gains.

Table 9: Distribution of Large MNE Profits and Assets Across Country Groups in Orbis

Average 2013-19 (Millions USD)

	Obs.	Avg. Assets	Avg. Profits	% Affiliates	% Assets	% Fixed Assets	% Profits
Full sample	33,807	264.4	21.8	100.0	100.0	100.0	100.0
Initial adopters	19,838	194.9	14.2	58.7	43.3	47.6	38.3
Other countries	8633	218.6	22.7	25.5	21.1	34.1	26.6
OFCs	5336	596.7	48.5	15.8	35.6	18.3	35.2

Source: Orbis.

Notes: Assets = total assets. Fixed assets = tangible fixed assets. The sample is limited to firms also reporting payroll.

Table 10 provides a disaggregation by major tax bracket. Low-tax affiliates account for a large share of total assets and profits in all country groups.³² While low-tax affiliates are fewer in number, they report much larger profits and hold more assets than other firms. Among countries initially adopting Pillar Two, low-tax affiliates account for more than 40% of assets and profits. Of this, the majority is held by affiliates with an ETR under 5%. In the context of the minimum tax, this is significant. The tax burden will increase by a large margin for firms at the bottom of the tax scale. This is beneficial in terms of revenue collection, but may have negative effects on investment. Among non-OFCs, a large share of tangible fixed assets also accrue to low-tax affiliates. This suggests capital-intensive projects may receive favorable tax treatment. The share of tangible fixed assets and total assets track each other relatively closely while low-tax affiliates in OFCs report abnormally high asset-holdings and profits relatively to tangible fixed assets.

³¹Most of these assets are intangible and highly mobile. It includes intellectual property, artificial ownership structures, and intracompany loans.

³²Table 10 includes affiliates reporting negative taxes. Their exclusion does not meaningfully change average profitability. We exclude holding companies and the regional headquarters of MNEs. Affiliates engaged in these activities are overrepresented within low tax brackets due to tax exemptions on intracompany payments. Other low-tax affiliates are engaged in a wide variety of activities including business support, manufacturing, resource exploration, software, etc.

Table 10: Distribution of Large MNE Profits and Assets Within Country Groups in Orbis

Average 2013-19 (Millions USD)

Tax Rate	Obs.	Avg. Assets	Avg. Profits	% Affiliates	% Assets	% Fixed Assets	% Profits
<i>Initial adopters</i>							
Under 15%	4939	251.5	18.0	26.2	44.4	39.5	42.0
0-5%	2236	354.1	23.6	11.9	28.3	22.2	24.9
Over 15%	13,895	111.9	8.9	73.8	55.6	60.5	58.0
<i>Other countries</i>							
Under 15%	1834	343.7	38.5	21.3	33.6	24.3	36.3
0-5%	549	300.4	27.6	6.4	8.8	6.9	7.8
Over 15%	6775	183.9	18.3	78.7	66.4	75.7	63.7
<i>OFCs</i>							
Under 15%	2456	999.1	90.4	46.0	77.1	46.5	85.8
0-5%	1019	1694.9	174.3	19.1	54.2	20.8	68.7
Over 15%	2880	253.6	12.7	54.0	22.9	53.5	14.2

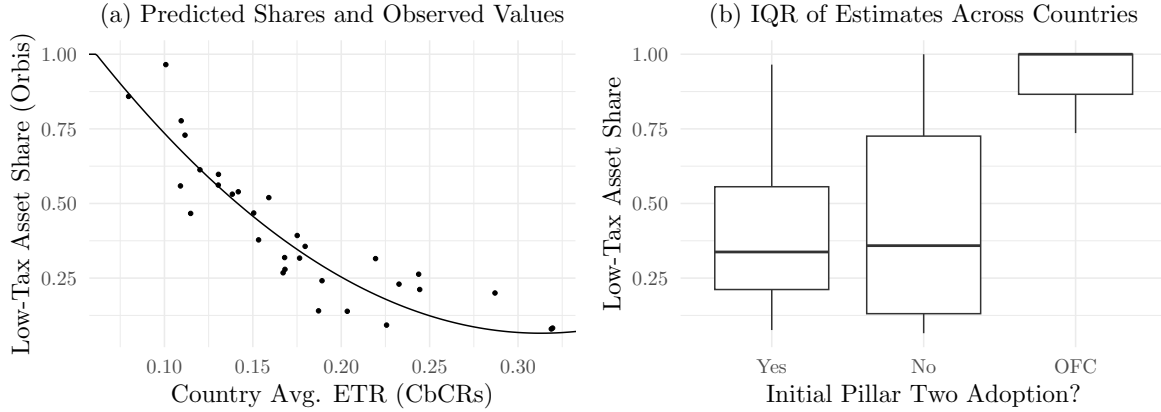
Source: Orbis.*Notes:* Assets = total assets. Fixed assets = tangible fixed assets. Excludes holding companies and regional headquarters for non-OFCs. Firms with negative tax values as reported as zero-tax.

3.2. Imputation of the Low-Tax Asset Share by Country

Since we only observe affiliates in a subset of countries, it is again necessary to impute the low-tax share of assets for the remaining countries. We use the average ETR, which is a strong predictor of the low-tax share of total assets. The results are presented in figure 2a.³³ Even when the country average ETR is relatively high, e.g. 20%, the estimate indicates a relatively large share of assets are low-tax, e.g. 25%. While figure 2a presents the result for low-tax assets, the relationship between low-tax profits and average ETRs is largely similar (see section A.6 in the appendix). Several robustness checks confirm the results although we note the presence of large residuals.

³³The relationship appears non-linear and we use a polynomial regression to account for this. Also note the double-counting of profits in CbCRs biases the country average ETR downward while tax reporting in Orbis is not affected by this issue.

Figure 2: Share of Large MNE Assets Held by Low-Tax Affiliates



Source: Orbis and authors' calculations.

Notes: Total assets equal fixed assets (tangible, intangible, and other) plus current assets (inventories, trade receivables, and short-term liquidity). Panel (a) shows the predicted share of capital held by low-tax affiliates include along with observed values by country. Panel (b) uses predicted values when actual values are unavailable. OFCs include initial adopters.

Looking at the distribution of estimates across countries, the interquartile range of the low-tax asset share lies between 15% and 60%, reflecting wide variation in average ETRs across countries. Around 40% of assets are low-tax in the median country (based on its ETR) with the median ETR slightly above 15%. Figure 2b shows the interquartile range for the low-tax share of assets is much larger for countries outside the initial wave of adopters. Whereas the countries initially adopting Pillar Two have relatively uniform corporate tax regimes, those outside are more heterogeneous. As an area for future research, we could leverage firm-level data to infer the tax revenue gains using the distance between the ETR of the low-tax affiliate and the Pillar Two minimum rate.³⁴

The top-up tax calculation for Pillar Two allows for deductions based on payroll and tangible assets. Some low-tax affiliates may have their tax liability waived if the carve-out amount exceeds profits.³⁵ This is not normally the case in OFCs, where most affiliates are shell companies without substantial activities, but may apply elsewhere. The share receiving a waiver also depends on the carve-out calculation. The initial deductions are set at 8% of tangible assets and 10% of payroll and the final deductions shrink to 5% of assets and payroll by 2033.

³⁴The low-tax share is a bad predictor of the revenue gains since the tax distance also matters. Take that countries A and B both have 10 affiliates earning 100 in profits and holding 1000 in assets. One affiliate in country A pays 0 tax and the rest are above the minimum rate. All affiliates in country B pay 13.5 in tax and are subject to Pillar Two. The low-tax asset share is 10% in country A and 100% in country B, while the revenue gain is the same.

³⁵See the 'excess profit' component in equation 1.

Table 11: Share of Low-Tax Affiliates Receiving a Full Tax Waiver from the Carve-Out by Location

	Obs.	Initial	Final
Full sample	9736	13.9	7.0
Initial adopters	5555	17.9	9.0
Other countries	1789	12.9	6.5
OFC	2392	5.1	2.8

Source: Orbis.

Notes: Only affiliates reporting payroll and fixed assets.

Overall, the share of low-tax affiliates receiving a full waiver due to the carve-out is very low – less than 10% given the final deductions (table 11). Results are relatively consistent across tax brackets and are omitted for brevity. The initial carve-out appears to favor affiliates in countries first implementing the reform, but the difference becomes marginal as the carve-out decreases. In part, this reflects higher payroll costs among the initial adopters. Affiliates are less profitable in these countries as well, which mechanically increases the share with an exemption. Due to uncertainty on the correct allocation of profits, we exclude the carve-out from the final estimates. There is no straightforward imputation for the carve-out when data are missing. The share of firms with a full carve-out is relatively small and the final results can be adjusted downward using results from table 11 if desired. An additional adjustment for minority interests may be needed as well, which is discussed in section A.5 of the appendix.

4. What Share of FDI Is Subject to Income Inclusion Rules?

Countries initially implementing the reform account for around one-half of the global FDI stock or \$18.1 trillion on an outward basis.³⁶ Within these countries, QDMTTs will apply to resident low-tax affiliates. Tax administrations may equally apply an IIR or UTPR to the foreign low-tax affiliates of resident MNEs. In many cases, the share of FDI subject to top-up taxes through an IIR can be estimated using bilateral FDI positions. Still, investments are often structured through offshore holding companies. In such cases, IIRs may fall on intermediate links in the MNE’s ownership chain. This section outlines an approach to reconstructing ownership chains to determine if FDI is potentially subject to an IIR, due to either direct or indirect ownership. Whereas Casella (2019)

³⁶For consistency, tabulations for FDI are based on 2019 data. In anticipation of the tax rules, some countries have seen large divestments over recent years but these are generally minor relative to the FDI stock.

uses an absorbing Markov chain methodology to find ultimate ownership generally, we modify this approach to recover ownership chains passing through a country with an IIR. We cannot recover top-up taxes resulting from UTPRs using this approach. Still, the IIR should apply in the vast majority of cases. Section A.3 looks at how different ownership structures determine the applicable tax rule.

4.1. A Probabilistic Approach to Ownership Chains

To establish the effect of the IIR, the absorbing Markov chain approach is specified as follows. First, take that FDI has a ‘transient’ state i_T where country i both receives and makes direct investments of equal amounts and an ‘absorbing’ state i_A where country i is the final recipient for the direct investment. This gives four probabilities for FDI from country i to country j :

$$p_{j,i}^{A,A} = Pr(i_A \xrightarrow{\text{DIR}} j_A) = \begin{cases} 1 & \text{if } i = j \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

$$p_{j,i}^{A,T} = Pr(i_T \xrightarrow{\text{DIR}} j_A) = 0 \quad (3)$$

$$p_{j,i}^{T,A} = Pr(i_A \xrightarrow{\text{DIR}} j_T) = p_d(j, i) [1 - p_c(i)] \quad (4)$$

$$p_{j,i}^{T,T} = Pr(i_T \xrightarrow{\text{DIR}} j_T) = p_d(j, i) p_c(i) \quad (5)$$

where $p_d(j, i)$ is the probability that country i is a direct investor in the recipient country j and $p_c(i)$ is the probability that investment from country i transits country j and $1 - p_c(i)$ is the probability it stays.³⁷ We make the state fully absorbing for all countries applying Pillar Two, i.e. $p_c(i) = 0$, reflecting the presence of an IIR. This captures the tax, but does not recover which country ultimately receives the associated revenue. For a set of n countries $i \in \{1, 2, \dots, n\}$ four sub-matrices can be defined such that

$$\mathbf{P}^{A,A} = \begin{bmatrix} p_{1,1}^{A,A} & \cdots & p_{1,n}^{A,A} \\ \vdots & \ddots & \vdots \\ p_{n,1}^{A,A} & \cdots & p_{n,n}^{A,A} \end{bmatrix} \quad \text{etc.} \quad (6)$$

Here, rows give the probabilities that FDI in country $j = 1$ has an immediate owner in country i and columns capture the probability that country $i = 1$ receives an investment from country j . The transition matrix combines the sub-matrices, which can be rewritten using a standard notation:

$$\mathbf{P} = \begin{bmatrix} \mathbf{P}^{A,A} & \mathbf{P}^{A,T} \\ \mathbf{P}^{T,A} & \mathbf{P}^{T,T} \end{bmatrix} = \begin{bmatrix} \mathbf{I} & \mathbf{0} \\ \mathbf{R} & \mathbf{Q} \end{bmatrix} \quad (7)$$

where \mathbf{I} is the identity matrix. The solution matrix \mathbf{R}^* is given by

$$\mathbf{R}^* = (\mathbf{I} - \mathbf{Q})^{-1} \times \mathbf{R} = \begin{bmatrix} p_{1,1}^* & \cdots & p_{1,n}^* \\ \vdots & \ddots & \vdots \\ p_{n,1}^* & \cdots & p_{n,n}^* \end{bmatrix} \quad (8)$$

where, $p_{j,i}^*$ defines the share of country j 's FDI stock subject to an IIR from country i . Finally, we can multiply each row of the solution matrix by an indicator matrix. The scalar product gives total FDI subject to an IIR

$$\mathbf{z}_j^* = \begin{bmatrix} \mathbb{1}(i_1 \in X) & \cdots & \mathbb{1}(i_n \in X) \end{bmatrix}' \begin{bmatrix} p_{j,1}^* FDI_{j,1} & \cdots & p_{j,n}^* FDI_{j,n} \end{bmatrix} \quad (9)$$

Here, X is the set of countries adopting Pillar Two and FDI is the bilateral inward FDI stock in country j from country i . The exercise takes bilateral FDI stocks from the 2021 IMF Coordinated Direct Investment Survey and SPE (conduit) shares from the OECD Foreign Direct Investment Statistics database. The conduit shares are imputed when unavailable and the relevant estimates are included in section ?? of the appendix

After adjusting for ultimate investment, we find countries initially adopting Pillar Two account for the majority of FDI outside the reform, around 55% in the typical case (see table 12). The simulation results can change depending on which countries are inside the reform's perimeter: Adding China, a major investor in many developing countries, can have a large effect. The share of FDI within

³⁷ $p_d(j, i)$ is the share of country i in country j 's total FDI stock and $p_c(i)$ is the share of SPEs in country i 's FDI stock.

Pillar Two increases 10 percentage points for the typical developing country with this addition. The exercise is also sensitive to whether the United States is included or not. It is the largest global investor and has implemented tax legislation similar to the Pillar Two model rules in the form of the Global Intangible Low-Taxed Income (GILTI) tax. The US tax regime is similar to the Pillar Two IIR since it ensures the foreign affiliates of US MNEs pay a minimum tax. Furthermore, taxes levied through the GILTI regime count towards the calculation of affiliates' GloBE ratio. Still, there are important differences between the GILTI and Pillar Two regimes: The GILTI targets MNEs with at least \$1 billion USD in revenue as opposed to €750 million. Also, the headline GILTI tax rate is lower, ranging from 10.5% to 13.125%. Finally, the US GILTI regime includes several deductions inconsistent with the OECD model rules.

5. Assessing the Scope and Implementation of Pillar Two

This section takes the intersection of the scope and application of Pillar Two. We make two major assumptions: First, we generalize the large MNE shares observed in the project-level data to the FDI stock. Second, we treat the large MNE share of FDI and the low-tax share of assets as independent. Both are areas for improvement, but the data constraints remain severe at present.

5.1. FDI in the Scope of Pillar Two by Country

The overall scope of Pillar Two is given by the intersection of two elements by country:

$$\% \text{ FDI in Scope} = \% \text{ Investment by Large MNEs} \times \% \text{ Assets Held by Low-Tax Affiliates}$$

For the large MNE share of investment, we use the following weighting scheme:

$$\% \text{ Investment by Large MNEs} = \frac{0.55 \times GF^* + MA^* + 0.2 \times IPF^*}{0.55 \times GF + MA + 0.2 \times IPF}$$

where GF^* denotes the sum of announced expenditures on greenfield projects by large MNEs in a country and GF represents expenditures by all firms, etc. The large MNE share for each component was described in section 2.1 while the weighting scheme, based on the execution rate for each component, is covered in section A.2 of the appendix.

Table 12: Share of FDI Subject to Income Inclusion Rules (by Scenario)

Country	Initial P2	Initial P2 & US	Full IF	Country	Initial P2	Initial P2 & US	Full IF
Afghanistan	0.06	0.13	1.00	Kuwait	0.27	0.28	0.73
Albania	0.89	0.90	0.98	Kyrgyzstan	0.44	0.46	0.99
Algeria	0.47	0.75	0.98	Laos	0.09	0.09	1.00
American Samoa	0.99	1.00	1.00	Lebanon	0.51	0.53	0.86
Andorra	0.96	0.96	1.00	Liberia	0.24	0.36	1.00
Angola	0.81	0.82	1.00	Libya	0.97	0.98	0.99
Anguilla	0.16	0.68	1.00	Macao SAR China	0.22	0.35	0.99
Antigua & Barbuda	0.94	0.97	1.00	Madagascar	0.76	0.82	1.00
Argentina	0.51	0.77	0.99	Malawi	0.21	0.36	1.00
Armenia	0.40	0.44	0.93	Malaysia	0.51	0.64	0.93
Aruba	0.21	0.92	0.98	Maldives	0.06	0.11	1.00
Australia	0.54	0.78	0.91	Mali	0.47	0.49	0.76
Azerbaijan	0.44	0.46	0.91	Marshall Islands	0.50	0.95	1.00
Bahamas	0.24	0.60	1.00	Mauritania	0.89	0.91	0.98
Bahrain	0.07	0.10	0.88	Mauritius	0.28	0.55	0.99
Bangladesh	0.35	0.58	0.98	Mexico	0.63	0.97	1.00
Barbados	0.71	1.00	1.00	Micronesia (Federated States of)	0.07	0.07	1.00
Belarus	0.49	0.50	0.93	Moldova	0.72	0.75	1.00
Belize	0.33	0.40	1.00	Mongolia	0.60	0.65	1.00
Benin	0.40	0.40	0.96	Montenegro	0.54	0.56	0.88
Bermuda	0.44	0.91	1.00	Morocco	0.53	0.55	1.00
Bhutan	0.19	0.23	0.90	Mozambique	0.37	0.41	0.98
Bolivia	0.70	0.77	0.97	Myanmar (Burma)	0.30	0.37	0.96
Bosnia & Herzegovina	0.70	0.71	1.00	Namibia	0.36	0.39	0.74
Botswana	0.59	0.61	0.97	Nauru	1.00	1.00	1.00
Brazil	0.69	0.89	0.99	Nepal	0.17	0.32	0.97
British Virgin Islands	0.24	0.30	1.00	New Caledonia	1.00	1.00	1.00
Brunei	0.71	0.74	0.95	New Zealand	0.27	0.36	0.96
Burkina Faso	0.54	0.63	0.98	Nicaragua	0.22	0.30	0.98
Burundi	0.89	0.91	1.00	Niger	0.45	0.45	0.97
Cambodia	0.30	0.34	0.92	Nigeria	0.58	0.81	0.99
Cameroon	0.67	0.71	1.00	Niue	0.28	0.55	1.00
Cape Verde	0.81	0.81	0.82	North Korea	0.10	0.10	1.00
Caribbean Netherlands	0.53	0.90	1.00	North Macedonia	0.79	0.83	1.00
Cayman Islands	0.22	0.55	1.00	Norway	0.84	0.96	1.00
Central African Republic	0.77	0.77	1.00	Oman	0.90	0.90	0.98
Chad	0.40	0.40	1.00	Pakistan	0.62	0.69	0.98
Chile	0.65	0.76	0.84	Palau	0.52	0.67	0.94
China	0.36	0.44	0.92	Palestinian Territories	0.20	0.21	0.81
Colombia	0.56	0.70	1.00	Panama	0.44	0.60	0.87
Congo - Brazzaville	0.81	0.83	1.00	Papua New Guinea	0.77	0.77	1.00
Congo - Kinshasa	0.48	0.50	1.00	Paraguay	0.43	0.58	1.00
Cook Islands	0.99	0.99	1.00	Peru	0.58	0.68	0.99
Costa Rica	0.27	0.84	0.96	Philippines	0.68	0.82	0.98
Cuba	0.82	0.82	1.00	Qatar	0.32	0.96	1.00
Curaçao	0.42	0.80	0.99	Russia	0.82	0.89	0.98
Côte d'Ivoire	0.61	0.66	0.95	Rwanda	0.27	0.42	0.92
Djibouti	0.36	0.40	1.00	San Marino	0.99	0.99	1.00
Dominica	0.97	0.97	1.00	Saudi Arabia	0.69	0.89	1.00
Dominican Republic	0.65	0.87	1.00	Senegal	0.58	0.61	0.87
Ecuador	0.78	0.84	1.00	Serbia	0.83	0.85	0.99
Egypt	0.74	0.94	0.99	Seychelles	0.41	0.58	1.00
El Salvador	0.33	0.60	0.95	Sierra Leone	0.55	0.60	1.00
Equatorial Guinea	0.08	0.94	1.00	Singapore	0.40	0.69	0.98
Eritrea	0.67	0.67	1.00	Solomon Islands	0.13	0.22	0.92
Ethiopia	0.33	0.36	1.00	Somalia	0.63	0.63	1.00
Falkland Islands	1.00	1.00	1.00	South Africa	0.81	0.88	0.98
Fiji	0.24	0.28	0.98	South Sudan	0.55	0.55	1.00
French Polynesia	0.98	1.00	1.00	Sri Lanka	0.36	0.42	0.99
Gabon	0.51	0.61	1.00	St. Lucia	0.48	0.91	1.00
Gambia	0.05	0.06	1.00	Sudan	0.43	0.43	0.99
Georgia	0.49	0.54	0.98	Suriname	0.50	0.50	0.50
Ghana	0.63	0.68	1.00	Syria	0.87	0.87	0.87
Gibraltar	0.99	0.99	1.00	São Tomé & Príncipe	0.79	0.91	1.00
Greenland	0.98	0.99	1.00	Taiwan	0.62	0.96	1.00
Grenada	0.55	0.82	1.00	Tajikistan	0.19	0.22	0.96
Guam	1.00	1.00	1.00	Tanzania	0.43	0.53	0.99
Guatemala	0.32	0.55	0.96	Thailand	0.59	0.71	0.98
Guinea	0.32	0.38	0.98	Timor-Leste	0.31	0.31	1.00
Guinea-Bissau	0.28	0.32	0.83	Togo	0.32	0.35	0.97
Guyana	0.95	0.95	1.00	Tonga	0.13	0.13	1.00
Haiti	0.85	1.00	1.00	Trinidad & Tobago	0.22	0.92	1.00
Honduras	0.26	0.57	0.86	Tunisia	0.78	0.82	0.99
Hong Kong SAR China	0.27	0.37	0.99	Turkey	0.56	0.59	0.99
Iceland	0.91	0.94	0.99	Turkmenistan	0.28	0.28	1.00
India	0.61	0.83	1.00	Turks & Caicos Islands	0.22	0.22	1.00
Indonesia	0.49	0.67	0.99	Tuvalu	1.00	1.00	1.00
Iran	0.63	0.64	1.00	Uganda	0.56	0.61	0.98
Iraq	0.45	0.65	0.98	Ukraine	0.88	0.90	0.97
Israel	0.46	0.69	0.75	United Arab Emirates	0.92	0.95	1.00
Jamaica	0.63	0.69	1.00	United States	0.90	0.92	0.99
Jordan	0.69	0.73	0.95	Uruguay	0.54	0.67	0.93
Kazakhstan	0.62	0.87	1.00	Uzbekistan	0.36	0.37	1.00
Kenya	0.48	0.56	1.00	Vanuatu	0.05	0.05	1.00
Kiribati	0.87	0.87	1.00	Venezuela	0.76	0.88	1.00
				Vietnam	0.70	0.73	1.00

The final sample includes 133 countries and covers 90% of global FDI. Investments by MNEs in the scope of Pillar Two constitute the majority of FDI in the typical country. Furthermore, a significant share of this investment is held by low-tax affiliates. Taking their intersection, around 25% of the FDI appears in the scope of Pillar Two for the typical non-OFC country. Applying country-specific shares to the FDI stock indicates \$8.9 trillion out of \$25.2 trillion in total FDI is in the scope of the reform, not counting OFCs.³⁸ Of this, \$1.9 trillion is located in developing countries.

5.2. Final Estimates

The final estimates capture the intersection of Pillar Two's scope and implementation:

$$\% \text{ FDI Taxed} = \% \text{ FDI in Scope} \times \% \text{ FDI Subject to an IIR (or QDMTT)}$$

The carve-out is excluded since data are not available for many countries and only a small share of affiliates appear to benefit from a full deduction. In the baseline scenario, a limited set of countries initially implement Pillar Two: Canada, European Union members, Japan, South Korea, Switzerland, and the United Kingdom. For these countries, QDMTTs apply to the inward FDI stock whenever it falls within the reform's scope. For other countries, the application of top-up taxes also depends on how ownership chains are structured and IIRs may only apply to a small share of the inward FDI stock. Figure 3 gives the interquartile range of outcomes.

With initial implementation, around 10% to 15% of FDI is subject to additional tax for the median non-OFC when looking at the intersection of Pillar Two's scope and the application of IIRs. With the first wave of countries implementing the reform, around \$15.2 trillion in FDI appears subject to additional tax with \$7.8 trillion located within OFCs. This comprises more than one-third of the \$41 trillion global FDI stock. Around \$2.8 trillion of FDI subject to tax is located in the countries initially implementing the reform. Among non-OFC developing countries, around \$930 billion of their \$7.1 trillion FDI stock is potentially subject to top-up taxes. The United States accounts for the majority of the \$3.7 billion remainder for non-OFC developed countries.

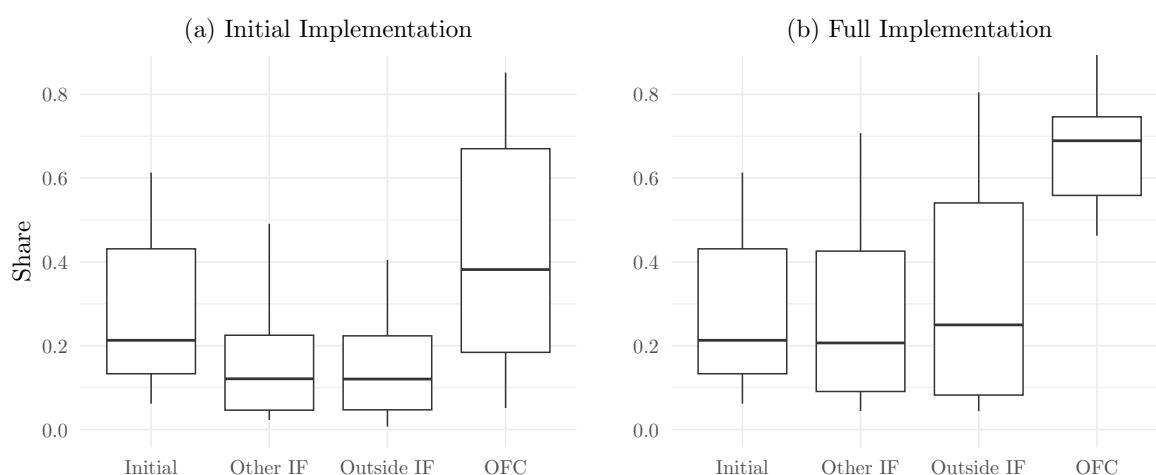
Given full implementation of the tax rules across countries in the Inclusive Framework, the total

³⁸Here, we use 2019 values from the IMF BOP database. For countries with missing data, we use values from UNCTAD when reported.

amount of FDI subject to additional tax is estimated at \$17.6 trillion. Around one-half of this, \$8.8 trillion, is located in OFCs. Of the \$8.8 trillion remainder, around \$1.9 trillion is located in developing countries, of which \$160 billion is in countries outside the IF.

Figure 3 shows that the initial effect of the reform will fall mostly on OFCs (to varying degrees) and the countries first adopting the reform. Given full implementation, Pillar Two appears well-targeted. Top-up taxes apply to most FDI located in OFCs – around 70% in the typical case. For other countries, the impact varies. Between 10% and 45% of inward FDI will be subject to top-up taxes when looking at the interquartile range.³⁹

Figure 3: Interquartile Ranges of Inward FDI Subject to Additional Tax (Baseline Scenario)



Note: Excludes OFCs.

Table 13 looks at the share of FDI subject to top-taxes for the main country groups in this analysis. Among ‘other developed’ countries yet to implement the reform, the United States explains a large share of the FDI stock potentially subject to IIRs. Similarly, China explains a large share among developing countries. For countries outside the Inclusive Framework, around one-quarter of the FDI stock may be subject to IIRs. This group is heterogenous, but includes many low-income countries.

³⁹Since carve-outs are excluded, the actual share of FDI subject to additional taxes is likely to be even smaller in non-OFCs.

Table 13: Initial Impact of Pillar Two on Inward FDI for Non-OFCs (Baseline Scenario)

Status	IF	#	FDI Stock (Bil. USD)	Large MNE Share	Low-Tax Asset Share	% FDI with IIR	FDI Taxed (%)	FDI Taxed (Bil. USD)
Initial Adopters	Yes	25	7815	90	40	..	36	2796
Other Developed	Yes	14	10,256	93	44	87	36	3726
Developing	Yes	50	6726	84	31	52	13	841
Developing	No	24	389	78	55	52	23	88
Total IF	Yes	89	24,797	90	39	81	30	7363

Source: Orbis and IMF BOP, and UNCTAD FDI databases. FDI positions are 2019 values.

Notes: IF = Inclusive Framework. FDI in ‘other OFCs’ based on values from UNCTAD.

5.2.1. Offshore Financial Centers

Around one-third of the FDI stock is located in OFCs, largely in the form of intangible assets and intra-company loans. By design, most of the impact of Pillar Two will fall on these jurisdictions. The estimated share of FDI conducted by large MNEs is similar for OFCs and non-OFCs, both around 90%. Nine OFCs in the sample impose no corporate income tax (CIT) and we assume all FDI in these countries is low-tax.⁴⁰ In addition, some OFCs appear in the Orbis sample. Individual results for the low-tax share of profits and assets are provided in table 14. As might be expected, a large share of assets are held by low-tax affiliates in these countries, much more than the typical non-OFC. With the exception of Singapore, all are among the countries initially implementing Pillar Two in the baseline scenario, so QDMTTs will apply in most cases.

Table 14: Share of Assets and Profits Reported by Low-Tax Affiliates in Orbis, Average 2013-19

	Obs.	% All Affiliates	% Assets	% Profits
Belgium	261	19.0	55.5	49.5
Ireland	498	67.9	83.8	94.2
Luxembourg	286	79.2	91.0	98.3
Netherlands	241	28.6	73.6	76.3
Singapore	1163	57.8	82.2	90.8

Source: Orbis.

Notes: The observation count is only for low-tax affiliates.

Although we only have complete information on 15 out of 32 OFCs, including the five above, they cover the majority of the FDI stock in OFCs – around three-quarters. Hong Kong accounts for

⁴⁰According to the OECD’s Corporate Tax Statistics. These are Anguilla, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, and the Turks and Caicos Islands. The Tax Foundation’s Corporate Tax Rates database also lists these countries as zero-tax.

much of the remainder and has shifted towards a QDMTT regime. Hong Kong has a two-tiered CIT and the initial rate is 8.25% for profits up to \$2 million HKD and then 16.5% on profits above. Since \$2 million HKD is far below the Pillar Two de minimis threshold, the higher tax rate should apply. While foreign-sourced income was not taxed in the past, revised tax rules for 2023 now count offshore income for MNE groups. This includes interest, dividends, disposal gains, and IP licensing/royalty fees.

Table 15: Initial Impact of Pillar Two on Inward FDI for Offshore Centers (Baseline Scenario)

	FDI Stock (Bil. USD)	Large MNE Share	Low-Tax Asset Share	% FDI with IIR or QDMTT	FDI Taxed	
					(%)	(Bil. USD)
Belgium	587	91	56	100	51	298
Ireland	1033	92	84	100	78	801
Luxembourg	3278	98	91	100	89	2908
Netherlands	4062	94	74	100	69	2817
Singapore	1461	87	82	40	29	419
Switzerland ^a	1422	97	66	100	65	917
Other OFC ^a	963	85	96	72	62	594
Total	12,807	94	80	91	68	8754

Source: Orbis and IMF BOP, and UNCTAD FDI databases. FDI positions are 2019 values.

Notes: ^aImputed shares. FDI in ‘other OFCs’ based on values from UNCTAD when unavailable from the IMF.

As before, we estimate the final impact of Pillar Two in OFCs accounting for both the reform’s scope and its initial implementation. Results are tabulated by individual country.⁴¹ At least \$7.8 trillion of the \$11.4 trillion in FDI located in OFCs appears subject to additional tax following the initial implementation of Pillar Two. An additional \$900 billion is in the reform’s scope (the total being \$8.7 trillion). Of this, nearly all appears subject to additional tax given full implementation of the rules across the Inclusive Framework membership. As might be expected, the share of FDI subject to tax is much higher in OFCs than elsewhere. The average gap between current tax rates and the Pillar Two minimum is also large. Since tax revenue is a function of the tax gap and tax base, OFCs explain most of the anticipated revenue gains. Of course, the exercise is static and profit-shifting behavior is also expected to change over coming years.

⁴¹The FDI position for Andorra, Gibraltar, and the Turks and Caicos Islands are missing. We prefer FDI reported in the IMF BOP database when available since UNCTAD omits SPEs.

6. Conclusion

This paper has developed a set of stylized facts on the relative contribution of large MNEs to FDI. It further investigates tax heterogeneity across affiliates and finds there is significant variation within countries when looking at ETRs. While OECD CbCRs are a valuable resource in this regard, this study also contributes to the literature by developing alternative data sources and approaches to study this question. As with Hugger, Cabral, and O'Reilly (2023), we show that low-tax pockets in high-tax jurisdictions are a significant part of the Pillar Two tax base. We also show these pockets are often associated with capital-intensive activities. Accordingly, the new tax regime may interfere with incentives targeting industrial development and global value chain participation. While the carve-out provisions are meant to address this concern, they will not fully eliminate additional taxes in most cases.

We also develop an approach to estimate the share of FDI subject to IIRs given complex ownership chains. The analysis covers 90% of the global FDI stock. Following Pillar Two's implementation, we find additional taxes will apply to a large share, although most of the initial impact will fall on the countries first implementing the reform and OFCs. In 2019, almost \$17.6 trillion in FDI was within the scope of reform. Of this, \$10.1 trillion (around 60%) was located in countries likely to adopt the rules by 2024, including those classified as OFCs. To compare, the in-scope FDI stock in developing countries amounted to around \$1.9 trillion. While developing countries account for a small share of all FDI subject to the reform – around 10% – this does not mean the impact will be small from their perspective. Additional taxes will apply to 20% to 25% percent of the FDI stock for the median developing country given full implementation. Even with partial implementation, additional taxes will apply to around 15% of the FDI stock through IIRs.

As this paper highlights, the potential impact of Pillar Two on investment may be large. Pillar Two is generally well-targeted and most of the impact falls on OFCs. Still, countries could be selective about how IIRs or UTPRs are applied. In cases where an MNE has substantive activities in a low-income country, tax waivers should be considered. This would minimize potential spillovers in a context where many developing countries struggle to attract projects. While the benefits of tax competition are debated, it is clear that many developing countries cannot easily unwind existing tax incentives or implement new investment promotion strategies. Similarly, the carve-out provisions could be

revisited. Larger deductions may help stimulate investment and are less likely to interfere with existing tax incentives.

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A. Appendix

A.1. Country Groupings

The following countries are treated as OFCs (by ISO3 code):

ABW; AIA; AND; ATG; BEL; BHR; BHS; BLZ; BMU; BRB; CHE; CUW; CYM; CYP; GIB; GRD; HKG; IRL; KNA; LBN; LCA; LUX; MHL; MLT; MUS; NLD; PAN; SGP; SYC; TCA; VCT; VGB

Figure 1 excludes the following countries:

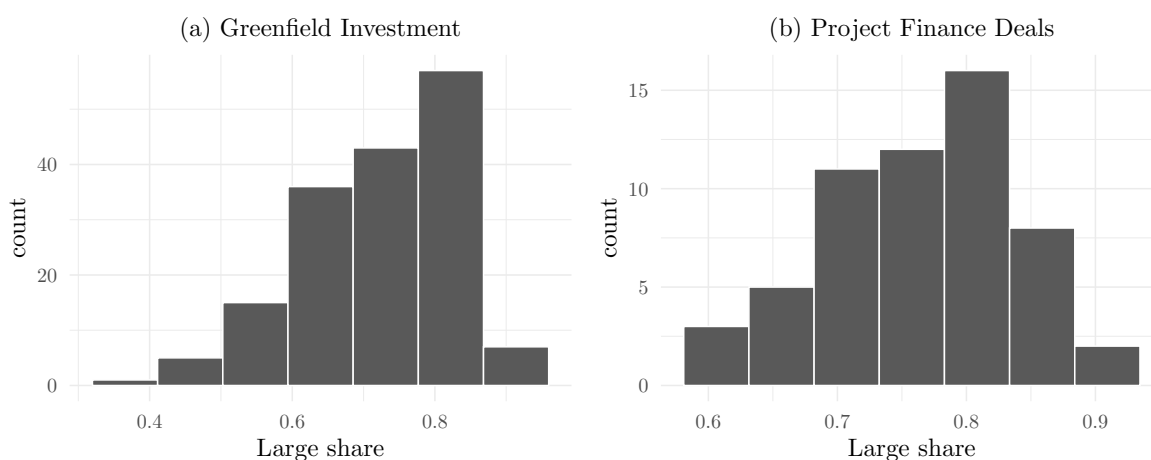
AGO; ARE; BEN; GNB; TUN; TZA

Most are primary commodity exporters and taxes on income from resource extraction may apply.

A.2. The Large MNE Contribution to Cross-Border Transactions

The estimated share for investment by large MNEs across countries mostly falls between 50% and 90% for greenfield investment and 65% and 90% for international project finance deals (figure 4). Table 16 provides the number of project announcements by country, the corresponding capital expenditures (capex), and the imputation for the large MNE share of projects. While the number of announcements is low for some countries, we include them for completeness. Otherwise, all results are limited to the subset of countries with 25 or more total projects. For M&A, we only provide values and an analysis of 2023 announcements suggests the large MNE share is around 90% overall.

Figure 4: The Distribution of Large MNE Project Announcement Shares Across Countries



Source: Author's estimates. Note: Only countries with 25 or more observations are included.

Table 16: Cross-Border Transactions, Totals 2011-23 in Millions 2011 USD

Country	Greenfield Investment					International Project Finance Deals				
	#	Total Capex	Large Capex	Large Share	M&A Sales	#	Total Value	Large Value	Large Share	FDI Inflows
Afghanistan	14	990	723	0.73	0	3	821	617	0.75	637
Albania	142	11,945	8,359	0.70	0	9	2,050	1,618	0.79	12,354
Algeria	485	79,353	58,973	0.74	140	11	16,016	13,679	0.85	14,105
Angola	410	86,678	81,374	0.94	120	20	11,906	9,812	0.82	12,993
Antigua & Barbuda	8	2,483	1,130	0.46	.	0	.	.	.	1,386
Argentina	1,830	110,820	89,102	0.80	7,638	40	21,043	14,540	0.69	102,607
Armenia	276	8,969	6,107	0.68	299	1	150	64	0.43	4,030
Aruba	13	1,146	796	0.70	.	1	78	0	0.00	1,544
Australia	6,923	545,058	465,782	0.85	253,566	440	448,502	354,630	0.79	514,702
Austria	1,814	49,720	41,397	0.83	26,853	18	3,202	2,435	0.76	61,377
Azerbaijan	454	38,169	32,134	0.84	4,719	5	7,298	6,130	0.84	23,890
Bahamas	39	1,931	1,410	0.73	.	3	1,022	874	0.86	14,129
Bahrain	827	40,286	29,566	0.73	6,888	14	2,831	2,147	0.76	14,960
Bangladesh	366	34,811	27,780	0.80	1,757	36	39,148	29,140	0.74	24,774
Barbados	18	1,021	597	0.58	.	1	350	229	0.65	3,472
Belarus	394	14,780	9,731	0.66	561	8	2,033	1,793	0.88	19,094
Belgium	3,565	100,348	83,793	0.84	53,820	37	18,638	15,208	0.82	258,991
Belize	21	666	263	0.39	33	0	.	.	.	1,103
Benin	35	2,456	2,113	0.86	0	4	1,343	964	0.72	2,630
Bermuda	41	690	377	0.55	47,528	6	2,448	1,988	0.81	365
Bhutan	21	1,941	818	0.42	0	0	0	0	.	149
Bolivia	145	22,541	18,093	0.80	487	7	3,892	2,368	0.61	6,461
Bosnia & Herzegovina	476	19,993	11,257	0.56	104	20	3,009	2,001	0.67	5,087
Botswana	149	8,228	4,281	0.52	106	6	4,739	3,253	0.69	2,256
Brazil	5,908	441,645	363,193	0.82	129,405	373	123,698	87,983	0.71	698,260
Brunei	72	19,354	15,785	0.82	1	5	16,457	14,958	0.91	4,878
Bulgaria	2,027	79,233	54,303	0.69	837	32	11,589	9,115	0.79	19,757
Burkina Faso	55	4,109	2,023	0.49	18	12	900	559	0.62	2,344
Burundi	36	1,229	752	0.61	0	3	126	71	0.56	89
Cambodia	532	33,783	22,710	0.67	1,162	25	8,648	7,053	0.82	28,759
Cameroon	142	19,516	15,254	0.78	0	8	4,407	3,168	0.72	7,938
Canada	6,250	379,082	313,412	0.83	253,056	141	97,302	74,109	0.76	497,754
Cayman Islands	66	2,114	1,337	0.63	.	0	0	0	.	379,304
Central African Republic	10	270	158	0.58	0	0	0	0	.	190
Chad	26	2,007	1,170	0.58	0	3	565	493	0.87	4,900
Chile	1,612	156,502	125,292	0.80	29,646	237	93,219	67,454	0.72	193,168
China	21,772	1,689,811	1,389,775	0.82	197,712	112	42,036	35,388	0.84	1,536,891
Colombia	2,319	92,825	71,494	0.77	12,134	70	21,197	15,702	0.74	146,785
Comoros	7	153	95	0.62	0	0	.	.	.	72
Costa Rica	1,156	20,091	15,178	0.76	939	4	1,149	863	0.75	28,583
Côte d'Ivoire	321	16,765	10,068	0.60	117	20	6,649	4,779	0.72	7,701
Croatia	887	23,150	15,659	0.68	2,141	23	5,645	4,312	0.76	15,364
Cyprus	220	5,882	4,234	0.72	10,620	3	337	236	0.70	255,912
Czechia	2,646	79,754	62,668	0.79	11,313	9	3,584	2,844	0.79	79,268
Congo - Kinshasa	160	22,165	14,461	0.65	2	21	7,029	4,676	0.67	19,816
Denmark	1,878	29,265	21,197	0.72	50,550	47	9,455	7,082	0.75	59,250
Djibouti	41	7,295	5,155	0.71	0	7	7,683	6,056	0.79	1,757
Dominica	7	344	213	0.62	.	1	167	117	0.70	388
Dominican Republic	344	30,850	20,426	0.66	2,286	21	5,543	3,917	0.71	29,891
Timor-Leste	14	7,120	6,173	0.87	0	0	0	0	.	476
Ecuador	277	15,248	11,919	0.78	1,153	10	3,731	2,769	0.74	9,399
Egypt	1,510	341,872	235,322	0.69	7,972	102	64,668	54,000	0.84	68,687
El Salvador	217	8,067	5,947	0.74	103	14	4,314	2,272	0.53	4,472
Equatorial Guinea	24	5,754	4,478	0.78	0	1	297	252	0.85	6,057
Eritrea	9	1,690	804	0.48	0	0	0	0	.	367
Estonia	609	15,488	10,008	0.65	758	18	19,923	16,783	0.84	13,940

Table 16: Cross-Border Transactions, Totals 2011-23 (millions constant 2011 USD) *(continued)*

Country	Greenfield Investment					International Project Finance Deals				
	#	Total Capex	Large Capex	Large Share	M&A Sales	#	Total Value	Large Value	Large Share	FDI Inflows
Eswatini	27	1,270	667	0.53	0	3	2,185	1,681	0.77	596
Ethiopia	293	26,527	14,359	0.54	1,024	22	24,427	19,455	0.80	27,655
Fiji	50	2,448	1,314	0.54	174	3	907	625	0.69	3,331
Finland	1,874	40,362	25,747	0.64	52,181	120	22,167	15,455	0.70	67,496
France	11,302	255,610	203,068	0.79	243,057	233	77,035	58,593	0.76	282,976
French Polynesia	2	74	48	0.66	0	1	137	105	0.77	620
Gabon	77	15,863	12,257	0.77	60	12	4,056	3,350	0.83	12,139
Gambia	24	1,241	742	0.60	0	0	0	0	.	827
Georgia	420	20,521	13,868	0.68	422	11	3,226	2,375	0.74	15,409
Germany	17,148	353,514	279,242	0.79	242,548	181	72,340	49,197	0.68	399,191
Ghana	625	50,739	33,606	0.66	375	34	16,219	11,907	0.73	31,608
Greece	740	36,525	28,921	0.79	19,266	31	13,072	11,217	0.86	36,978
Grenada	13	209	169	0.81	.	1	935	824	0.88	1,354
Guatemala	262	10,386	6,834	0.66	747	8	1,555	1,017	0.65	15,030
Guinea	65	11,276	6,437	0.57	133	26	19,572	12,775	0.65	3,832
Guinea-Bissau	11	1,143	671	0.59	.	0	.	.	.	267
Guyana	49	24,891	23,602	0.95	7	11	22,266	18,989	0.85	12,852
Haiti	33	2,204	1,422	0.65	4	1	49	26	0.53	1,319
Honduras	157	8,285	5,992	0.72	24	4	749	568	0.76	10,620
Hong Kong SAR China	3,839	101,310	67,224	0.66	108,329	9	11,124	9,184	0.83	1,203,660
Hungary	2,840	114,229	92,318	0.81	1,864	16	5,492	4,583	0.83	63,621
Iceland	69	4,117	2,752	0.67	2,905	10	32,025	27,003	0.84	4,196
India	14,945	769,370	628,384	0.82	136,509	355	155,192	124,603	0.80	453,112
Indonesia	2,456	362,736	285,124	0.79	18,644	123	117,183	85,988	0.73	205,246
Iran	248	45,490	34,256	0.75	922	5	17,232	15,060	0.87	30,455
Iraq	378	71,946	49,181	0.68	2,925	18	29,522	25,166	0.85	5,213
Ireland	4,123	161,908	131,681	0.81	156,449	93	34,851	22,825	0.65	657,480
Israel	879	38,915	34,540	0.89	96,126	13	11,383	9,369	0.82	165,966
Italy	3,620	172,395	138,102	0.80	123,048	312	56,545	38,839	0.69	212,384
Jamaica	114	7,610	5,685	0.75	62	5	586	374	0.64	6,317
Japan	4,017	162,786	130,940	0.80	80,468	132	35,780	27,266	0.76	120,681
Jordan	425	50,717	38,297	0.76	2,460	33	11,134	8,654	0.78	15,337
Kazakhstan	760	124,474	100,376	0.81	1,131	44	70,707	58,762	0.83	78,260
Kenya	930	27,086	18,412	0.68	1,105	32	13,555	10,330	0.76	15,035
Kuwait	458	14,048	12,488	0.89	14,680	4	5,586	4,665	0.84	11,124
Kyrgyzstan	64	7,115	4,879	0.69	27	2	479	362	0.76	4,377
Laos	235	20,479	11,931	0.58	72	20	11,054	8,096	0.73	9,854
Latvia	679	20,241	12,057	0.60	500	7	1,143	900	0.79	12,372
Lebanon	284	16,024	11,505	0.72	419	14	1,191	893	0.75	24,552
Lesotho	22	1,442	485	0.34	29	3	330	226	0.68	961
Liberia	47	8,427	6,810	0.81	380	4	1,059	813	0.77	4,647
Libya	174	45,737	35,445	0.77	20	3	2,345	1,972	0.84	2,074
Lithuania	1,088	22,897	15,690	0.69	1,139	24	5,761	4,101	0.71	15,989
Luxembourg	489	10,157	7,514	0.74	57,717	6	3,811	3,108	0.82	286,202
Macao SAR China	232	20,294	16,029	0.79	486	1	2,500	2,259	0.90	31,672
Madagascar	67	9,519	7,790	0.82	5	12	4,321	2,994	0.69	5,191
Malawi	43	3,331	2,025	0.61	102	11	2,669	1,840	0.69	2,980
Malaysia	3,414	241,287	185,115	0.77	16,820	71	108,386	98,384	0.91	111,667
Maldives	64	4,895	3,572	0.73	51	10	2,824	2,423	0.86	5,277
Mali	46	4,324	2,197	0.51	78	9	1,736	1,006	0.58	4,737
Malta	241	5,473	3,707	0.68	2,068	0	0	0	.	86,942
Mauritania	42	6,308	4,667	0.74	32	5	1,269	940	0.74	8,850
Mauritius	142	4,803	3,205	0.67	2,488	4	438	313	0.71	4,130
Mexico	7,439	428,000	357,425	0.84	49,164	145	77,927	57,463	0.74	355,800
Moldova	166	4,850	3,591	0.74	78	2	268	199	0.74	3,224
Mongolia	105	16,450	11,966	0.73	245	10	11,693	7,486	0.64	21,845

Table 16: Cross-Border Transactions, Totals 2011-23 (millions constant 2011 USD) *(continued)*

Country	Greenfield Investment					International Project Finance Deals				
	#	Total Capex	Large Capex	Large Share	M&A Sales	#	Total Value	Large Value	Large Share	FDI Inflows
Montenegro	126	9,359	6,803	0.73	36	7	1,055	695	0.66	5,980
Morocco	1,368	93,182	72,451	0.78	3,555	27	49,174	41,172	0.84	28,845
Mozambique	358	62,666	48,943	0.78	2,730	41	117,077	101,237	0.86	41,124
Myanmar (Burma)	696	59,604	47,198	0.79	876	22	66,931	60,386	0.90	21,963
Namibia	188	14,923	9,885	0.66	83	14	15,657	12,947	0.83	5,944
Nepal	93	4,522	2,925	0.65	5	10	8,205	6,335	0.77	1,157
Netherlands	4,388	145,051	110,493	0.76	265,440	93	27,064	21,302	0.79	472,429
New Caledonia	12	3,361	3,346	1.00	0	1	9	6	0.67	12,682
New Zealand	1,026	34,586	24,805	0.72	18,452	21	5,059	3,923	0.78	35,379
Nicaragua	162	46,789	18,711	0.40	138	2	40,186	40,126	1.00	10,295
Niger	21	6,202	6,106	0.98	23	3	1,308	881	0.67	6,764
Nigeria	931	136,072	94,966	0.70	5,198	53	45,340	36,629	0.81	41,675
North Korea	19	2,008	1,638	0.82	0	0	.	.	.	694
North Macedonia	373	13,508	8,540	0.63	53	14	2,141	1,482	0.69	4,283
Norway	699	28,191	22,740	0.81	57,826	53	17,956	14,571	0.81	49,270
Oman	840	93,152	67,045	0.72	1,254	81	31,776	26,928	0.85	28,948
Pakistan	609	94,764	63,712	0.67	1,226	35	23,919	19,617	0.82	19,496
Panama	529	34,385	25,036	0.73	3,087	22	10,625	8,585	0.81	38,144
Papua New Guinea	67	23,509	16,485	0.70	6,706	11	32,405	28,211	0.87	986
Paraguay	129	7,633	4,454	0.58	15	5	2,312	1,978	0.86	4,933
Peru	1,150	109,763	82,395	0.75	9,914	59	40,836	32,018	0.78	79,942
Philippines	2,318	137,707	99,293	0.72	11,998	106	110,439	90,663	0.82	76,228
Poland	7,009	293,087	240,352	0.82	19,463	150	22,713	16,118	0.71	169,386
Portugal	1,794	76,480	60,503	0.79	32,904	88	22,830	15,496	0.68	85,484
Qatar	1,181	123,714	115,793	0.94	837	19	14,930	9,429	0.63	5,020
Congo - Brazzaville	48	9,948	8,275	0.83	7	6	4,884	3,540	0.72	22,690
Romania	4,611	186,585	138,468	0.74	1,910	69	14,852	10,579	0.71	56,423
Russia	6,662	422,601	329,866	0.78	77,852	51	35,980	31,870	0.89	296,797
Rwanda	197	9,459	5,709	0.60	121	10	4,477	3,571	0.80	3,591
St. Lucia	32	1,294	573	0.44	.	0	.	.	.	970
St. Vincent & Grenadines	2	36	21	0.58	.	0	.	.	.	1,159
Samoa	4	957	264	0.28	444	0	0	0	.	138
São Tomé & Príncipe	4	271	183	0.68	.	1	536	363	0.68	352
Saudi Arabia	2,208	214,679	183,393	0.85	38,366	309	101,060	66,783	0.66	95,322
Senegal	185	14,996	12,400	0.83	531	14	7,209	5,567	0.77	10,098
Serbia	1,683	62,602	40,818	0.65	2,400	55	20,386	14,099	0.69	39,090
Seychelles	38	1,624	1,300	0.80	708	0	0	0	.	1,867
Sierra Leone	44	4,753	2,271	0.48	52	8	3,494	2,676	0.77	4,221
Singapore	6,902	237,413	183,345	0.77	108,107	16	10,074	8,055	0.80	853,794
Slovakia	1,395	72,819	59,643	0.82	857	11	2,528	2,102	0.83	16,946
Slovenia	385	10,345	8,267	0.80	3,613	6	1,909	1,639	0.86	11,436
Solomon Islands	5	389	204	0.52	23	1	448	219	0.49	436
Somalia	25	1,268	707	0.56	0	1	942	664	0.70	3,850
South Africa	2,497	133,166	98,770	0.74	50,670	106	62,194	48,808	0.78	80,783
South Korea	2,385	171,956	144,914	0.84	31,174	37	10,128	7,169	0.71	131,040
South Sudan	81	4,996	4,040	0.81	.	0	.	.	.	420
Spain	10,119	322,049	260,785	0.81	190,388	370	112,117	82,071	0.73	294,175
Sri Lanka	496	45,117	18,561	0.41	674	13	8,833	6,989	0.79	10,032
Sudan	85	9,766	7,631	0.78	466	11	6,183	4,687	0.76	11,939
Suriname	13	1,071	437	0.41	4	1	480	237	0.49	1,314
Sweden	1,863	50,952	39,267	0.77	87,432	117	37,627	23,582	0.63	159,000
Switzerland	2,534	55,535	43,196	0.78	236,043	17	5,024	3,894	0.78	337,743
Syria	168	30,408	19,323	0.64	22	1	18	13	0.72	804
São Tomé & Príncipe	3	214	178	0.83	0	0	536	363	0.68	352
Taiwan	1,681	72,665	60,899	0.84	15,603	67	22,458	13,579	0.60	54,985
Tajikistan	102	8,788	5,815	0.66	100	3	4,225	3,273	0.77	3,281

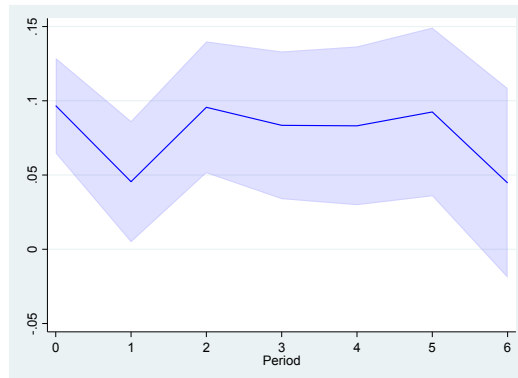
Table 16: Cross-Border Transactions, Totals 2011-23 (millions constant 2011 USD) (*continued*)

Country	Greenfield Investment				M&A Sales	International Project Finance Deals				FDI Inflows
	#	Total Capex	Large Capex	Large Share		#	Total Value	Large Value	Large Share	
Tanzania	401	24,890	13,549	0.54	54	27	14,360	9,028	0.63	13,978
Thailand	3,222	147,052	118,607	0.81	1,674	33	24,245	20,618	0.85	91,615
Togo	51	4,127	3,263	0.79	536	4	1,472	1,140	0.77	1,690
Tonga	2	141	80	0.57	0	0	.	.	.	230
Trinidad & Tobago	65	8,449	7,260	0.86	2,954	3	691	486	0.70	1,917
Tunisia	515	32,560	25,350	0.78	381	16	4,596	2,758	0.60	10,731
Turkey	3,220	176,545	150,530	0.85	28,546	68	52,155	44,409	0.85	141,939
Turkmenistan	75	21,188	19,003	0.90	0	1	519	436	0.84	25,869
Turks & Caicos Islands	4	425	240	0.56	.	0	.	.	.	175
United Arab Emirates	7,646	195,735	133,701	0.68	37,899	112	36,065	28,453	0.79	140,030
Uganda	349	29,508	22,759	0.77	96	12	2,584	2,084	0.81	11,074
Ukraine	1,626	65,532	44,618	0.68	2,224	36	10,582	8,206	0.78	43,651
United Kingdom	21,269	824,144	664,993	0.81	930,560	440	222,082	170,970	0.77	725,475
United States	30,047	1,347,610	1,077,576	0.80	1,974,874	737	439,898	346,141	0.79	2,977,480
Uruguay	353	26,366	21,931	0.83	1,551	22	8,964	6,476	0.72	19,175
Uzbekistan	419	45,216	34,837	0.77	324	16	11,589	8,549	0.74	15,910
Vanuatu	3	46	18	0.38	3	0	.	.	.	356
Venezuela	260	47,198	41,659	0.88	0	3	690	464	0.67	17,427
Vietnam	4,346	413,200	320,725	0.78	27,792	85	57,074	46,420	0.81	137,551
Zambia	292	25,916	18,076	0.70	223	31	22,488	17,827	0.79	10,549
Zimbabwe	183	26,357	15,523	0.59	153	25	20,062	15,619	0.78	4,304
Total	304,867	16,006,882	12,601,354	0.79	6,855,343	8,190	4,399,500	3,433,420	0.78	18,544,268

A.2.1. Local Projections of Project Announcements on FDI

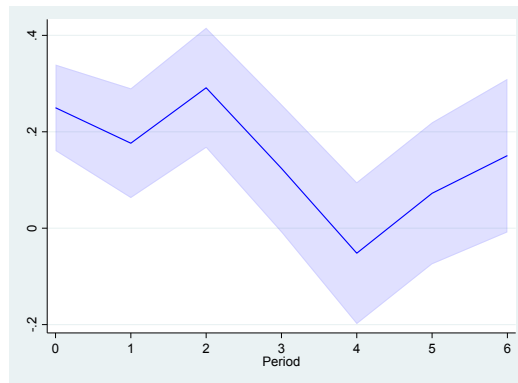
The following charts and tables give the results for the local projections of cross-border transactions on FDI. After six periods, they are all statistically indistinguishable from 0 at the 95% confidence interval.

Figure 5: Local Projection of Greenfield Investment on FDI



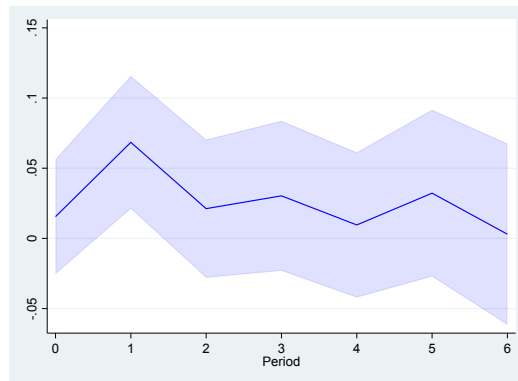
Period	IRF	Std. Err.	IRF Lower	IRF Upper
0	0.09673	0.01645	0.06450	0.12896
1	0.04552	0.02084	0.00467	0.08637
2	0.09561	0.02264	0.05124	0.13999
3	0.08348	0.02538	0.03374	0.13321
4	0.08314	0.02728	0.02967	0.13662
5	0.09249	0.02899	0.03567	0.14931
6	0.04466	0.03261	-0.01926	0.10859

Figure 6: Local Projection of M&A Deals on FDI



Period	IRF	Std. Err.	IRF Lower	IRF Upper
0	0.24988	0.04574	0.16023	0.33953
1	0.17630	0.05813	0.06236	0.29024
2	0.29131	0.06364	0.16658	0.41604
3	0.12412	0.06795	-0.00905	0.25729
4	-0.05185	0.07515	-0.19915	0.09545
5	0.07237	0.07518	-0.07498	0.21972
6	0.15061	0.08130	-0.00874	0.30996

Figure 7: Local Projection of International Project Finance Deals on FDI



Period	IRF	Std. Err.	IRF Lower	IRF Upper
0	0.01548	0.02090	-0.02549	0.05645
1	0.06843	0.02412	0.02115	0.11571
2	0.02120	0.02511	-0.02801	0.07041
3	0.03032	0.02725	-0.02309	0.08373
4	0.00958	0.02638	-0.04213	0.06128
5	0.03223	0.03031	-0.02718	0.09164
6	0.00300	0.03294	-0.06157	0.06756

A.3. FDI Structures and the Mechanics of Pillar Two

Box 2 provides a stylized overview of different MNE holding structures and the relevant tax rule within Pillar Two. We expect that a QDMTT or IIR will apply most of the time. The UTPR has a deterrence role and prevents MNEs from shielding part of their operations from the minimum tax. The cases from Box 2 are summarized below:

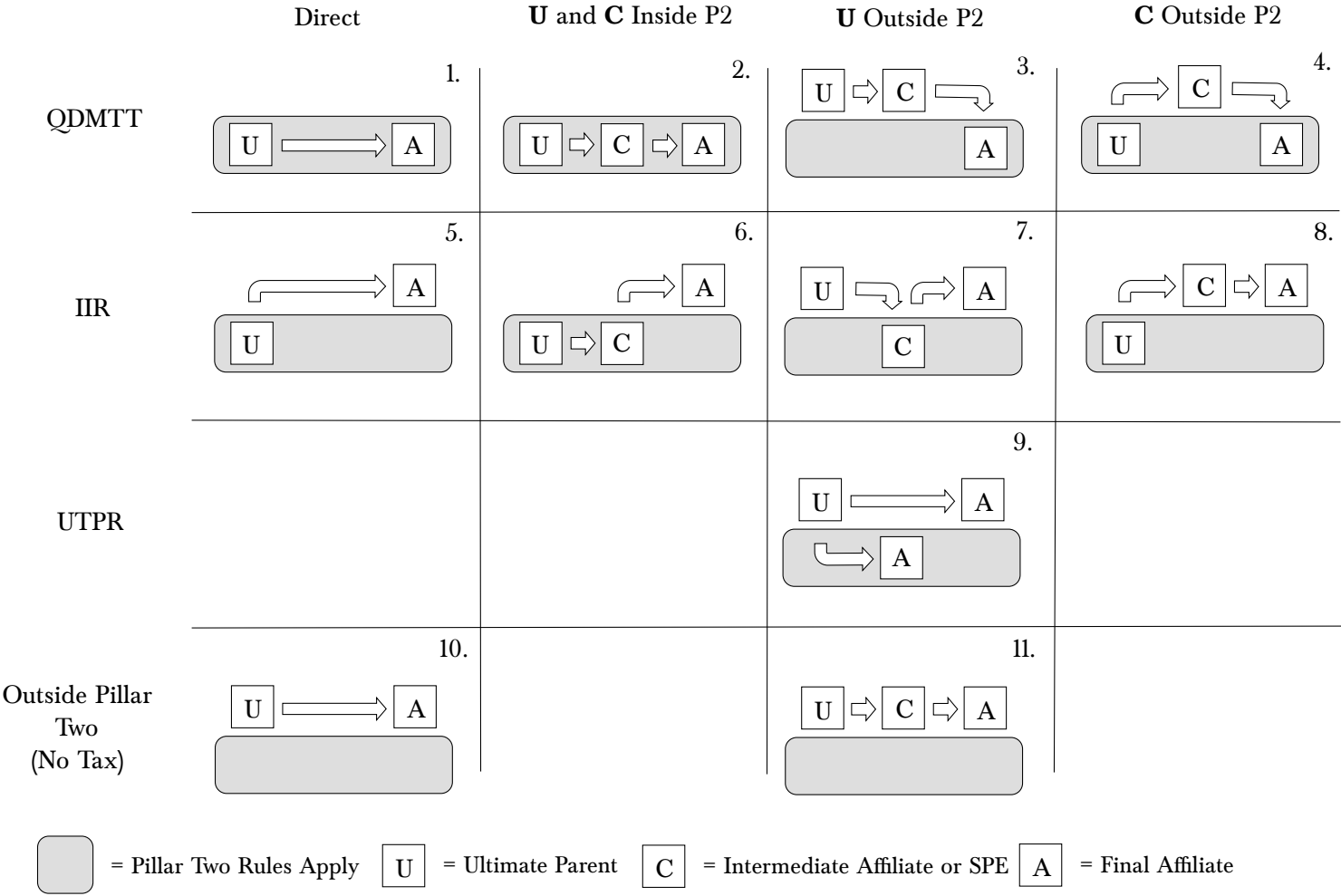
Qualified Domestic Top-Up Tax (Cases 1-4): The QDMTT takes precedence over other Pillar Two taxes. The tax is collected by the country where the low-tax affiliate is located and the tax regime faced by other parts of the MNE group is irrelevant.

Income Inclusion Rule (Cases 5-8): The IIR has second priority. If a low-tax affiliate is not subject to a QDMTT where it is located, then tax rights devolve to the country where the ultimate parent resides. If the ultimate parent is not subject to BEPS, then tax rights move down the ownership chain of the MNE group.

Undertaxed Payments Rule (Case 9): If both the MNE parent and the ownership chain connecting it to a low-tax affiliate lie outside Pillar Two, the UTPR may apply if other parts of the MNE group are inside Pillar Two countries. The UTPR cancels any tax deduction these affiliates receive for intragroup payments until tax underpayments are recouped. The allocation of tax rights across Pillar Two countries is more complicated than the other rules. The first allocation key is roughly equal to each country's share of intragroup payments to the low-tax affiliate. If this is insufficient, then a second key allocates tax rights based on each country's share of intragroup expenditures.

While investments may pass through multiple conduits, the simplified taxonomy captures the vast majority of cases. The location of the ultimate investor is needed to test if Pillar Two applies (cases 3, 4, 8, 10, and 11). Only the application of a UTPR (case 9) is difficult to distinguish.

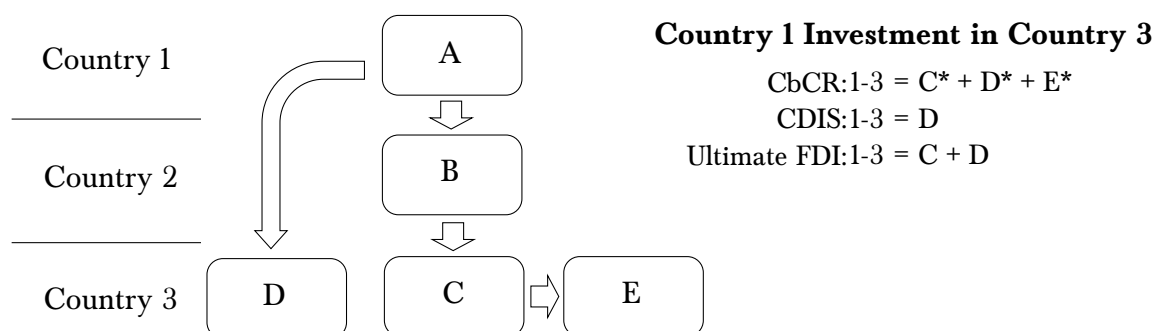
Box 2: Simplified Taxonomy of FDI Structures and Pillar Two Tax Regimes



A.4. The Problem of Consolidation and Complex Ownership Chains

Complex ownership makes it difficult to directly estimate the large MNE share. The closest analog to FDI in CbCRs, ‘stated capital,’ is not reported on a consolidated basis.⁴² For example, if a holding company invests in a subsidiary, which then invests in another subsidiary, each of those investments is added to the total.⁴³ This double counting problem arises both within and across countries. Meanwhile, bilateral FDI statistics give the consolidated position within a country. Comparing CbCRs to consolidated FDI positions leads to an upward bias. This is observable but difficult to accurately measure – CbCRs indicate holding companies are present in more than three-quarters of countries. Furthermore, MNEs frequently structure investments through offshore intermediaries.

To illustrate the problem, take that MNEs based in country 1 have ownership structures similar to the diagram below. The parent company (A) has two productive affiliates in country 3. One affiliate (D) is directly held by the parent. The second affiliate (E) is indirectly held via two holding companies. One holding company (B) is offshore and the other (C) is in the same country as the affiliate. This case is fairly typical.



The CbCR tables for country 1 will include the total capital of all affiliates in country 3 in the scope of Pillar Two (denoted C^* , D^* , and E^*). Most countries only report FDI for immediate investors (D). If the desired estimate is the share of FDI in the scope of Pillar relative to total FDI in country 3, there is a consistent upward bias:

⁴²According to the OECD [tax guidance](#): “in the Capital element, the sum of the stated capital of all Constituent Entities resident for tax purposes in the relevant Tax Jurisdiction should be provided.” The [IRS](#) also clarifies that MNE groups should provide aggregated data on the CbC reports (excluding intracompany dividends).

⁴³Still, it is interesting to note an outsized share of capital from CbCRs (\$9.8 out of \$22.5 trillion) is located in OFCs.

$$\% \text{ FDI in Pillar Two Scope} = \underbrace{\frac{C^* + D^* + E^*}{D}}_{\text{immediate investor}} \geq \underbrace{\frac{C^* + D^* + E^*}{C + D}}_{\text{ultimate investor}} \geq \underbrace{\frac{D^* + E^*}{D + E}}_{\text{desired estimate}} \quad (\text{given } C = E)$$

The bias is greatest when only immediate investors (D) are included in the definition of FDI. Adding ultimate investment (C) reduces the bias, but it is only fully addressed if the CbCR data are consolidated.

A.5. The Large MNE Share of FDI

A.5.1. Data Sources

Three primary data sources inform the tax analysis: First, the OECD CbCR Tables provide an important benchmark. Despite some of the aforementioned issues, CbCRs capture affiliates within the scope of Pillar Two and the indicators are based on consistent reporting standards. Second, the EUTAX database collects public CbCRs and publishes the data at the affiliate level, but suffers from selection bias and a small sample size. Orbis – the third and final source – is by far the most comprehensive and provides granular information on MNE affiliates, but has several limitations. Accounting standards may be inconsistent with BEPS Pillar Two and not all affiliates are correctly linked to their ultimate owners. Additionally, the sample is biased towards larger affiliates and particular regions. Despite these limitations, the three sources align in many respects and all three show there is a large degree of variation in tax rates within most countries.

OECD Country by Country Reporting (CbCR) Tables

At the time of writing, the OECD has published tables with country-by-country data for 2016-20 at both the country level and for some country pairs. The CbCRs are now mandatory for all MNEs in the scope of Pillar Two and are collected by the jurisdiction where the MNE has its headquarters. Reporting includes most elements needed to calculate average ETRs, including profits and taxes accrued/paid. Results are based on sample averages using all years with data available unless noted otherwise. Ultimate parent countries and ‘stateless’ entities are excluded to minimize issues with intra-firm dividends. Furthermore, several countries and country pairs are excluded since they report ETRs considerably higher than STRs. All are primary commodity exporters and taxes on income from resource extraction can be high relative to other activities.⁴⁴

⁴⁴As noted in the previous section, covered taxes may include taxes on income from resource extraction.

The OECD notes several shortcomings for CbCR data relevant to this analysis. First, initial reported may have included intra-company dividends in profit figures, introducing a downward bias when calculating effective tax rates. Dropping the ultimate parent jurisdiction is a common way to address this concern and the sample is limited to the international affiliates of MNEs. This also addresses another shortcoming of the data – tax-exempt entities such as pension funds are required to file CbCRs and are included in the aggregates. Their inclusion could distort the relationship between profits and taxes, but again most are headquartered in the reporting (ultimate parent) jurisdiction. There are other sources of bias we cannot address: The samples across years are not fully comparable as CbCRs transitioned from voluntary to mandatory filing. The bilateral tax distribution in figure 1 is based on incomplete reporting. Around 100 out of 148 countries have more than 3 bilateral observations in CbCR data and only 43 have more than 10 observations. These data issues should gradually resolve over time, but alternative data sources are needed given the timeline of the reform and planned 2024 implementation. Due to inconsistencies, we exclude the following countries from the analysis whenever CbCR tax rates are used: Angola, Benin, Guinea-Bissau, Tanzania, Tunisia, and the United Arab Emirates.

EU Tax Observatory Database of Public CbCRs

Some companies voluntarily disclose their CbCRs and the EU Tax Observatory (EUTAX) has constructed an affiliate-level database from these indicators, which includes profits before income taxes, income taxes paid/accrued, and tangible assets. Most reporters follow the GRI 207 accounting standard, which conforms with the OECD requirements and covers the series needed to calculate the GloBE ratio. In addition, the final report for Action 13 (OECD) provides a template for multinationals to disclose information on their operations by jurisdiction, which some have also used. The EUTAX database includes most variables needed to calculate the GloBE ratio, but payroll is excluding making it impossible to calculate the carve-out amount.

Similar to the OECD CbCR database, we drop observations for the ultimate parent jurisdiction. Affiliates with negative profits are excluded from the sample, as are cases where the ETR is greater than one. When multiple observations are available, we use the average across years. Some MNEs report negative taxes and their inclusion as zero-tax affiliates can influence the results. These observations are dropped since many affiliates only have one year of data and we cannot determine

if the negative values are idiosyncratic or persistent. Still, we track their presence.

ETRs are available for around one-third of the full EUTAX sample. The resulting subsample covers 165 public CbCRs for the 2017-21 fiscal years from 95 multinational companies headquartered in 21 different jurisdictions. The median MNE reports ETRs across seven jurisdictions after data cleaning. Companies in the extraction and oil sector are overrepresented and make up more than 30% of the sample by count. Also, companies apply some discretion in choosing what variables to report and may not follow standard definitions. Despite these caveats, we find the results align fairly closely with the OECD CbCR Tables. We do not use the EUTAX database extensively due to the small sample size by country, but it helps validate the main findings from Orbis.

Bureau Van Dijk Orbis Database

Orbis provides comparable financial data for a large number of companies as well as information on their ownership structure and main activities. The database is global, but coverage is strongest for Europe. Out of the 41 million firms with detailed financial information, around 1 million are subsidiaries in the scope of BEPS and almost 50,000 provide unconsolidated information on accounting profits and tax paid over the 2013-19 sample period. Unfortunately, financial information for smaller subsidiaries may only appear on a consolidated basis, one possible source of bias in the data. An OECD study finds firms in Orbis are disproportionately larger, older, and more productive than the general population of firms.⁴⁵ The average firm size is 450 employees in the sample with operating revenue around \$200 million and profits at \$22 million – quite large compared to the average firm.

The sample is limited to firms where a foreign corporate entity is the majority shareholder and the ultimate parent has more than €750 million in revenue.⁴⁶ The following variables are used: profits ('P/L before tax'), taxes paid ('taxation'), total assets, tangible fixed assets, payroll ('costs of employees'), and the number of employees. To be included, the firm must provide unconsolidated financial statements and report profits more than €1 million for at least one year within the sample period. Firms with less than three observations over the 2013-19 sample period are dropped from

⁴⁵Source.

⁴⁶We use average annual exchange rates when the Orbis interface does not offer native Euro conversion. Parent revenue is calculated for 2021.

the sample. Following the initial selection, taxes paid and profits before tax are summed across all years to calculate the final ETR. This helps avoid issues with deferred taxes and loss carry-forward. Firms with negative profits in aggregate and ETRs greater than one are then excluded from the sample. Firms reporting negative taxes are included as zero-tax affiliates in the baseline estimates if the negative tax is observed over two or more years. These observations are separately tracked. Holding companies, head offices, and business support activities are concentrated among low-tax affiliates. We exclude them from figures and tables since intracompany dividends can distort tax ratios. The search criteria in Orbis are given in table 17.

Table 17: Orbis Search Criteria

Search Step	Step result	Search result
1. Entity type	Corporate	412,603,479
2. Subsidiaries with Ultimate Owners by profile	UO with a given operating revenue of minimum 750m EUR; GUO only; Def. of the UO: min. path of 50.01%, known shareholder, closest quoted company in the path leading to the Ultimate Owner (if any)	1,027,858
3. P/L before tax (m EUR)	min=1, 2013-19, for at least one of the selected periods, exclusion of companies with no recent financial data and Public authorities/States/Governments	746,916
4. Taxation	All companies with a known value, 2013-19, for at least one of the selected periods, exclusion of companies with no recent financial data and Public authorities/States/Governments	14,708,314
5. Consolidation code	U1 (unconsolidated accounts with no consolidated companion), U2 (unconsolidated accounts with a consolidated companion), Additional unconsolidated accounts (U*)	42,683,339
6. Subsidiaries with foreign shareholders	An Ultimate Owner or shareholder owning together 51% located anywhere (excluding unknown countries); May have other shareholders located in country of origin; Def. of the UO: min. path of 50.01%, known shareholder, closest quoted company in the path leading to the Ultimate Owner (if any)	2,945,758
Boolean search	1 and 2 and 3 and 4 and 5 and 6	
TOTAL		48,072

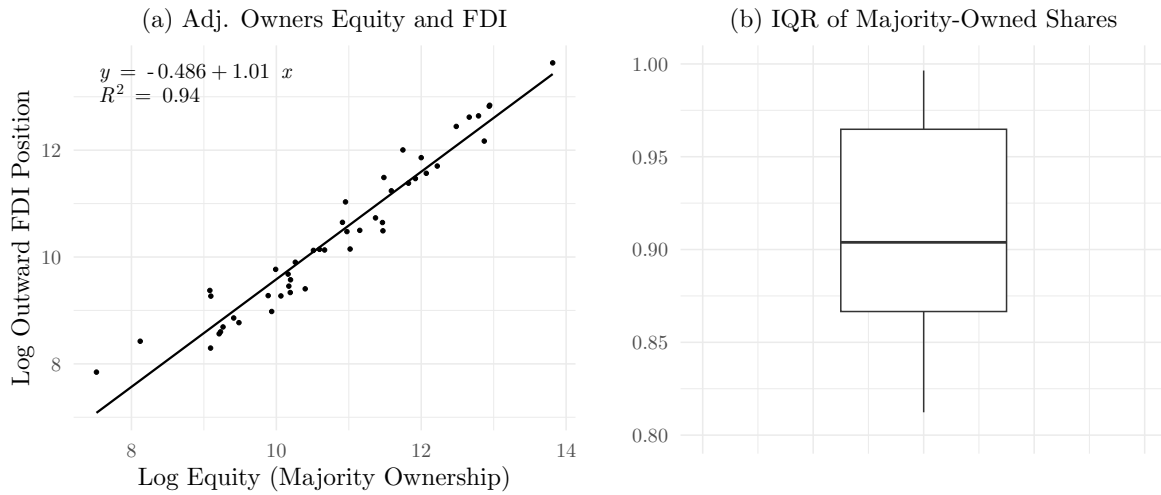
A.5.2. *Are Minority Interests Relevant?*

We use data from the US Bureau of Economic Analysis to test if minority interests explain a large share of FDI. The Worldwide Activities of US Multinational Enterprises tables summarize the finances of US foreign affiliates, including owners equity, which comprises minority interests (down to 10% of total equity) and majority-ownership. We use the difference to calculate the share of minority

interests in total investment.

Owners equity is adjusted to reflect the consolidated total and we find a near one-to-one correlation with FDI at the country level (see figure 8a).⁴⁷ Most residual variation is explained by the presence of SPEs. We then calculate the share of majority ownership in total equity. Figure 8b provides the interquartile range of shares across countries. The median value is around 90% suggesting most FDI takes the form of majority ownership.

Figure 8: The Share of FDI Explained by Majority Ownership



Source: US BEA USDIA and FDI databases and authors' calculations.

Notes: Excludes OFCs. Equity is adjusted for holding structures. Panel (a) shows the relationship between equity for majority-owned affiliates and FDI. Panel (b) compares the value of equity for majority-owned affiliates and all affiliates. Netherlands and Luxembourg are outliers and are omitted.

A.6. The Low-Tax Share of Profits

A.6.1. The EUTAX Database

Summing EUTAX affiliate-level data by country and calculating the ETR shows they are consistent with estimates from the OECD CbCR tables (see figure 9a). For each recipient country (j), we take

$$z_j = \frac{\sum_k x_{jk}}{\sum_k y_{jk}}$$

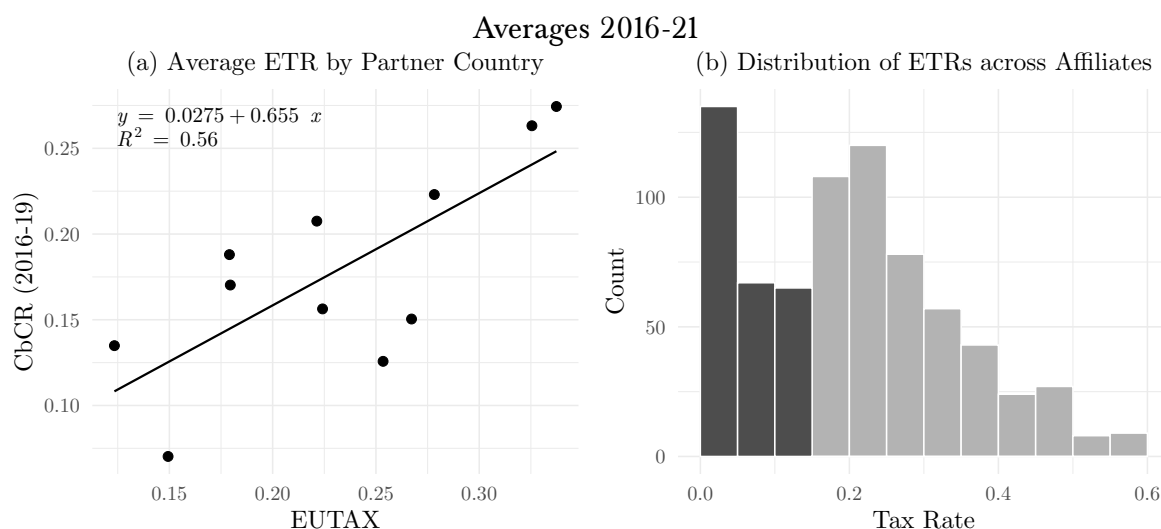
where z is the ETR, x is the average tax paid by each affiliate (k), and y is the affiliate's average profits. Tax rates across countries in EUTAX tend to be larger than corresponding CbCR values.

⁴⁷We use majority ownership since country reporting is more complete.

This is not surprising since most MNEs in the EUTAX database exclude intracompany dividends.

A surprisingly large share of affiliates have little or no tax liability in EUTAX, even though the average ETR is well above 15% for most countries. Around 37% of affiliates paid less than the Pillar Two minimum rate and 19% of affiliates paid an ETR less than 5%. Another interesting feature of the EUTAX data is the number of high-tax affiliates (see figure 9b). A large share report ETRs well above STRs. This is explained in part by the large number of resource extraction companies in the sample, which are often subject to tax surcharges. Also, a timing mismatch may arise whenever profits and associated taxes are recorded in different periods. As mentioned, EUTAX only reports one year of data in many cases. The tax distribution from Orbis is less right-skewed as several years are averaged together. The share of low-tax affiliates is also smaller.

Figure 9: The Distribution of Affiliate ETRs in the EUTAX Public CbCR Database



Source: OECD CbCR Tables and the EU Tax Observatory Public CbCR database.

Notes: Excludes affiliates in OFCs. Taxes paid and profits before tax are summed by country across firms/years to calculate the ETR. Since many MNEs only report one year, negative values are dropped (79 total). Panel (a) excludes countries with less than 15 observations. Panel (b) excludes OFCs.

The correlation between country average ETRs in the Orbis and OECD CbCR data remains fairly robust (see figure 10a). As with EUTAX, values in Orbis also tend to be higher. The gap is not a cause for concern since CbCRs often inflate profits due to the inclusion of intracompany dividends. Affiliates appear to follow a bimodal distribution in Orbis, similar to EUTAX, with a large proportion of affiliates paying little or no tax. Around 30% of firms paid an ETR less than the Pillar Two minimum rate and 16% had an average ETR less than 5%. A disproportionate share of profits – more than 40% – accrued to these low-tax affiliates. This suggests the downward bias from ignoring tax

heterogeneity is large and a substantial portion of the tax base is likely subject to some form of top-up tax.

A.6.2. Imputation of the Low-Tax Share of Large MNE Assets

Table 18 gives the results underlying the imputation of the low-tax share of total assets. We use the country average ETR from Orbis in the estimation.

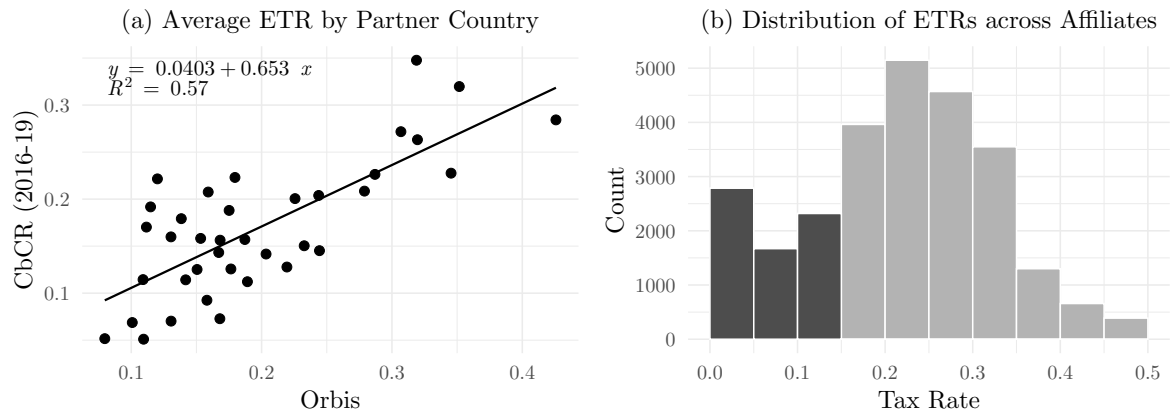
Table 18: Polynomial Regression for the Low-Tax Asset Share

	<i>Dependent variable:</i>
	Low-Tax Asset Share
Country average ETR	−9.248*** (1.039)
(Country average ETR) ²	14.777*** (2.177)
Constant	1.512*** (0.110)
Observations	31
R ²	0.845
Adjusted R ²	0.834
Residual Std. Error	0.096 (df = 28)
F Statistic	76.264*** (df = 2; 28)

Notes: Excludes OFCs. *p<0.1; **p<0.05; ***p<0.01

Figure 10a compares the country average ETR from Orbis to the corresponding ETRs derived from the OECD CbCR tables. ETRs from the CbCRs generally appear lower than the corresponding values from Orbis. This may be due to the double-counting of profits, but it is also possible reporting in Orbis is biased towards firms paying higher taxes. Figure 10a gives the overall distribution of ETRs reported in Orbis across individual firms.

Figure 10: The Distribution of Affiliate ETRs in Orbis, Averages 2013-19



Source: OECD CbCR Tables and Orbis.

Notes: Excludes affiliates in OFCs, holding companies, and regional headquarters. Taxes paid and profits before tax are summed by country across firms/years to calculate the ETR. Panel (a) excludes countries with less than 30 observations. Taxes paid and profits before tax are summed across firms/years within each country to calculate the ETR.

Table 19 provides the imputed low-tax share of MNE assets and underlying data.

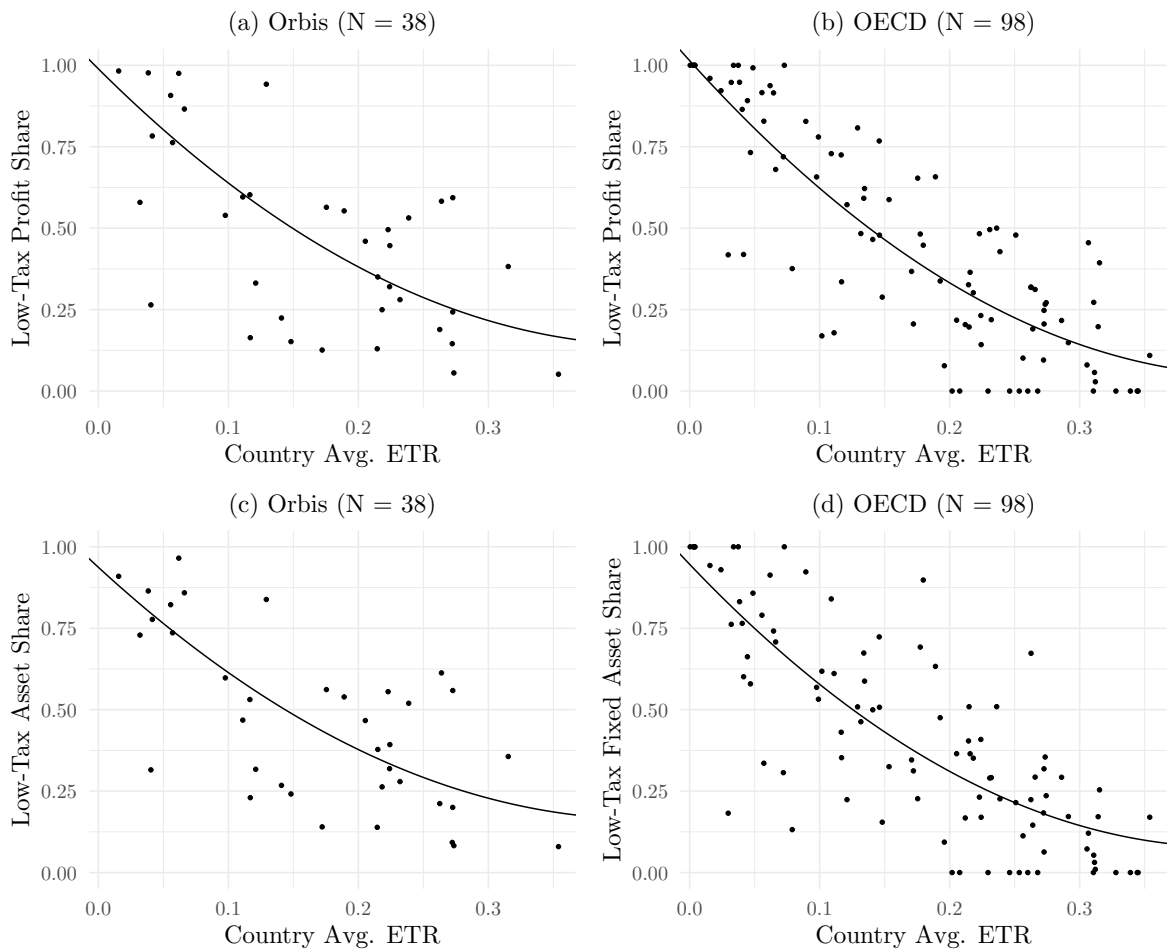
Table 19: ETRs and the Low-Tax Asset Share in Orbis

Country	Orbis		CBCR		Country	Orbis		CBCR	
	ETR	Low-Tax Assets	ETR	Est. Low-Tax Assets		ETR	Low-Tax Assets	ETR	Est. Low-Tax Assets
Albania	-	-	0.11	0.64	Laos	-	-	0.07	0.87
Algeria	-	-	0.15	0.47	Latvia	0.11	0.78	0.05	1.00
American Samoa	-	-	0.08	0.79	Lebanon	-	-	0.13	0.52
Argentina	-	-	0.27	0.14	Lesotho	-	-	0.27	0.14
Australia	0.24	0.21	0.14	0.48	Lithuania	0.15	0.47	0.12	0.56
Austria	0.11	0.56	0.11	0.61	Luxembourg	0.02	0.91	0.02	1.00
Azerbaijan	-	-	0.11	0.63	Macao SAR China	-	-	0.10	0.70
Bahrain	-	-	0.01	1.00	Madagascar	-	-	0.21	0.30
Bangladesh	-	-	0.33	0.04	Malawi	-	-	0.29	0.11
Barbados	-	-	0.01	1.00	Malaysia	-	-	0.17	0.40
Belarus	-	-	0.21	0.29	Mali	-	-	0.16	0.42
Belgium	0.17	0.56	0.20	0.31	Malta	-	-	0.02	1.00
Bermuda	-	-	0.01	1.00	Mauritania	-	-	0.25	0.20
Bosnia & Herzegovina	-	-	0.03	1.00	Mauritius	-	-	0.03	1.00
Botswana	-	-	0.14	0.49	Mexico	-	-	0.27	0.14
Brazil	0.29	0.20	0.23	0.25	Monaco	-	-	0.12	0.57
British Virgin Islands	-	-	0.00	1.00	Mongolia	-	-	0.15	0.46
Brunei	-	-	0.09	0.71	Montenegro	-	-	0.07	0.86
Bulgaria	0.10	0.97	0.07	0.88	Morocco	0.14	0.53	0.18	0.37
Burkina Faso	-	-	0.07	0.90	Mozambique	-	-	0.33	0.04
Cambodia	-	-	0.10	0.67	Myanmar (Burma)	-	-	0.10	0.68
Cameroon	-	-	0.39	0.00	Namibia	-	-	0.19	0.34
Canada	-	-	0.17	0.40	Netherlands	0.16	0.74	0.04	1.00
Cayman Islands	-	-	0.00	1.00	New Zealand	-	-	0.21	0.29
Chile	-	-	0.14	0.49	Nicaragua	-	-	0.28	0.13
China	0.18	0.39	0.19	0.34	Niger	-	-	0.09	0.76
Colombia	-	-	0.32	0.06	Nigeria	-	-	0.30	0.09
Congo - Brazzaville	-	-	0.23	0.24	North Macedonia	-	-	0.13	0.53
Congo - Kinshasa	-	-	0.14	0.51	Norway	0.43	0.19	0.28	0.12
Costa Rica	-	-	0.10	0.69	Oman	-	-	0.18	0.37
Croatia	0.17	0.32	0.07	0.85	Pakistan	-	-	0.32	0.07
Cyprus	-	-	0.02	1.00	Panama	-	-	0.08	0.83
Czechia	0.19	0.14	0.16	0.44	Papua New Guinea	-	-	0.09	0.76
Côte d'Ivoire	-	-	0.27	0.15	Paraguay	-	-	0.07	0.86
Denmark	-	-	0.19	0.33	Peru	-	-	0.26	0.18
Dominican Republic	-	-	0.16	0.43	Philippines	0.24	0.26	0.20	0.30
Ecuador	-	-	0.23	0.25	Poland	0.17	0.28	0.16	0.44
Egypt	-	-	0.28	0.12	Portugal	0.23	0.23	0.15	0.47
El Salvador	-	-	0.22	0.27	Puerto Rico	-	-	0.01	1.00
Estonia	0.22	0.32	0.13	0.55	Qatar	-	-	0.15	0.47
Eswatini	-	-	0.12	0.58	Romania	0.17	0.27	0.14	0.49
Ethiopia	-	-	0.28	0.13	Russia	0.12	0.61	0.22	0.26
Faroe Islands	-	-	0.01	1.00	Saudi Arabia	-	-	0.12	0.59
Fiji	-	-	0.17	0.41	Serbia	0.08	0.86	0.05	1.00
Finland	0.15	0.38	0.16	0.44	Seychelles	-	-	0.15	0.45
France	0.18	0.36	0.22	0.25	Sierra Leone	-	-	0.19	0.33
Gabon	-	-	0.29	0.11	Singapore	0.06	0.82	0.05	1.00
Germany	0.16	0.52	0.21	0.29	Slovakia	0.20	0.14	0.14	0.49
Ghana	-	-	0.13	0.56	Slovenia	0.14	0.54	0.11	0.61
Gibraltar	-	-	0.00	1.00	South Africa	-	-	0.26	0.17
Greece	-	-	0.27	0.15	South Korea	0.23	0.09	0.20	0.31
Greenland	-	-	0.27	0.14	South Sudan	-	-	0.03	1.00
Guatemala	-	-	0.07	0.85	Spain	0.18	0.32	0.13	0.56
Guernsey	-	-	0.02	1.00	Sri Lanka	-	-	0.12	0.59
Guinea	-	-	0.19	0.34	Sweden	0.13	0.56	0.16	0.43
Honduras	-	-	0.13	0.53	Switzerland	-	-	0.07	0.90
Hong Kong SAR China	-	-	0.07	0.88	Syria	-	-	0.05	1.00
Hungary	0.11	0.73	0.17	0.40	Taiwan	-	-	0.15	0.48
Iceland	-	-	0.14	0.51	Thailand	-	-	0.16	0.42
India	0.32	0.08	0.35	0.02	Timor-Leste	-	-	0.06	0.91
Indonesia	-	-	0.28	0.13	Trinidad & Tobago	-	-	0.35	0.02
Iran	-	-	0.10	0.71	Turkey	0.11	0.47	0.19	0.33
Iraq	-	-	0.09	0.73	Uganda	-	-	0.15	0.47
Ireland	0.08	0.84	0.10	0.67	Ukraine	0.19	0.24	0.11	0.62
Isle of Man	-	-	0.07	0.88	United Kingdom	0.13	0.60	0.07	0.88
Israel	-	-	0.19	0.33	United States	-	-	0.13	0.52
Italy	0.32	0.08	0.26	0.17	Uruguay	-	-	0.09	0.73
Jamaica	-	-	0.23	0.23	Venezuela	-	-	0.06	1.00
Japan	-	-	0.23	0.24	Vietnam	-	-	0.15	0.46
Jersey	-	-	0.01	1.00	Yemen	-	-	0.21	0.29
Jordan	-	-	0.03	1.00	Zambia	-	-	0.24	0.22
Kazakhstan	-	-	0.12	0.59	Zimbabwe	-	-	0.23	0.24
Kenya	-	-	0.35	0.01					

A.6.3. Comparing Low-Tax Shares in Orbis and the OECD CbCRs

CbCRs disaggregated by tax bracket are available for the United States and Spain. In figure 11 below, panels *b* and *d* below show the low-tax profit and asset shares by country. The corresponding results for Orbis are presented in panels *a* and *c*. The horizontal axis of each panel gives the country average ETR. The vertical axes in panels *a* and *b* give the low-tax profit shares while panels *c* and *d* give the low-tax asset shares. For the OECD CbCR data, we use fixed tangible assets, which is less prone to double-counting. The regression results for the polynomial lines are given in table 20 and the point estimates for the two data sources are comparable. Table 21 presents the cross-country correlation for the low-tax profit and asset shares in Orbis and CbCR data. For low-tax profits in particular, the correlation is strong and near one-to-one.

Figure 11: Share of Large MNE Profits and Assets Reported by Low-Tax Affiliates



Source: Orbis and OECD CbCR databases and authors' calculations.

Notes: Panel (a) shows the predicted share of capital held by low-tax affiliates along with observed values by country. Panel (b) gives predicted values when actual values are unavailable. The prediction uses ETRs from the OECD CbCR tables.

Table 20: Polynomial Regression Comparing Low-Tax Shares in Orbis and OECD CbCRs

	<i>Dependent variable:</i>			
	Low-Tax Profits		Low-Tax Assets	
	Orbis	OECD	Orbis	OECD
	(1)	(2)	(3)	(4)
Country average ETR	−3.969*** (0.852)	−4.422*** (0.472)	−3.667*** (0.765)	−4.189*** (0.520)
(Country average ETR) ²	4.645*** (1.692)	5.060*** (1.144)	4.346*** (1.519)	5.056*** (1.260)
Constant	0.989*** (0.097)	1.014*** (0.046)	0.937*** (0.087)	0.946*** (0.051)
Observations	36	96	36	96
R ²	0.546	0.715	0.555	0.634
Adjusted R ²	0.518	0.709	0.528	0.626
Residual Std. Error	0.201	0.177	0.181	0.195
F Statistic	19.829***	116.779***	20.573***	80.489***

Notes:

*p<0.1; **p<0.05; ***p<0.01

Table 21: Joint Distribution of Low-Tax Shares in Orbis and OECD CbCRs by Country

	<i>Dependent variable:</i>	
	Low-Tax Profits (Orbis)	Low-Tax Assets (Orbis)
	(1)	(2)
Low-tax profits (OECD)	0.872*** (0.109)	
Low-tax tangible fixed assets (OECD)		0.769*** (0.157)
Constant	0.073 (0.057)	0.122 (0.076)
Observations	35	35
R ²	0.660	0.421
Adjusted R ²	0.650	0.404
Residual Std. Error (df = 33)	0.173	0.205
F Statistic (df = 1; 33)	64.084***	24.043***

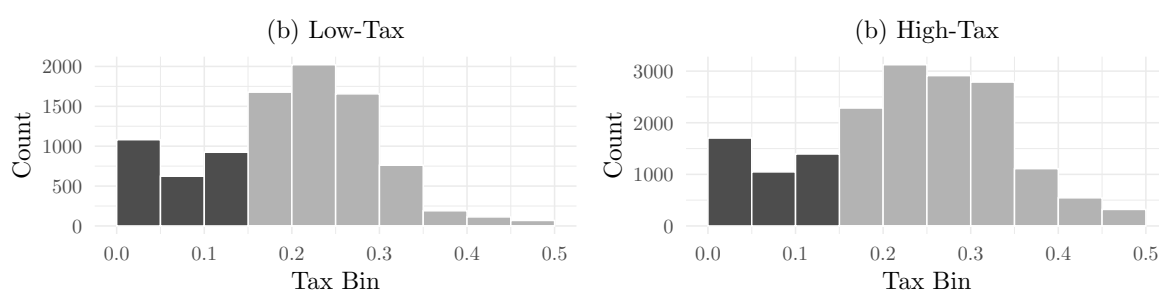
Notes:

*p<0.1; **p<0.05; ***p<0.01

A.6.4. The Distribution of ETRs Within Countries

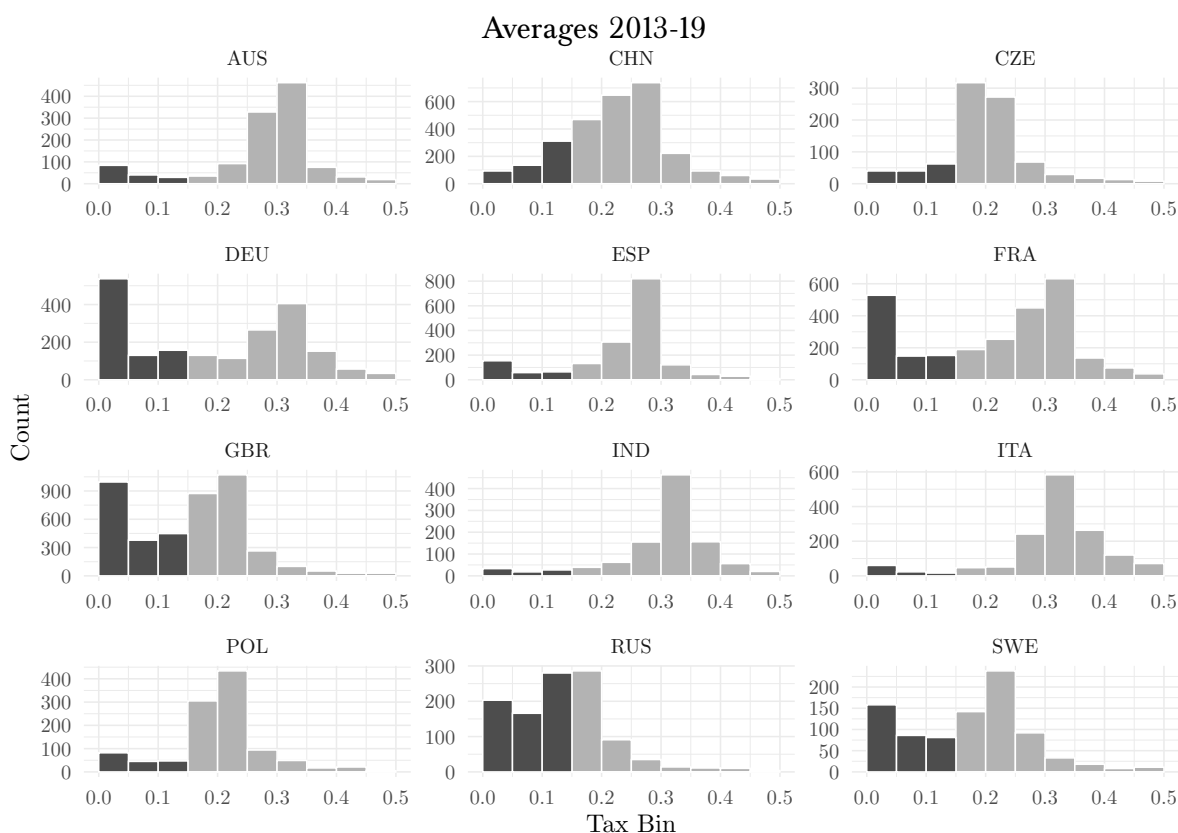
Low-tax affiliates have a substantial presence in countries with high average tax rates (i.e. above 15%). The tax distribution of individual affiliates within low- and high-tax countries appears quite similar (see figure 12). There are more substantial differences when looking at the tax distribution within countries and the general case should be interpreted with caution.

Figure 12: The Distribution of Affiliate ETRs in Low- and High-Tax Countries (Orbis)



Source: OECD CbCR Tables and Orbis. Notes: Excludes OFCs, holding companies, and regional headquarters. High-tax = country average ETR over 15% in the OECD CbCR tables.

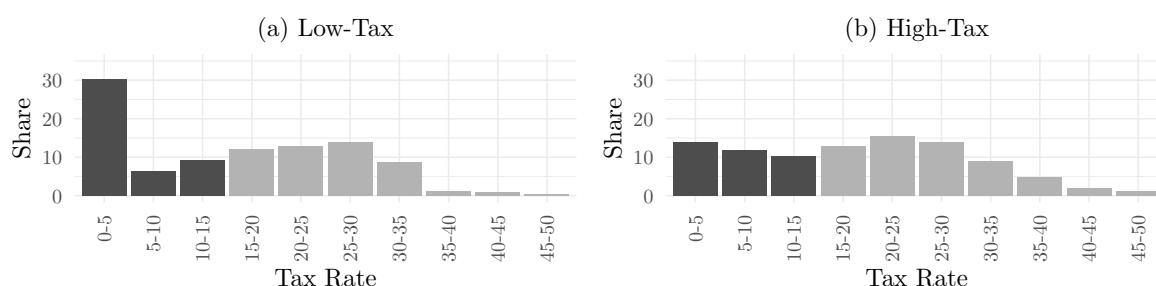
Figure 13: The Distribution of Affiliate ETRs in Orbis for Selected Countries



The distribution of assets holdings by affiliate tax bracket reveals a greater disparity between low- and high-tax countries (figure 14). In low-tax countries, almost one-third of assets are held by affiliates

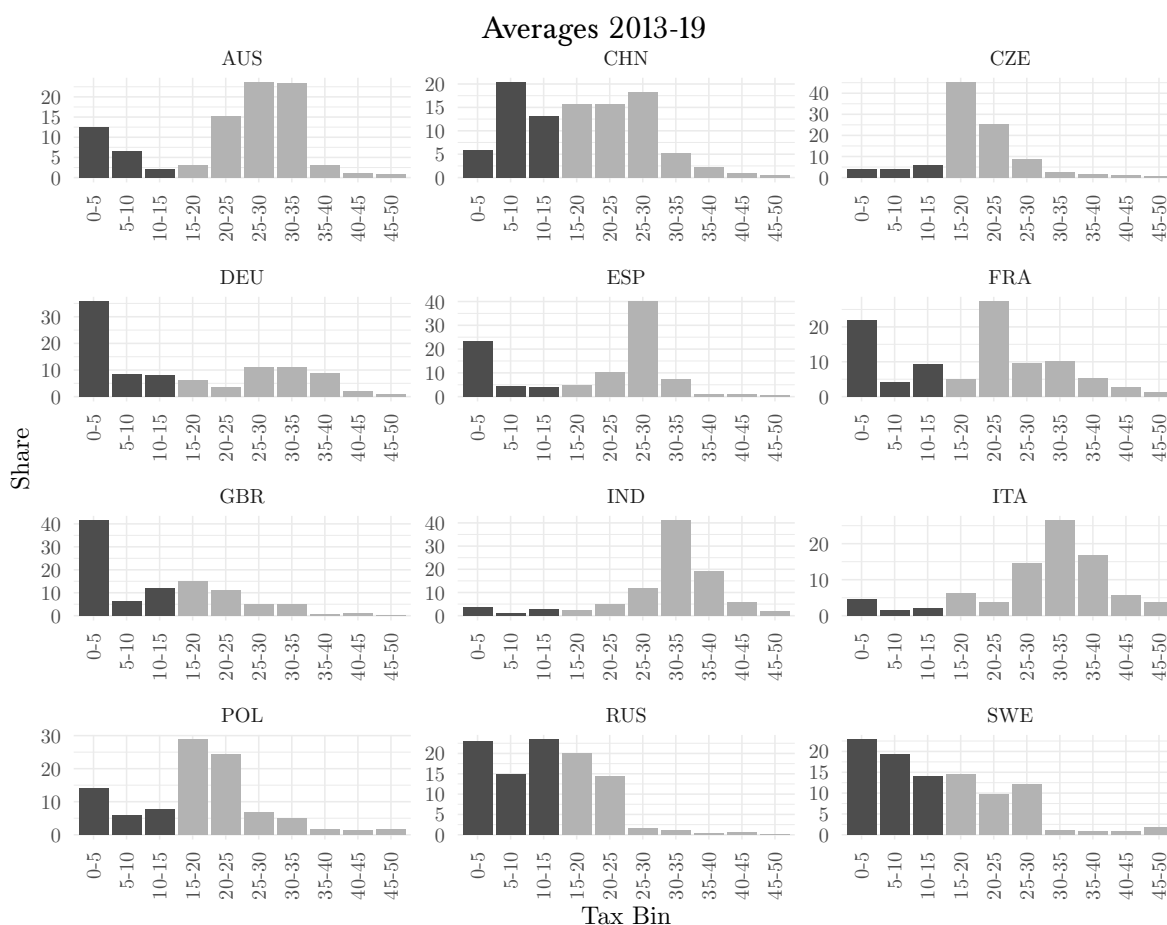
paying little or no tax and 30 percent of assets are held by affiliates paying an ETR less than 5%. There is much less concentration at the bottom of the tax scale in high-tax countries. Variation across individual countries remains (figure 15) but the tax distribution often shifts left, meaning more assets are held by low-tax affiliates. While interesting, the results should be interpreted with caution. The full tax distribution is not available and the subset of firms in Orbis may not be representative.

Figure 14: The Distribution of Total Assets by Tax Rate in Low- and High-Tax Countries (Orbis)



Source: OECD CbCR Tables and Orbis. Notes: Excludes OFCs, holding companies, and regional headquarters. High-tax = country average ETR over 15% in the OECD CbCR tables.

Figure 15: The Distribution of Total Assets by Tax Rate in Orbis for Selected Countries



A.7. Ultimate Investors

A.7.1. *The SPE Share of FDI*

Offshore centers are characterized by large FDI asset and liability positions, often many multiples of their GDP, and small net positions. Most of this activity is explained by holding companies, commonly referred to as special purpose entities or SPEs.⁴⁸ Between 30% and 40% of the global FDI is routed through offshore centers – sometimes for profit shifting, but also for investor protections and managing internal finances. At this point, few countries provide FDI by ultimate investor or the SPE share, although reporting is improving. Due to gaps in the data, we infer the conduit share using the implied investment method documented in Bolwijn, Casella, and Rigo (2018).⁴⁹ This approach builds on the assumption of a relationship between GDP and FDI stock. Countries with a disproportionate amount of FDI relative to their size are flagged as outliers and the excess component is then associated with FDI into SPEs. we employ a ‘hybrid’ approach using SPE data where available and the imputation only applies to countries missing data.

To estimate the average relationship between FDI and GDP, we first omit known OFCs from the sample. We then pool 2015-19 and identify the top quartile of countries by FDI stock and estimate the elasticity of outward FDI to GDP using this sub-sample (see table 22). Based on this, we predict the 90% confidence interval and identify any FDI above it as conduit. This ‘excess’ component is then divided by total outward FDI to find the conduit share for each country. We classify all FDI as conduit in some well-known OFCs (e.g. Cayman Islands, Mauritius).

Using Project-Level Data to Determine if IIRs Apply to the Ultimate Parent

As a final exercise, we use greenfield project data to trace ultimate ownership as opposed to the Markov chain approach. This is a simple tabulation based on the data provided by fDi Markets, although it fails to account for intermediate ownership chains.

⁴⁸A SPE is a subsidiary created to gain legal protections or tax advantages for subsequent investments. Most are located in OFCs and act as intermediate links in MNE ownership chains.

⁴⁹Others approaches include Damgaard, Elkjaer, and Johannesen (2019), which is similar to my own, and Turban et al. (2020), which is used in the OECD Economic Impact Assessment of BEPS. Alternatively, Coppola et al. (2021) reconstructs ownership from affiliate-level data.

Table 22: Regression of Outward FDI on GDP (Between Estimator)

<i>Dependent variable:</i>	
	log(Outward FDI)
log(USD GDP)	0.837*** (0.104)
Constant	1.098 (1.448)
Observations	28
R ²	0.712
Adjusted R ²	0.701
F Statistic	64.297*** (df = 1; 26)
<i>Notes:</i>	*p<0.1; **p<0.05; ***p<0.01

Table 23: Share of Greenfield Investment Subject to IIRs (by Scenario)

Country	Initial P2	Initial P2 & US	Full IF	Country	Initial P2	Initial P2 & US	Full IF
Albania	0.93	0.95	0.98	Lebanon	0.14	0.19	0.85
Algeria	0.30	0.34	0.99	Liberia	0.34	0.36	0.98
Andorra	0.84	0.95	1.00	Libya	0.35	0.39	1.00
Angola	0.59	0.89	0.99	Lithuania	0.70	0.79	1.00
Argentina	0.54	0.73	0.99	Luxembourg	0.53	0.92	1.00
Armenia	0.47	0.61	0.98	Macao SAR China	0.27	0.62	0.99
Australia	0.52	0.81	1.00	Madagascar	0.70	0.80	0.99
Austria	0.80	0.89	1.00	Malawi	0.22	0.22	0.96
Azerbaijan	0.66	0.71	0.99	Malaysia	0.38	0.54	0.93
Bahrain	0.28	0.41	0.79	Maldives	0.21	0.25	1.00
Bangladesh	0.17	0.38	0.99	Mali	0.67	0.70	1.00
Belarus	0.44	0.50	0.95	Malta	0.59	0.68	0.87
Belgium	0.62	0.89	0.99	Mauritius	0.42	0.59	0.99
Benin	0.60	0.60	0.87	Mexico	0.53	0.87	0.99
Bermuda	0.41	0.93	1.00	Moldova	0.60	0.69	0.94
Bolivia	0.62	0.71	0.96	Monaco	0.87	0.92	0.99
Bosnia & Herzegovina	0.60	0.62	0.99	Mongolia	0.74	0.77	0.97
Botswana	0.45	0.57	0.97	Montenegro	0.44	0.54	0.84
Brazil	0.58	0.80	0.99	Morocco	0.62	0.69	0.99
Brunei	0.16	0.18	1.00	Mozambique	0.41	0.46	0.97
Bulgaria	0.70	0.80	1.00	Myanmar (Burma)	0.42	0.46	0.96
Burkina Faso	0.68	0.68	1.00	Namibia	0.63	0.64	1.00
Burundi	0.49	0.51	0.88	Nepal	0.23	0.36	0.99
Cambodia	0.26	0.33	0.98	Netherlands	0.54	0.89	0.99
Cameroon	0.49	0.60	0.99	New Zealand	0.30	0.65	1.00
Canada	0.41	0.88	1.00	Nicaragua	0.11	0.14	0.99
Cayman Islands	0.44	0.57	0.95	Nigeria	0.46	0.59	0.99
Chile	0.72	0.84	1.00	North Macedonia	0.62	0.71	1.00
China	0.49	0.70	0.91	Norway	0.77	0.94	1.00
Colombia	0.54	0.71	0.98	Oman	0.24	0.34	0.97
Congo - Brazzaville	0.64	0.92	1.00	Pakistan	0.31	0.39	0.98
Congo - Kinshasa	0.39	0.53	0.99	Panama	0.55	0.78	0.96
Costa Rica	0.39	0.82	0.96	Papua New Guinea	0.17	0.31	0.99
Croatia	0.77	0.88	1.00	Paraguay	0.59	0.65	0.91
Cuba	0.57	0.58	0.86	Peru	0.42	0.54	0.99
Cyprus	0.55	0.61	0.99	Philippines	0.40	0.57	0.98
Czechia	0.77	0.90	0.98	Poland	0.75	0.92	1.00
Côte d'Ivoire	0.59	0.61	0.98	Portugal	0.82	0.90	1.00
Denmark	0.62	0.84	1.00	Qatar	0.37	0.71	0.99
Djibouti	0.10	0.14	0.87	Romania	0.81	0.89	1.00
Dominican Republic	0.56	0.77	0.96	Russia	0.65	0.77	1.00
Ecuador	0.48	0.54	0.98	Rwanda	0.26	0.33	0.96
Egypt	0.29	0.32	0.97	Saudi Arabia	0.44	0.70	0.97
El Salvador	0.41	0.78	0.95	Senegal	0.46	0.47	0.99
Estonia	0.78	0.82	1.00	Serbia	0.63	0.70	0.99
Ethiopia	0.12	0.29	0.99	Seychelles	0.45	0.45	1.00
Fiji	0.07	0.44	0.98	Sierra Leone	0.63	0.71	0.99
Finland	0.60	0.72	1.00	Singapore	0.46	0.74	0.95
France	0.68	0.91	1.00	Slovakia	0.80	0.89	0.99
Gabon	0.36	0.63	0.97	Slovenia	0.86	0.90	1.00
Georgia	0.41	0.48	0.90	South Africa	0.45	0.59	0.99
Germany	0.55	0.82	1.00	South Korea	0.48	0.78	0.99
Ghana	0.42	0.52	0.99	South Sudan	0.32	0.35	0.87
Greece	0.74	0.86	1.00	Spain	0.69	0.89	0.99
Guatemala	0.56	0.85	0.99	Sri Lanka	0.16	0.18	1.00
Guinea	0.35	0.48	1.00	St. Lucia	0.28	0.42	0.98
Guyana	0.02	0.92	1.00	Sudan	0.18	0.18	0.94
Haiti	0.24	0.40	0.79	Sweden	0.65	0.83	1.00
Honduras	0.31	0.68	0.91	Switzerland	0.51	0.87	0.99
Hong Kong SAR China	0.45	0.72	0.98	Taiwan	0.60	0.89	1.00
Hungary	0.74	0.84	1.00	Tajikistan	0.29	0.32	0.94
Iceland	0.50	0.93	0.99	Tanzania	0.54	0.58	0.97
India	0.49	0.75	0.97	Thailand	0.50	0.72	0.98
Indonesia	0.37	0.49	0.94	Togo	0.27	0.31	0.96
Iran	0.46	0.56	0.97	Trinidad & Tobago	0.47	0.82	0.99
Iraq	0.26	0.42	0.91	Tunisia	0.59	0.66	0.99
Ireland	0.34	0.93	1.00	Turkey	0.47	0.60	0.83
Israel	0.17	0.90	1.00	Uganda	0.62	0.65	0.98
Italy	0.70	0.90	0.99	Ukraine	0.64	0.74	0.99
Jamaica	0.29	0.68	1.00	United Arab Emirates	0.43	0.58	0.94
Japan	0.31	0.74	0.93	United Kingdom	0.55	0.79	1.00
Jordan	0.12	0.19	0.97	United States	0.74	0.74	0.96
Kazakhstan	0.25	0.59	0.99	Uruguay	0.74	0.80	0.96
Kenya	0.31	0.44	0.94	Uzbekistan	0.35	0.43	1.00
Kosovo	0.85	0.88	1.00	Venezuela	0.33	0.58	0.96
Kuwait	0.36	0.56	0.99	Vietnam	0.48	0.58	0.92
Kyrgyzstan	0.61	0.63	0.96	Zambia	0.39	0.45	0.97
Laos	0.09	0.12	0.97	Zimbabwe	0.42	0.45	1.00
Latvia	0.72	0.76	1.00				