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The Global Minimum Tax and the taxation of MNE profit

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Abstract

The Global Minimum Tax (GMT) introduces significant changes to the international tax architecture and thereby to the taxation of large multinational enterprises. This paper assesses the impact of the GMT using new and unique data on MNE worldwide activity building on comprehensive estimates of global low-taxed profit.

The paper has four main findings. First, the GMT reduces the incentives to shift profits, resulting in an estimated fall in global shifted profits by around half. Second, the GMT will reduce low-taxed profit worldwide through reduced profit shifting and top-up taxation. The global amount of MNE profit taxed below the 15% minimum effective rate is estimated to fall by more than two thirds. Third, the GMT is estimated to increase CIT revenues by USD 155-192 billion per year, or between 6.5-8.1% of current global CIT revenues. The distribution of these gains across jurisdictions strongly depends on the implementation choices of governments. Finally, the GMT is estimated to reduce tax rate differentials across jurisdictions. This could have potentially important impacts on the efficiency of the global allocation of investment and economic activity.

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1 Introduction

1. **The Global Minimum Tax on multinational corporate profit is a reality.** Around 45 jurisdictions are already taking steps to implement the Global Minimum Tax (GMT) on profits of large multinational enterprises (MNEs). The GMT, introduced by the Global Anti-Base Erosion (GloBE) Rules, is a key part of Pillar Two of the two-pillar solution agreed by the OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (Inclusive Framework on BEPS). It aims to address the tax challenges arising from the digitalisation of the economy (OECD, 2021[1]).[1]

2. **The GMT ensures that large multinational enterprises with revenues above EUR 750 million are subject to a 15% effective minimum tax rate regardless of where they operate.** Due to the interlocking nature of the rules, it is expected that around 90% of in-scope MNEs will be subject to the GMT by 2025, based on the jurisdictions that have implemented or announced implementation.[2] The GloBE Rules set out the detailed terms of the GMT (OECD, 2021[2]).[3] Since the publication of the GloBE Rules, additional assistance and guidance has been published to support jurisdictions in the implementation of the GMT (OECD, 2023[3]; Christians et al., 2023[4]; O'Sullivan and Cebreiro Gómez, 2022[5]; OECD, 2022[6]).

3. **This paper assesses the implications of the GMT for the international taxation of MNEs.** The paper builds on earlier OECD work that analysed the impact of the two-pillar solution (OECD, 2020[7]), and extends it to include some important updates. The updates seek to better capture the final design of the GMT, better estimate low-taxed profit including those in high tax jurisdictions, and to make use of the most up to date data available.[4] These new data are then used to assess the impact of the GMT on profit shifting, on low-taxed profit, on tax rate differentials, and on tax revenues.

[1] Pillar Two of this package establishes the GMT and the Subject to Tax Rule (STTR) which establishes a minimum level of taxation for certain payments that can give rise to Base Erosion and Profit Shifting (BEPS) risks. The STTR was delivered by Members of the OECD/G20 Inclusive Framework on BEPS in July 2023 as part of the package to further implement the two-pillar solution (OECD, 2023[77]). The impact of the STTR is not analysed in this paper.

[2] The 90% figure is based on the number of MNE groups in Country-by-Country Reporting data that could be affected by the GMT. This figure is computed in several steps: First, a list is compiled of all countries that have implemented, or publicly announced an intention to implement the GMT ("implementing jurisdictions"). Second, all MNE groups with Ultimate Parent Entities in an implementing jurisdiction are assumed to be in-scope of the GMT. Third, for each non-implementing jurisdiction, the number of in-scope MNE groups is assumed to be the number of MNE groups with their UPE in that non-implementing jurisdiction and with foreign operations in the 'largest foreign implementing jurisdiction' for that non-implementing UPE jurisdiction. For each non-implementing UPE jurisdiction, the 'largest foreign implementing jurisdiction' is the implementing jurisdiction with the largest number of MNE groups operating in it that have UPEs in the non-implementing jurisdiction. This reflects a lower bound estimate. Lastly, combining the information of MNEs with Ultimate Parent Entities in implementing and non-implementing jurisdictions yields the total share of MNEs in scope of the GMT.

[3] They are complemented by a Commentary and Administrative Guidance that are updated on an ongoing basis (OECD, 2022[75]; OECD, 2023[78]).

[4] Throughout this paper, jurisdictions with an average effective tax rate above 15% are referred to as high tax jurisdictions, while jurisdictions with an average effective tax rate below 15% are referred to as low tax jurisdictions. Likewise, low-taxed profit is defined as profit subject to ETRs below 15% (Section 6).

4. **The paper contributes to a large and growing literature that assesses various aspects of the impact of the GMT.** Some studies have analysed the impact of the GMT on tax revenue, with several academics, think tanks and jurisdictions publishing revenue estimates (Devereux et al., 2020[8]; Barake et al., 2022[9]; Reitz, 2023[10]; IMF, 2023[11]; Joint Committee on Taxation, 2023[12]). Others study the potential MNE responses to the GMT, e.g. the likely reductions in profit shifting (Johannesen, 2022[13]; Ferrari et al., 2023[14]). Several papers investigate the impact of the GMT on investment (OECD, 2020[15]; UNCTAD, 2022[16]), with some highlighting the potential positive impacts on investment outside of low tax jurisdictions (Keen, Liu and Pallan, 2023[17]), and others focusing on the potential negative impact on investment, especially for intangible intensive firms (Bilicka, Devereux and Güçeri, 2023[18]). Some studies examine the impact on jurisdictional responses, with some papers pointing to the increased space for jurisdictions to raise tax rates due to reduced tax competition (Hebous and Keen, 2021[19]), and others stressing the incentives for jurisdictions to implement Qualified Domestic Minimum Top-up Taxes (QDMTTs) to collect top-up taxes from low-taxed profit arising in their jurisdiction in priority to others (Devereux, 2023[20]). Other papers point to the opportunities to reform tax incentives due to the potentially reduced effectiveness of many kinds of tax incentives that result in low effective tax rates (ETRs) (OECD, 2022[6]; Ferreira Liotti et al., 2022[21])

5. **The analysis presented is subject to a variety of caveats and is based on various assumptions.** The methodology seeks to approximate the GMT calculation accounting for the scope of the rules, certain exclusions, and the way in which the GloBE Rules treat certain tax and accounting differences. The paper uses a comprehensive data infrastructure that maps global MNE profit and activity at the jurisdictional level. The fact that data is aggregated at the jurisdictional level implies that certain MNE-specific adjustments contemplated in the GloBE Rules cannot be made. In addition, while the implementation of the GMT is already underway, some uncertainty remains with respect to the full extent of implementation by jurisdictions. Implementation decisions play a role in the distribution of revenue gains across jurisdiction groups. Similarly, given the unprecedented nature of this reform, the behavioural reactions of MNEs to reduced profit shifting incentives are highly uncertain. This is complicated by the continuing implementation of BEPS measures in many countries which may also reduce shifted profit. To address these uncertainties, the paper relies on different implementation and behavioural reaction scenarios to illustrate the sensitivity of the results.

6. **This paper is organised as follows.** Section 2provides an overview of the methodology and results. Section 3lays out the main mechanics of the GMT. Section 4describes the methodology used to construct the data underlying the analysis and discusses the current distribution of MNE profit and activity. The next sections cover the four key effects of the GMT analysed in this paper. Section 5describes changes to profit shifting incentives from the implementation of the GMT. Section 6describes changes to the taxation of global low-taxed profit. Section 7estimates the average change to MNE ETRs from the introduction of the GMT and its effects on tax rate differentials across jurisdictions. Section 8translates the increase in the taxation of low-taxed profit into tax revenue gains and discusses their distribution across jurisdictions, while Section 9provides some concluding remarks.

2 Overview of methodology and key results

2.1. Methodological approach

7. **This paper updates and extends previous OECD impact assessment work in several directions.** The OECD published a comprehensive impact assessment of the two-pillar solution in 2020 (OECD, 2020[15]). Since then, the design of the GMT has been developed through the finalisation of the GloBE Rules and associated guidance, and more up to date and extensive data have become available. This has led to the following key updates:

- **First, the analysis relies on data for the years 2017-2020 with improved coverage of the global distribution of profit and activities of large MNEs (i.e. those with revenues above EUR 750 million).** The previous impact assessment relied on 2016 data. The broader and more up to date year coverage implies that some key changes to the international tax system such as the measures introduced by the BEPS project or the United States Tax Cuts and Jobs Act (TCJA) now fall within the sample period, although the effects of some reforms may not yet be fully apparent. The expansion in coverage of Country-by-Country Reporting (CbCR) data means the data quality is significantly improved. Profits from CbCR represent 85% of total profit in the data.[5]
- **Second, the analysis reflects the agreed design of the GloBE Rules.** Previous work relied on the OECD Blueprints (OECD, 2020[7]) which implied the use of multiple assumptions where parameters were yet to be agreed by the Inclusive Framework.
- **Third, the analysis approximates the calculation of GloBE Income and the GloBE ETR**. In particular, the methodology performs adjustments to account for certain temporary book and tax differences in a manner akin to the GloBE Rules.
- **Fourth, the analysis relies on a new methodology to build more comprehensive estimates of global low-taxed profit**. The new methodology shows substantial low-taxed profit in high tax jurisdictions (Hugger, González Cabral and O'Reilly, 2023[22]). This improvement is key to modelling top-up taxes arising from the GMT in all jurisdictions.
- **Fifth, the analysis introduces updated assumptions regarding the implementation of the GMT**. The new assumptions capture governments' incentives to introduce QDMTTs as well as the ongoing progress of the implementation of the GMT.

[5] For comparison, in OECD (2020[7]), CbCR data only accounted for 63% of profit. The number of UPE-affiliate jurisdiction pairs for which CbCR data is available is more than three times higher in the new data. In addition, the data used in OECD (2020[7]) is for the year 2016, where potential data quality issues may have been more prevalent.

2.2. Key results

8. **The paper considers the impact of the GMT along several interrelated dimensions.** The key results are outlined below. Results in this section are reported as averages across the 2017-2020 period, unless otherwise specified, with additional year-by-year estimates presented in the annex.

Low-taxed profit

9. **A central impact of the GMT is to reduce low-taxed profit.** At present, low tax outcomes are common globally, and not just in low tax jurisdictions. A companion paper finds that more than one third of global profit (36.1%) is taxed at ETRs below 15% and that more than half of this profit (53.2%) is in high tax jurisdictions, i.e., those with an average ETR above 15% (Hugger, González Cabral and O'Reilly, 2023[22]). Low-taxed profit is the outcome of the observed decline in statutory tax rates (STRs) and ETRs worldwide (Devereux et al., 2002[23]; Rincke and Overesch, 2011[24]; OECD, 2020[15]). The steady expansion in the use of tax incentives in both developed and developing countries may have contributed to the decline in ETRs (World Bank Group, 2017[25]; González Cabral et al., 2023[26]). The increasing globalisation and digitalisation of MNE activities and the increasing importance of intangible capital, combined with some international tax changes such as the move to territorial tax systems may have contributed to intensified tax competition across jurisdictions.

10. **Reducing MNE's low-taxed profit would support a more level playing field between MNEs and other firms and across governments.** Several studies show that MNEs tend to face lower ETRs than firms operating in a single jurisdiction (Bilicka, 2019[27]; Egger, Strecker and Zoller-Rydzek, 2020[28]). The ability of large MNEs to engage in profit shifting can exacerbate the uneven playing field between large multinationals and other firms. This can favour the accumulation of market power (Sorbe and Johansson, 2017[29]) which may result in MNEs earning economic rents (Power and Frerick, 2016[30]; Clausing, 2023[31]). International tax spillovers, i.e., the extent to which one country's tax policy influences MNE activity in other jurisdictions, can impact domestic tax policies. Placing multilaterally agreed limits on the extent to which low-taxed profit arises may provide governments with more autonomy to pursue their own fiscal policies in the presence of international spillovers.

11. **The analysis estimates that the GMT will reduce the stock of low-taxed profit by more than two thirds.** This reduction stems from both reduced profit-shifting and the direct application of the GMT. The paper estimates that the GMT will reduce global low-taxed profit by 69.5%, from an average of USD 2,143 billion between 2017-2020 to USD 653 billion. The reduction in low-taxed profit is observed across all income groups, but it is largely concentrated in investment hubs.[6]

Profit shifting

12. **A second key effect of the GMT is to reduce profit shifting.** Profit shifting is a substantial risk for many jurisdictions (Clausing, 2020[32]; Tørsløv, Wier and Zucman, 2022[33]).The move to territoriality of many corporate income tax (CIT) systems has contributed to exacerbated profit shifting risks, leading to a proliferation of anti-avoidance measures (IMF, 2019[34]; Langenmayr and Liu, 2023[35]). While research has suggested that the measures implemented as part of the BEPS Project have successfully reduced some forms of profit shifting (Beer, Mooij and Liu, 2018[36]), it continues to present challenges for domestic resource mobilisation and economic efficiency.

13. **By introducing a minimum level of taxation, the GMT reduces tax rate differentials between investment hubs and other jurisdictions thereby reducing profit shifting incentives.** Profits have been shown to be sensitive to tax rate differentials between jurisdictions (Heckemeyer and Overesch,

[6] Table E.1 in Annex E provides the definitions of the income groups used in this paper.

2017[37]) with emerging evidence suggesting that profit shifting responses are strongly non-linear and may be most sensitive to very low tax rates (Bratta, Santomartino and Acciari, 2021[38]; Dowd, Landefeld and Moore, 2017[39]; Fuest et al., 2022[40]). By concentrating tax rate increases in low tax jurisdictions, the GMT is likely to have a particularly strong impact on profit shifting. The GMT introduces an unprecedented, coordinated increase in ETRs worldwide, which means that the responsiveness of profit shifting to this reform may differ from profit shifting responses to unilateral reforms. Extrapolations based on existing estimates of the responsiveness of profit shifting to tax rate differentials should be treated with great caution.

14. **This paper estimates that shifted profit will fall by half.** The paper estimates that the annual stock of shifted profit falls from USD 698 billion to USD 356 billion on average over the sample period 2017-2020 due to the reduction of tax rate differentials. Reduced profit shifting incentives will mean that more profit will be located in jurisdictions where MNEs have significant economic activities. Reduced profit shifting incentives may particularly benefit developing countries, which some studies have suggested are particularly exposed to profit shifting (Johannesen, Tørsløv and Wier, 2020[41]; Cobham and Janský, 2018[42]). However, behavioural responses to the reduced profit shifting incentives and hence the decline in profit shifting itself may take some time to materialise, as MNEs gradually restructure their operations.

Tax rate differentials and potential implications for economic efficiency

15. **A third key effect of the reform is to reduce tax rate differentials between MNEs and between jurisdictions.** Increasing competition for investment has resulted in an increasing use of tax incentives as mentioned above. Investment location decisions have been shown to be responsive to average tax rates, among other factors (Devereux and Griffith, 2003[43]). However, the extent to which incentives are effective in generating additional investment on a global scale (as opposed to the shifting of investment from one jurisdiction to another) has been disputed (Knoll et al., 2021[44]; Klemm and Van Parys, 2012[45]; Hanappi and Whyman, 2023[46]). Differences in the taxation of capital assets can lead to inefficiencies in the allocation of capital across asset groups and across jurisdictions (Jorgenson and Yun, 1986[47]; King and Fullerton, 1984[48]; Fatica, 2017[49]). Reducing tax rate differentials can support a more efficient allocation of capital while reducing pressures to compete through the tax system and thereby protecting domestic tax bases.

16. **The GMT is estimated to reduce tax rate differentials by around 30%.** As a result of the increase in the taxation of low-taxed profit worldwide, the average absolute tax rate differential across all jurisdictions falls from 10.6 percentage points to 7.1 percentage points through the application of the GMT. The reduction in tax rate differentials between investment hubs and non-hub jurisdictions is larger with the average differential falling by almost half, from 14.2 percentage points to 7.5 percentage points. Narrower differences in taxation across jurisdiction elevate the importance of other non-tax factors such as human capital or infrastructure for investment decisions (Van Parys and James, 2009[50]) and can provide room to reconsider the role of the tax system in the investment policy mix.

CIT revenues

17. **The GMT increases global CIT revenues as a result of reduced profit shifting, and the application of top-up taxes.** Based on the average values of all variables between 2017-2020, the paper finds that the GMT could raise additional CIT revenues of USD 155-192 billion globally each year or between 6.5% and 8.1% of global CIT revenues. Estimated revenue gains are expected to accrue to all jurisdiction groups, with the distribution of revenue gains depending on the assumptions on governments' implementation and MNE's behavioural reactions. The results show that the implementation of QDMTTs can be an important tool for jurisdictions to collect top-up taxes from low-taxed profit arising in their own jurisdiction.

3 The Global Minimum Tax: Basic mechanics

18. **The GMT introduces a minimum level of effective taxation for large MNEs**. The GMT introduces a coordinated system of minimum taxation that ensures that large MNE groups with annual revenues above EUR 750 million are subject to a minimum ETR of at least 15%, in every jurisdiction they operate. This means that where in-scope MNE profit in a given jurisdiction is subject to an ETR below the 15% rate, a top-up tax equal to the difference between the 15% rate and the ETR in the jurisdiction is levied. In practice, this ETR is defined under the GloBE Rules and is referred to as the GloBE ETR.

19. **This section provides an overview of the GloBE Rules focusing on key elements that impact the analysis in this paper**. It covers four key elements: (i) the scope of the rules, (ii) the calculation of the jurisdictional GloBE ETR; (iii) the calculation of top-up taxes; and (iv) the rule order in collecting top-up taxes.[7]

3.1. Scope

20. **The GMT applies to MNE groups with annual revenues of EUR 750 million or more, with certain exclusions**. Governmental Entities, International Organisations, Non-profit Organisations, and Pension Funds are excluded from the scope of the rules notwithstanding that they may be members of an MNE group within scope. Investment Funds and Real Estate Investment Vehicles are also excluded if they are the Ultimate Parent Entity (UPE) of the MNE group. Certain types of income such as international shipping income are also excluded from the GMT calculation, with some limitations. The GMT is calculated at the level of MNE subgroups, comprising all entities of the MNE group located in one jurisdiction. Section 0.604.1discusses further how the profit in scope of the rules is calculated in this paper.

3.2. Jurisdictional GloBE ETR

21. **To determine whether top-up taxes are due for a given MNE, the first step is to calculate its jurisdictional GloBE ETR.** The ETR calculation is performed at the jurisdictional level for each MNE subgroup. Since tax bases differ across jurisdictions, the GMT relies on financial accounts to build a consistent approach to calculating the ETR. The jurisdictional GloBE ETR is computed by dividing all covered taxes of entities located in the jurisdiction by their total GloBE Income (see Annex D for additional details). Financial accounts serve as the starting point for both measures. GloBE Income (or loss) is calculated by applying certain agreed adjustments to the financial accounting figures to address certain book and tax differences. Box 1 details some of these adjustments, which have important implications for

[7] This section aims to provide a high-level overview on the most important elements. For details on the workings of the rules, please refer to the GloBE Rules and the associated administrative guidance.

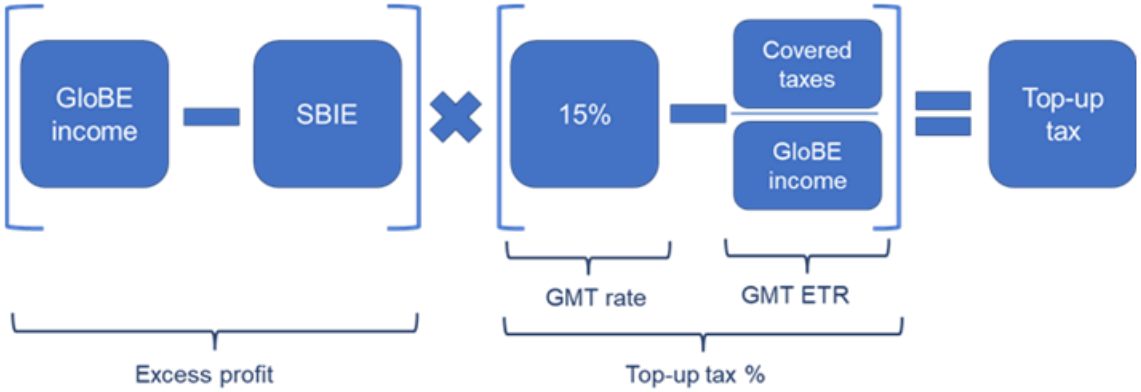
the calculation of the GloBE ETR and hence on the resulting top-up taxes levied. Section 5.3discusses further how the GloBE ETR is calculated in this paper and the adjustments made to account for losses.

3.3. Top-up tax calculation

22. **If the jurisdictional GloBE ETR is below 15%, the top-up tax is calculated.** The top-up tax rate is computed as the difference between the 15% minimum rate and the GloBE ETR.

23. **GloBE top-up taxes are levied on excess profit which is defined as profit in excess of an exclusion for economic substance.** The tax base for the GMT is calculated as GloBE Income in excess of the Substance-Based Income Exclusion (SBIE), which excludes a 'routine' return from the GloBE tax base. GloBE Income includes all profits and losses of entities of a subgroup of in-scope MNEs.[8] The SBIE excludes a share of GloBE Income from the tax base under the GloBE Rules, based on the amount of tangible assets and payroll reported in a jurisdiction. A transitional period of ten years is provided for in the GloBE Rules during which the size of the SBIE gradually declines. At the beginning of the transitional period, i.e., the first year of the introduction of the GMT, the SBIE equals the sum of 8% of the value of tangible assets and 10% of the value of payroll (hereafter, year-one SBIE). These shares decline over the transition period until SBIE is equal to the sum of 5% of the value of tangible assets and 5% of the value of payroll ten years after the introduction of the GMT (hereafter, year-ten SBIE). Section 6.2discusses further the calculation of GloBE Income and excess profit.

Figure 1. Top-up tax calculation, jurisdictional level



Note: Simplified formula for the calculation of top-up taxes at the subgroup level. The year-one SBIE equals 8% of the value of tangible assets and 10% of payroll; the year-ten SBIE is equal to 5% of the value of tangible assets and 5% of payroll.

[8] If GloBE income is negative for a given year, no top-up tax will be levied in this year.

Box 1. Adjustments to financial accounts and the treatment of temporary differences under the GloBE Rules

The starting point for the calculation of top-up taxes under the GloBE Rules are financial accounts. The financial accounts are adjusted to ensure that some common differences between tax and financial accounting do not give rise to top-up taxation. For example, temporary differences may arise when there are timing differences in the recognition of receipts (income or loss) and expenses for tax and financial reporting purposes, or due to tax benefits from loss carry over provisions. These adjustments prevent temporary differences from resulting in top-up taxes. The GloBE Rules allow for temporary differences as long as they revert within five years or are listed as always permitted. Certain temporary differences are always allowed. An example are provisions that allow the faster recovery of tangible assets such as accelerated depreciation or expensing for tangible assets. In contrast, permanent differences between tax and financial accounting can result in top-up taxation (OECD, 2022[6]).

The mechanism to perform these adjustments is based on deferred tax accounting. The main idea is to increase or decrease covered taxes depending on whether the difference between tax and financial reporting is negative or positive. Two common causes of deferred tax assets and liabilities are losses and accelerated depreciation provisions that can be used to illustrate the mechanism. Losses typically generate a deferred tax asset as loss carry-over provisions reduce taxes due in the future. To account for losses, the GloBE Rules adjust covered taxes, i.e., the numerator in the GloBE ETR calculation, to include the deferred tax asset valued at the GMT rate of 15%. Accelerated depreciation provisions generate a deferred tax liability as tax payments are postponed. Such deferred tax liabilities are also added to the numerator of the GloBE ETR and are valued at the GMT rate. These adjustments ensure that temporary differences allowed by the GloBE Rules do not lower the GloBE ETR giving rise to top-up taxes. The modelling mimics the operation of the GloBE Rules (Section 6.2) with certain limitations. For instance, certain adjustments, such as the treatment of capital gains, could not be taken into account.

Note: For further details see Article 4.4. in (OECD, 2021[2]) and respective examples in OECD (2022[51]).

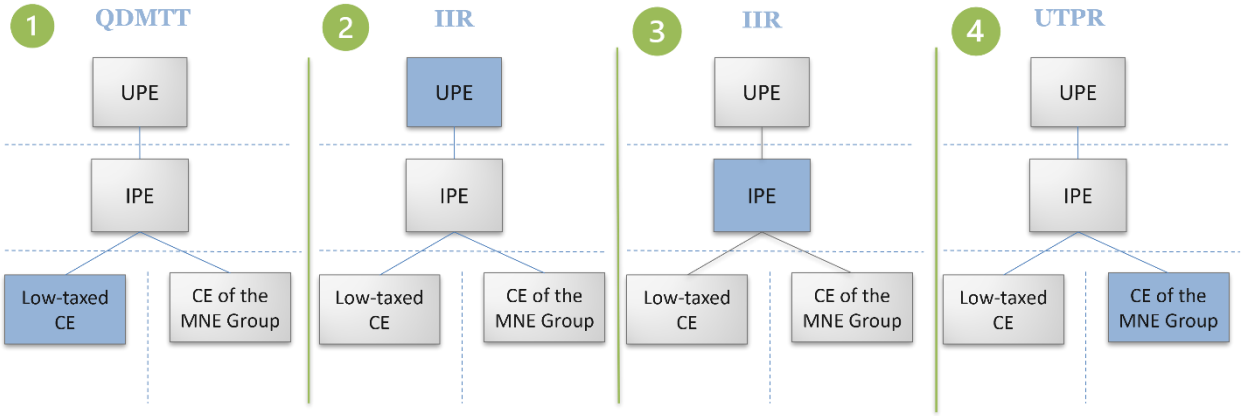
3.4. Collection of top-up taxes: Rule order

24. **Top-up taxes are distributed across jurisdictions based on an agreed rule order that ensures the effective implementation of the GMT.** Once top-up taxes are determined across jurisdictions, the next step is to determine which jurisdiction has the right to collect these top-up taxes. Figure 2 shows the order of top-up tax collection under the GloBE Rules. If top-up tax is owed with respect to a jurisdiction, that jurisdiction can itself collect the top-up tax by implementing a QDMTT (Case 1). Any top-up tax remaining after the application of QDMTTs can be collected by the UPE jurisdiction under the Income Inclusion Rule (IIR, Case 2). If the IIR has not been implemented by the UPE jurisdiction, top-up taxes can also be collected under the IIR by an intermediate parent entity (IPE, Case 3).[9] The IIR will generally apply where jurisdictions choose not to implement a QDMTT. Finally, if any top-up tax still remains, it is imposed by multiple jurisdictions under the UTPR. The UTPR is a backstop to ensure that all low-taxed income is captured under the GMT. Each jurisdiction which has adopted the UTPR can collect

[9] Collection by the jurisdiction of an IPE is not modelled in this paper, such that all top-up tax under the IIR is assumed to be collected by the UPE jurisdiction.

top-up tax in proportion to the amount of substance of the MNE group in the jurisdiction, where substance is measured by tangible assets and employees at equal weights. These interlocking rules mean that the top-up tax collected by a given jurisdiction depends on the actions of other jurisdictions. Section 8.1discusses further the assumptions made on implementation.

Figure 2. GMT agreed rule order



Note: QDMTT stands for Qualified Domestic Minimum Top-Up Tax. IIR stands for the Income Inclusion Rule. UPE stands for Ultimate Parent Entity. IPE stands for Intermediate Parent Entity and CE stands for Constituent Entity.
Source: OECD (2023[3]).

4 Current distribution of MNE profit and activities

25. **Assessing the impact of the GMT involves first mapping the global activities of the MNEs within its scope.** This section discusses the data on the geographical distribution of MNE profit and economic activity across jurisdictions that is used throughout the paper. In general, the approach taken to estimate these distributions follows OECD (2020[15]), with some methodological updates and additions. Section 4.1first summarises the methodology to construct the underlying data on profit and activities of MNEs across jurisdictions. Sections 4.2and 4.3provide a broad overview of the distribution of MNE profit and economic activity. More detailed information is provided in Annex A.

4.1. Data and methodology

26. **The analysis relies on a variety of data sources to map the current global distribution of profit and activities of MNEs.** The approach to estimating these distributions builds on OECD (2020[15]) and combines a large number of complementary data sources into a consistent framework. The data gathered covers the years 2017-2020, meaning that the sample period extends beyond some recent developments in corporate taxation, including the implementation of many of the measures from the BEPS Project and the implementation of the US TCJA.

27. **The data includes information on profit, revenue, tangible assets, employment, and payroll, and is structured in bilateral matrices on a UPE-affiliate-jurisdiction basis.** 222 affiliate jurisdictions form the *rows* of the matrices. Profit and activities within each affiliate jurisdiction are broken down across 222 UPE jurisdictions, as recorded in *columns*. Each of the resulting matrices contains almost 50,000 UPE-affiliate jurisdiction pairs. In total, five matrices are constructed for each year in the sample period covering different dimensions of MNE activities that are key in estimating the impact of the GMT. The definitions of the different variables largely follow concepts from financial accounting with some adjustment, in line with the baseline definition of financial variables in the context of the GMT. The definitions are summarised in Table 1.

28. **A first matrix describes the global distribution of profit of large MNEs.** The profits are adjusted to account for prior-period losses of otherwise profitable MNEs to reflect the typical net profit earned by MNEs in a jurisdiction over the investment cycle. The loss adjustment is applied at the affiliate jurisdiction level based on the typical share of losses in positive profits observed in aggregated CbCR data. The methodology followed is mirrored in the calculation of loss-adjusted effective tax rates at the jurisdictional level used in Section 5Hugger, González Cabral and O'Reilly (2023[22]) provide additional details on the methodology of the loss adjustment, and the calculation of loss-adjusted ETRs. For the calculation of GloBE Income, an alternative profit matrix without this loss correction is constructed as discussed in Section 6.2

29. **The four additional matrices (revenues, assets, employees, and payroll) describe the global distribution of the economic substance of large MNEs.** These matrices are used to compute key

elements of the GMT such as the SBIE or the UTPR and are relevant for the estimation of the reduction in global profit shifting.[10]

30. **Four types of data are used, of which anonymised and aggregated CbCR data is the preferred source.** The underlying reporting framework for CbCR data was introduced as part of the BEPS Project. It requires MNE groups with consolidated revenues of EUR 750 million or more to report on their global activities at the subgroup level. The size threshold is aligned with the GMT threshold and the reporting at the subgroup level is also aligned with the jurisdictional blending applied in the calculation of the GMT. In the analysis, the CbCR data is combined with aggregated firm-level data from Bureau van Dijk's Orbis database, other sources of aggregated data on the activities of MNEs, and imputations based on macroeconomic data such as FDI, GDP, population, or wage levels taken from various OECD, IMF, World Bank, and ILO databases. Further details on the different data sources and the preference order based on deemed data quality are summarised in Annex A.

31. **CbCR data accounts for the majority of the total value of profit, revenue, assets, and employees in each matrix.** This is the case even though CbCR data is only available for around 7.5% of all cells for the different matrices across all years. The coverage of data sources for the different matrices is summarised in Figure A.1. In the profit matrix, for instance, CbCR contributes around 85.3% of the total. Extrapolations fill around half to two thirds of cells in the different matrices, but only account for a comparatively small share of the totals. The share of cells filled with extrapolations is typically higher for lower income jurisdictions than for higher income jurisdictions reflecting the wide gaps in the existing hard data for lower income jurisdictions.

Table 1. Definition of variables considered in the matrices

Variable	Definition
Profit	Profit before tax, excluding dividends received from affiliates adjusted for loss carry-over
Revenue	Revenues from sales to third-party and intra-group entities
Assets	Tangible assets, i.e. property, plant and equipment, net of depreciation (excluding cash or cash-equivalents and inventories)
Employees	Number of employees on a full-time equivalent basis
Payroll	Expenditures for salaries and wages, including bonuses, social contributions and other employee benefits

Note: Based on Table 5.1 of OECD (2020[15]). The exact definitions of variables across matrix cells can deviate from the 'targets' presented in this table due to limitations in the available underlying data. Notably, separate versions of the profit matrix are built gross and net of losses, and for excess profit as will be discussed below. All financial variables are based on financial accounting data. Only data for MNE subgroups with positive profit are included.

32. **The methodology to develop the matrices in this paper updates and extends earlier OECD work in several dimensions**. These improvements relative to OECD (2020[15]) reflect the availability of additional data and the need to construct an additional matrix that describes the global distribution of employees of large MNEs as part of the UTPR allocation key. The methodology to construct the payroll matrix has also been updated, and now largely relies on the multiplication of the number of employees from the employee matrix by an estimate of MNE wages in each jurisdiction. Two further key updates relate to the profit matrix. First, potential double counting issues in CbCR profits pointed out by Blouin and Robinson (2020[52]) and OECD (2020[53]) are addressed by applying a downward correction to profit of

[10] In addition to the data used in the matrices, taxes accrued from aggregated CbCR data are used in the calculation of the GloBE ETR as outlined in Hugger, González Cabral and O'Reilly (2023[22]).

UPEs. The double-counting issue is expected to particularly impact profit reported by UPEs.[11] Second, the profit matrix is adjusted for losses as discussed above. Further methodological updates relating to the data used in the matrices as well as details on the construction of the new employee matrix and the updated payroll matrix are summarised in Annex A.

33. **The matrices offer a comprehensive picture on the global distribution of profit and activities of large MNEs, but also have their limitations.** The extrapolations used can only serve as imperfect proxies for the actual activities of MNEs. Similarly, the sources of hard data used have their limitations. For instance, misreporting by MNEs can lead to errors in aggregated CbCR statistics. While the analysis has sought to address the issue of double counting of profit in CbCR, the corrections made are nonetheless based on assumptions. Additional guidance issued in the later years of the sample to address the double counting of profits in CbCR, which may have helped to alleviate the issue. In Orbis, the coverage varies across jurisdictions which can result in underestimations of totals when the firm-level data is aggregated. Data in the OECD Activities of Multinational Enterprises database (AMNE) and Analytical AMNE database, or Eurostat's Foreign Affiliates Statistics (FATS) partially rely on additional imputations. Overall, the resulting distributions of MNE activities should therefore be interpreted with some caution. This particularly applies to jurisdictions for which little hard data is available such as many lower income jurisdictions. The matrices - and the estimates of GMT revenues which stem from them – should therefore not be taken to offer precise and certain estimates for each individual data point. The extensive benchmarking exercises and consistency checks reported in OECD (2020[15]) give some confidence that the estimates represent a good approximation of the order of magnitude of the variables concerned.

4.2. Current distribution of MNE profit

34. **On average across the sample period of 2017-2020, large MNEs report net profit of USD 5,929 billion per year, with most profit concentrated in UPE jurisdictions.** Figure 1 shows the distribution of average profit of large MNEs aggregated by UPE and affiliate income group between 2017-2020.[12] Columns summarise profit by UPE location and rows by affiliate location. Generally, profit is concentrated in the diagonal of these matrices, indicating that most MNEs report large shares of their profit in their UPE jurisdiction. Overall, 55.1% of all profit is reported in the UPE jurisdiction. Turning to the distribution of affiliate profit across income groups, about half (50.1%) of global MNE profit is booked in high income jurisdictions, 27.7% in upper middle income jurisdictions, and 18.8% in investment hubs. Profit is even more concentrated when considering the UPE jurisdictions (i.e. matrix columns). 63.8% of all profits of large MNEs are generated by MNEs headquartered in high income jurisdictions. MNEs headquartered in upper middle income jurisdictions and investment hubs account for 20.6% and 13.8% of total profit. Only small shares of total MNE profit are reported in lower middle and low income jurisdictions or are generated by MNEs with UPEs in these jurisdiction groups.[13]

35. **There is a strong concentration of profit in a small number of jurisdictions.** The five affiliate jurisdictions in which most profit of large MNEs is reported account for almost half of total profit (48.1%); close to 80% of total profit is booked in 20 affiliate jurisdictions. In contrast, the 111 jurisdictions with least profit only account for 0.6% of total profit while representing half of the jurisdictions in the sample. Again, the concentration is even stronger when focusing on the UPE dimension. The top five UPE jurisdictions

[11] The methodology applied for the double counting adjustment is described in detail in Hugger, González Cabral and O'Reilly (2023[22]).

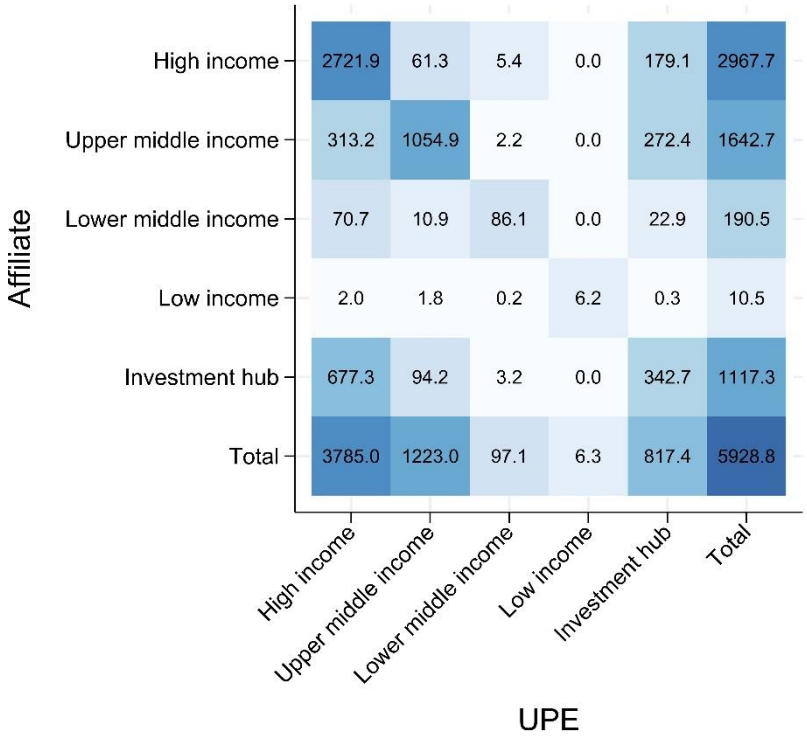
[12] Annex E shows the allocation of jurisdictions to income groups. Table B.1 to Table B.4 in Annex B show the annual aggregates for all matrices by income group.

[13] As described below, absolute profit figures do not account for the size of the economy. Low income jurisdictions represent 0.6% of global GDP and lower middle income jurisdictions 7.4%.

make up 56.4% of MNE profit; the top 20 account for 86.1% of the profit. The bottom half of UPE jurisdictions in terms of profit only represent 0.2% of the total, highlighting the small economic size of many of the jurisdictions covered in the analysis.

36. **While the absolute amount of MNE profit is largest in high-income jurisdictions, profit as a share of GDP is highest in investment hubs.** Figure 2 expresses total profit by income group of the affiliate as a percentage of GDP. Profit in investment hubs relative to GDP are significantly larger than in the other jurisdiction groups. In high and upper middle income jurisdictions, the ratio of profit reported by large MNEs to GDP is 5.9% and 6.7% respectively. In lower middle and low income jurisdictions, these shares are 3.1% and 2.3%. The differences between higher and lower income jurisdictions are somewhat reduced when this relative measure of MNE profit is used but are still considerable. Splitting affiliate jurisdictions into groups by average ETR also shows a clear pattern.[14] The higher the average ETR, the lower the ratio of large MNE profit to GDP. While this share is 49.7% for jurisdictions with average ETRs below 5%, it is only 4.4% for jurisdictions with average ETRs above 25%.

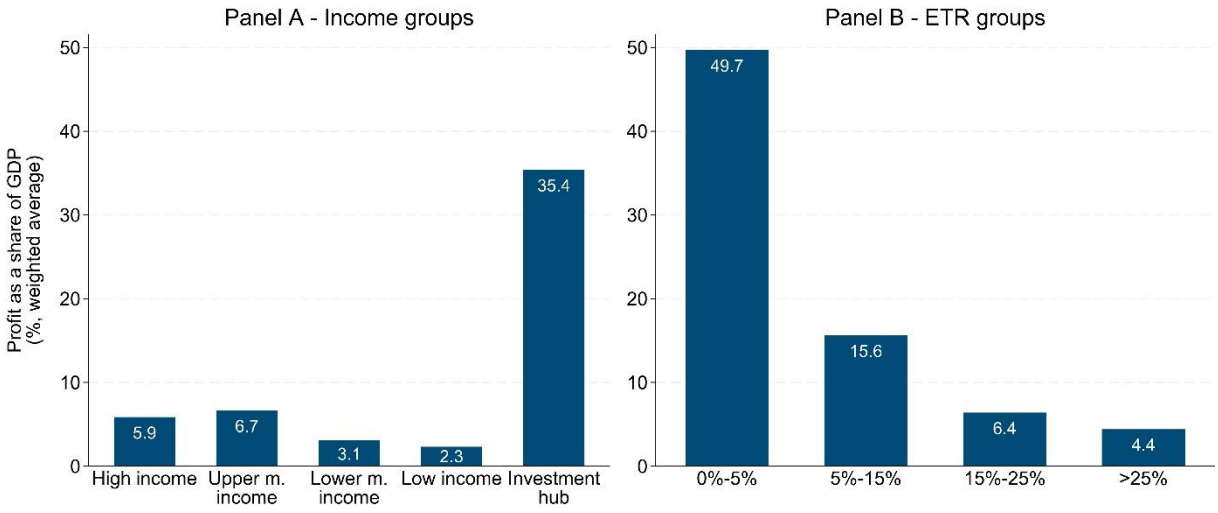
Figure 1. Global distribution of profit by UPE and affiliate jurisdiction income group



Note: Values shown are averages across the years 2017-2020 in USD billion, by income group of UPE and affiliate jurisdiction. Table E.1 shows the allocation of jurisdictions to income groups.

[14] The computation of average ETRs is discussed in Hugger, González Cabral and O'Reilly (2023[22]).

Figure 2. Profit of large MNEs as a share of GDP by affiliate jurisdiction group



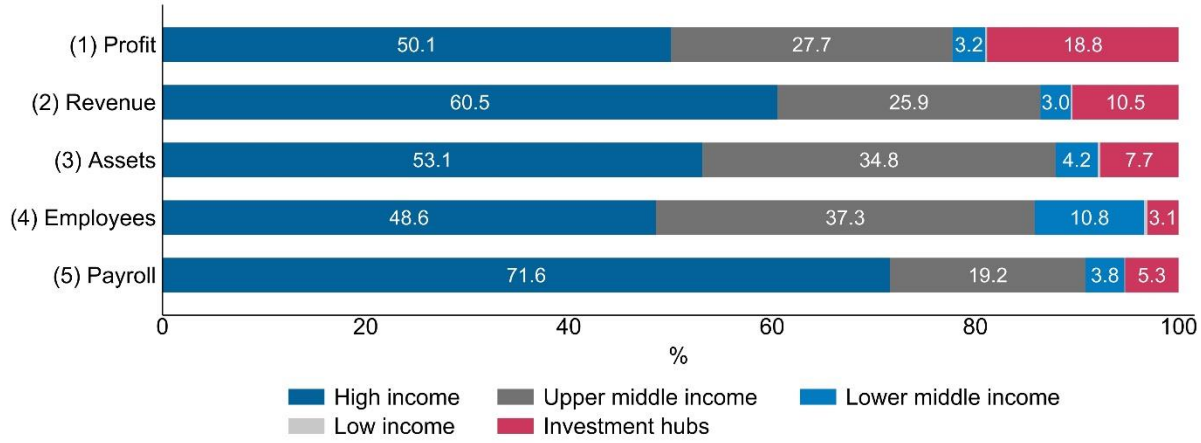
Note: Ratios of profit of large MNEs to GDP by income group (Panel A) and by ETR group (Panel B). Values shown are averages across the years 2017-2020. Annex E shows the allocation of jurisdictions to income groups and ETR groups.

37. **The distribution of total global net profit of large MNEs in the data is broadly stable over the sample period of 2017-2020, with a modest drop in 2020 which may be due to the COVID-19 pandemic.** There is some evidence suggesting differential rates of growth across jurisdiction groups. Total global net profit grew by 5.6% between 2017 and 2018 but declined by 1.5% between 2018 and 2019, and by another 11.1% between 2019 and 2020 (see Figure B.1). Anecdotal evidence from CbCR submitting jurisdictions suggests that the drop in 2020 was mainly due to the COVID-19 pandemic. The decline in total global profit in 2020 is primarily driven by a reduction in profit reported in high income jurisdictions, while profit reported in upper middle income jurisdictions was stable.

4.3. Current distribution of MNE activities and misalignment of profit

38. **The distribution of revenues, assets, employees, and payroll varies across all income groups.** The data collected in the revenue, asset, employee, and payroll matrices (Table B.1 to Table B.4 Annex B) capture different dimensions of the activities of large MNEs. Figure 3 plots the distribution of economic activity besides the distribution of profit by affiliate jurisdiction income groups. Across all measures of economic activity, relatively high shares are reported in affiliates located in high income and upper middle income jurisdictions. For example, the shares of assets and employees reported in high income jurisdictions are 53.1% and 48.6%, respectively; the share of payroll is 71.6%, driven by comparably high wages. While lower middle income jurisdictions represent a small share of the activities of large MNEs in most dimensions, their share of total employees is comparably high (10.8%). Due to low average wages in this jurisdiction group, this does not translate into a similarly high share of total payroll (3.8%). The inverse relationship holds for investment hubs, in which 3.1% of MNE employees are located, accounting for 5.3% of total payroll.

Figure 3. Distribution of profit and activities across income groups

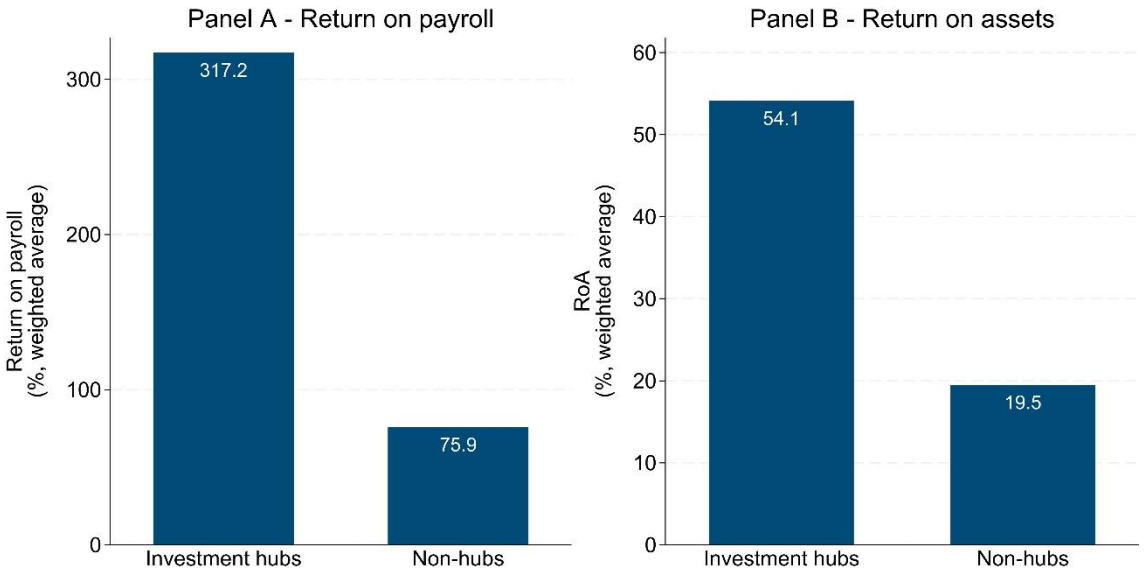


Note: Distribution of profit, assets, employees, and payroll across affiliate jurisdiction income groups. Variable definitions are described in Table 1. Values shown are averages across the years 2017-2020. Labels for values <0.5% are supressed to improve readability. Values for low income jurisdictions are 0.2% for profit, 0.1% for revenue, 0.2% for assets, 0.3% for employees, and 0.1% for payroll. Annex E shows the allocation of jurisdictions to income groups.

39. **As is the case with respect to profit, the global distribution of MNE activities is mostly stable over the sample period.** The economic slowdown in 2020 led to reductions in all measures of economic substance, mainly triggered by negative growth in high income jurisdictions between 2019 and 2020 (see Table B.1 to Table B.4 in Annex B).

40. **The data on MNE profit and activities point to a misalignment between the location of profit and the location of economic activities.** Investment hubs have a much larger share of profit relative to other kinds of MNE activity. Relative to the payroll of large MNEs, for instance, the share of MNE profit reported in investment hubs is more than three times larger. For assets, the share of profit reported in investment hubs is around 2.5 times larger. In the other jurisdiction groups, these ratios tend to be close to 1. As a result, the aggregate profitability of affiliates located in investment hubs is significantly higher than the profitability of affiliates in other jurisdictions. Figure 4 presents two measures of profitability, return on payroll and return on assets, for investment hubs compared to other jurisdictions (referred to as non-hubs for simplicity). Both measures show the same pattern. The average return on payroll in investment hubs exceeds 300%, whereas the average in all other jurisdictions is 75.9%. The return on assets is also significantly higher in investment hubs as compared to non-hubs, although to a lesser extent. Notwithstanding that some investment hubs may have substantive economic activities that could be commensurate with these returns, the data suggest potential misalignment between profit and economic substance, reflecting MNEs' incentives to shift profit to jurisdictions that tax MNE profit at comparatively low rates (see Section 5). The following section provides further analysis on the current extent of profit shifting of large MNEs and the expected changes due to the introduction of the GMT.

Figure 4. Profitability of MNE affiliates in investment hubs and non-hubs



Note: Panel A shows the weighted average of return on payroll for investment hubs and non-hubs; Panel B compares the weighted average return on assets. All values shown are averages across the years 2017-2020. Annex E shows the allocation of jurisdictions to income groups. "Non-hubs" refers to all jurisdictions except for investment hubs.

5 Impacts of the GMT on profit shifting

41. **The first key impact of the GMT considered in this paper is its impact on global corporate profit shifting.** Profit shifting has been a key concern of policy makers in recent decades. To counter profit shifting practices, many jurisdictions have implemented various aspects of the BEPS Project, particularly the minimum standards, as well as other anti-avoidance rules to protect their corporate tax bases. Profit shifting erodes public finances and creates an uneven playing field in two ways. First, it can result in an uneven playing field between governments as profit shifting opportunities undermine the ability of governments to effectively implement certain domestic tax policies and collect the associated tax revenues due to international spillovers. Second, differential access to profit shifting opportunities can give some MNEs advantages over other firms (Sorbe and Johansson, 2017[29]).

42. **A growing literature has estimated the extent of global shifted profit using different data sources.** OECD (2015[54]), using firm-level data, estimates that global revenue losses from profit shifting were between USD 100-240 billion in 2014, which was equivalent to 4-10% of global CIT revenues. Garcia-Bernardo and Janský (2021[56]), based on 2016 CbCR data, estimate global profit shifting to be between USD 965-994 billion implying a revenue loss of USD 186-207 billion. Wier and Zucman (2022[57]) extending previous work by Tørsløv, Wier and Zucman (2022[32]) use a combination of national accounts data and foreign affiliate statistics. They estimate that shifted profit represented USD 969 billion in 2019, which translates into a revenue loss of USD 247 billion or 10% of global CIT revenues. Clausing (2020[32]) using multiple data sources from the Bureau of Economic Analysis and the Internal Revenue Service, finds that profit shifting by US multinationals was likely eroding corporate tax revenues (in both the United States and elsewhere) by between USD 61 and USD 141 billion in 2017.

43. **The literature suggests that shifted profit responds to tax rate differentials in a non-linear manner.** Profit shifting responses to tax rate differentials are well documented in the literature (Hines and Rice, 1994[58]; Huizinga and Laeven, 2008[59]). In a meta-study, Beer, de Mooij and Liu (2018[36]) find a semi-elasticity of profit with respect to corporate tax rates of 1.5, i.e., a one percentage-point lower corporate tax rate is associated with an increase in tax base of 1.5%.[15] While early literature posed a linear relationship between tax rate differentials and profit shifting incentives, the concentration of low-taxed profit in very low tax jurisdictions suggested that responses to tax rate differentials are non-linear. Dowd et al. (2017[39]) argue that prior estimates which ignore nonlinearities understate the extent of profit shifting. By allowing for nonlinearities, the authors find very different tax elasticities depending on the affiliate country's tax rate, suggesting nonlinearities are important in capturing profit shifting across jurisdictions. Bratta et al. (2021[38]), using 2017 CbCR microdata, find that the elasticity of profit with respect to corporate tax rates is eight times larger than conventional estimates in the lowest tax jurisdictions, and 60% lower than conventional estimates amongst jurisdiction-pairs where tax rate differences are smaller. Fuest et al.

[15] This semi-elasticity is significantly larger than found in an earlier meta-study by Heckemeyer and Overesch (2017[37]). Both meta studies report significant variation across studies in terms of the type of data and methodology used to estimate profit shifting.

(2022[60]), using 2016-2019 CbCR microdata, find that the semi-elasticity is larger than 10 at ETRs below 5%, and becomes negligible at ETRs between 15 and 20%.

44. **Some studies have suggested that the responses to the reduction in tax rate differentials brought about by the GMT will differ from the responses to tax rate differentials found in the literature.** Prior literature has backed out changes in profit shifting incentives by exploiting unilateral changes to tax rate differentials (Garcia-Bernardo, Janský and Zucman, 2022[61]; Clausing, 2020[32]). Some exceptions relate to studies that capture increases in the overall cost of profit shifting across different jurisdictions from the introduction of anti-avoidance measures for instance (Mooij and Liu, 2018[62]; Clifford, 2019[63]; Hansen, Merlo and Wamser, 2023[64]). Since the GMT is an unprecedented, coordinated change to the international corporate tax system raising the floor of effective taxation in all jurisdictions at once, profit shifting responses may differ from existing evidence that relates to unilateral reforms. This calls for caution when extrapolating changes to profit shifting behaviour based on the elasticities reported in existing studies.

45. **In this study, the reduction in profit shifting is estimated based on changes in profit shifting incentives from the introduction of the GMT.** A first step to measure changes in profit shifting is estimating current shifted profit and profit shifting patterns. To do so, the methodology closely follows OECD (2020[15]) with some key differences described below and in Annex C. Different assumptions on the sensitivity of profits to tax rate differentials are used, bearing in mind that as discussed above there are limitations in the use of existing estimates to estimate profit shifting responses to the GMT.

46. **The structure of this section follows the four key methodological steps applied in this study to estimate the reduction in profit shifting.** First, Section 5.1outlines the estimation of the stock and location of shifted profit in investment hubs. Second, Section 5.2describes the strategy to identify the jurisdictions where profit was located prior to being shifted. Third, Section 5.3estimates the reduction in profit shifting incentives due to the reduction in tax rate differentials brought about by the implementation of the GMT. Finally, Section 5.4estimates the stock of shifted profit in a world where the GMT has reduced profit shifting incentives and the reduction in global corporate profit shifting brought about by the GMT.

5.1. Estimating the stock and location of global shifted profit

47. **The methodology applied in this study assumes shifted profit is only present in investment hubs, and estimates shifted profit based on a return on economic activity.** This assumption is common in the literature (e.g., Garcia-Bernardo, Janský and Zucman (2022[61])). The study assumes that shifted profits are only present in investment hubs. This assumption is a simplification as profits may also be shifted to jurisdictions that are not investment hubs.[16] Investment hubs have higher profitability rates compared to other jurisdiction groups which could suggest profit shifting activity (Section 4.3). At the same time, not all profit located in investment hubs is assumed to be shifted, but only profit in excess of a profitability threshold. For this, the paper computes a year-specific profitability cut-off based on the 75th percentile of returns on tangible assets depreciation and payroll among jurisdictions other than hubs.[17]

[16] In OECD (2020[15]), it was assumed that shifted profits could be located in a wider group of jurisdictions than investment hubs only i.e., those for which FDI represent more than 100% of GDP and have an ETR below the median. Using this extended list of jurisdictions, the estimated values of shifted profits were largely concentrated in investment hubs. For this reason, this paper focuses only on investment hubs. However, for completeness, Annex C replicates the analysis using the same criteria as OECD (2020[15]) and confirms that accounting for a broader set of jurisdictions to which profits can be shifted to does not significantly alter the total stock of shifted profits.

[17] The depreciation rate of tangible assets is proxied to be 10% of the value of tangible assets. In OECD (2020[15]) profit shifting is estimated based on a return on total revenue threshold. As total revenues contain related party revenues, this variable may itself be affected by profit shifting activities.

Profits above this cut-off in jurisdictions other than investment hubs are assumed not to be shifted profits. The year-specific cut-off ensures that global trends in profitability do not unduly affect the share of shifted profit in any given year. The approach yields a stock of shifted profit in each investment hub for each year.

48. **Our methodology assumes that losses are shifted with profits.** While firms may have incentives to retain losses in high tax jurisdictions to reduce their tax liabilities there, firms may be required to keep losses in low tax jurisdictions for different reasons. First, in order to locate profit in investment hubs, firms may need to also 'shift risk', as risk is associated with higher profit in profit allocation rules. This shifting of risk may mean that profitability in hubs is more volatile than in non-hubs, with some losses accruing as well as profits (Becker, Johannesen and Riedel, 2020[65]). In addition, affiliates in investment hubs may purchase or develop valuable intellectual property (IP) to retain the profit from this IP in a low-tax context. Such purchases or developments may be associated with (temporary) losses. For this reason, shifted profits are expressed net of losses as described in Hugger, González Cabral and O'Reilly (2023[22]).

49. **The estimated total shifted profit accounts for a significant share of profit reported in investment hubs.** On average, 62.5% of all profit reported in investment hubs during the 2017-2020 period is modelled as shifted profit, which amounts to USD 698.4 billion per year on average across the sample period. This represents 11.8% of total global profit. The estimated stock of shifted profit is of a comparable magnitude to global estimates in previous work based on aggregate data, but is more conservative with respect to some recent estimates in the literature (Garcia-Bernardo, Janský and Tørsløv, 2021[66]; Wier and Zucman, 2022[57]). This result on total shifted profit is largely robust to using other profitability thresholds, e.g., return on payroll, tangible assets, or revenues (Annex C).

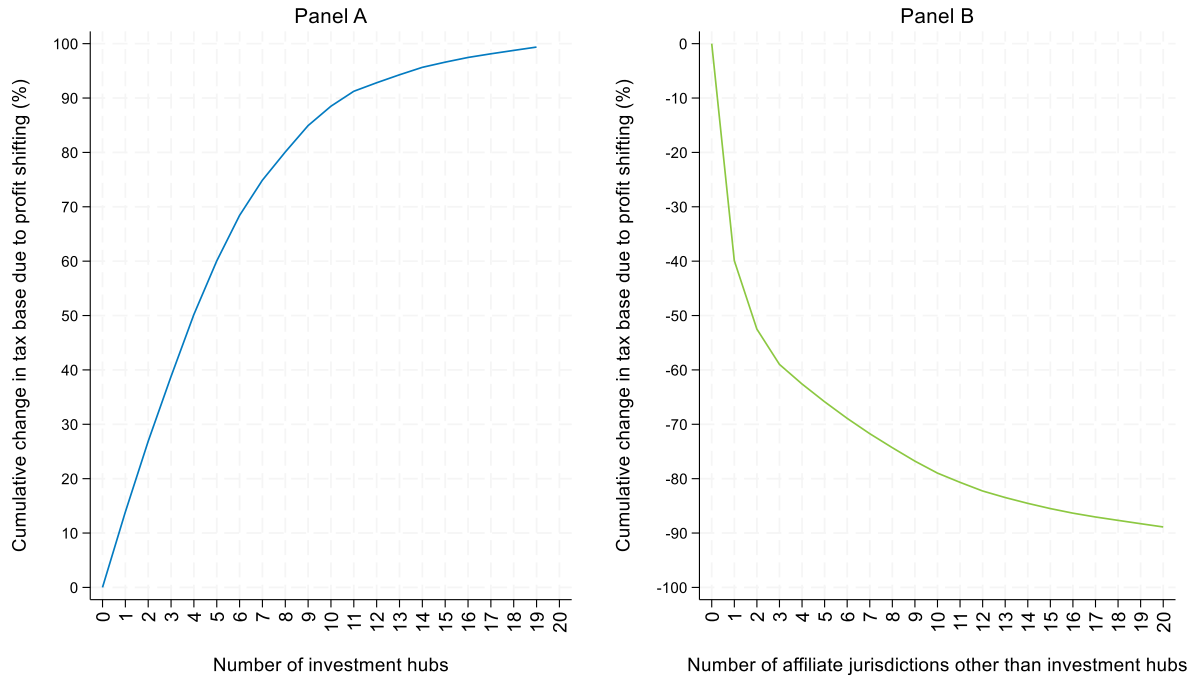
50. **Shifted profit is concentrated in a small number of investment hubs.** The ten investment hubs with most shifted profit comprise 88.5% of all shifted profit, with the first five comprising 60% of the total (Panel A of Figure 5). Most shifted profit is reported in investment hubs with non-zero tax rates (69% of total shifted profit).

5.2. Estimating the source of shifted profit

51. **Assessing the impact of the GMT on profit shifting requires determining the jurisdictions that are losing tax base due to profit shifting.** The previous section identified the total stock of shifted profit in each investment hub. This section seeks to allocate that shifted profit to the jurisdiction where they would have been located absent any profit shifting. Without a detailed consideration of the precise profit shifting channels, any such estimate is likely to be only a very imperfect proxy. The model follows OECD (2020[15]). Profit is assumed to have been shifted from the UPE jurisdiction or other non-hub jurisdictions where the MNE has operations. The methodology seeks to identify three key jurisdictions in the profit shifting structure: (i) the jurisdiction towards which profit is currently shifted, (ii) the jurisdiction where profit was shifted from, and (iii) the jurisdiction of the UPE. In this paper, shifting is assumed to occur only from non-hubs to investment hubs, not between two investment hubs or between two non-hubs.[18]

[18] In OECD (2020[15]), it was assumed that shifted profits could be located in a wider group of jurisdictions than investment hubs only. Since not all of those jurisdictions that were assumed to potentially contain shifted profits had high levels of estimated shifted profits in the analysis, and the estimated values of shifted profits were largely concentrated in hubs even under the previous approach. For this reason, an alternative approach is taken in this paper (Annex C).

Figure 5. Concentration of tax base gains and losses due to profit shifting, 2017-2020



Note: Cumulative distribution of tax base changes due to profit shifting for the first twenty investment hubs (Panel A) and non-hub jurisdictions (Panel B). The axis in Panel B is expressed in negative terms to graphically reflect that those changes refer to tax base losses. Shifted profit is defined as all profit above a threshold of return of tangible assets depreciation and payroll. The value of this threshold varies yearly reflecting fluctuations in overall profitability of MNEs and corresponds to the 75th percentile of the ratio for jurisdictions other than investment hubs in a particular year. Shifted profit are assumed to be present only in investment hubs and shifting between investment hubs is not considered.

52. **More profit is assumed to be shifted from jurisdictions where MNEs have greater economic presence and have higher tax rate differentials with investment hubs.** Profit shifted from non-hub jurisdiction i to investment hub j by MNEs with a UPE in jurisdiction k are estimated according to Equation (1). This equation shows that shifted profit is assumed to be a function of three parameters:

1. The economic activity of MNEs with UPE in jurisdiction k in each non-hub jurisdiction i ($\boldsymbol{Y_{ik}}$) The underlying assumption is that shifted profit originates from non-hubs where the MNE has more economic activity and hence the capacity to generate more profit. Economic activity is proxied using tangible assets and employees in a given jurisdiction, with both factors assigned equal weights. Sensitivity analysis of this is contained in Annex C.
2. The tax rate differential ($\boldsymbol{\tau_i - \tau_j}$) between non-hub i and hub j determining the incentive to shift profit in the first place. The larger the tax rate differential, the larger the incentive to shift profit.
3. A set of scaling factors $\boldsymbol{\lambda_{jk}}$ which weight the strength of the relationship between UPEs and investment hubs.[19]

[19] First, recognising that certain UPEs tend to have a greater propensity to shift profits to certain investment hubs (for example due to economic ties or specific treaty relationships); and second, to ensure that all profits are allocated to either a UPE jurisdiction, a non-UPE non-hub jurisdiction, or investment hub jurisdiction (i.e., that no profits are unallocated).

$$ProfitShifted_{ijk} = \lambda_{jk} Y_{ik} f(\tau_i - \tau_j) \quad (1)$$

$$\lambda_{jk} = \frac{\sum_i ProfitShifted_{ijk}}{\sum_i Y_{ik} f(\tau_i - \tau_j)}$$

53. **Unwinding profit shifting patterns provides a baseline from which to evaluate the impact of a reduction in profit shifting incentives.** Using Equation (1), the stock of shifted profit calculated in Section 5.1is allocated to all jurisdictions where profit was generated prior to shifting. In other words, all profit shifting is unwound. This creates a baseline against which to measure the impact of changes to profit shifting incentives after the implementation of the GMT which will be described in Section 5.3

54. **The analysis considers different assumptions on tax rate differentials and profit shifting intensity**. The estimates of the jurisdictions that lose tax base are influenced by the way in which tax rate differentials are computed and how these are assumed to affect profit shifting intensity. To capture the sensitivity of the estimates to these assumptions, the paper considers six scenarios, which include two alternative ways of computing tax rate differentials between hubs and non-hubs and three ways in which tax rate differentials may affect profit shifting intensity. These scenarios are used to compute uncertainty bounds around the profit shifting response.

- **Approaches based on tax rate differentials.** Tax rate differentials are computed using the difference between the STR in a non-hub jurisdiction and the ETR in an investment hub. They are also computed as the difference between ETRs between non-hubs and hubs.[20] Details on the estimation of the ETRs follow in the next section.
- **Approaches based on alternative shapes of the profit shifting function.** Three different approaches to the relationship between tax rate differentials and profit shifting are modelled (Figure 3.9 in (OECD, 2020[15]) illustrates these shapes). The first approach assumes that profit shifting is proportional to tax rate differentials. In the second approach, it is assumed that there are reduced profit shifting incentives at low differentials for high income jurisdictions, assuming that profit shifting may persist at low differentials for other income groups albeit at a lower intensity. The third approach builds on the previous shape and also assumes that at sufficiently high differentials, profit shifting intensity will decline. This is based on the idea that at sufficiently high differentials, an additional difference in taxation may matter relatively little to the investor. In addition, to reflect the fact that some jurisdictions may be more exposed to profit shifting, it is assumed throughout that, compared to high income jurisdictions, profit shifting intensity is 50% larger in upper middle income jurisdictions and twice as large for low and lower middle income jurisdictions.[21]

55. **Almost 80% of global tax base losses due to profit shifting are concentrated in just ten jurisdictions.** While tax base losses from profit-shifting are concentrated, profit shifting is a widespread phenomenon affecting all jurisdictions to different extents. The first ten jurisdictions make up 79% of global tax base losses, the next ten jurisdictions contribute an additional 9.9% of global tax base losses. The

[20] In the academic literature focused on profit-shifting, the tax rate differentials relevant for profit-shifting incentives are often assumed to be based on STRs under the assumption that this would be the marginal tax rate that an extra unit of profit would face (Devereux and Maffini, 2007[76]). However, such approaches do not consider the presence of tax incentives or specific tax provisions that may result into the marginal tax rate being significantly lower than a jurisdictions STR. Investment hubs can have relatively high STRs compared with their ETRs (Hugger, González Cabral and O'Reilly, 2023[22]). At the same time, investment hubs with non-zero rates comprise the bulk of shifted profits (Section 5.2). Using STRs would misrepresent profit shifting incentives. For this reason, tax rates differentials are always computed using the ETR for investment hubs.

[21] This follows some papers in the literature that suggest that developing countries are more exposed to profit-shifting (Cobham and Janský, 2018[42]).

difference in the concentration of tax base gains and losses due to profit shifting (Panel A and Panel B in Figure 5) implies that more jurisdictions stand to gain from a reduction in profit shifting compared to those that stand to lose from the reduction in profit shifting.

5.3. Reduction in profit shifting incentives

56. **The next step in modelling the impact of the GMT on profit shifting is to estimate tax rate differentials before and after the implementation of the GMT.** A reduction in tax rate differentials translates into a reduction in profit shifting incentives for MNEs in the model. Profit shifting before the GMT is estimated based on existing ETR differentials. The ETRs used to compute tax rate differentials prior to the implementation of the GMT are ETRs computed with respect to profits adjusted for losses as described in Hugger, González Cabral and O'Reilly (2023[22]).[22] This is because failing to adjust profit in CbCR for losses would lead to an underestimation of ETRs which would in turn overstate the effect of the GMT.[23]

57. **The GMT will reduce tax rate differentials by imposing top-up taxes on low-taxed profit.** After the GMT of 15% is taken into account, the ETR on in-scope profit will be equal to 15%. Since shifted profit is typically associated with limited substance, the SBIE is not expected to reduce the top-up tax levied on shifted profit significantly. This means that that the ETR on a marginal dollar of shifted profit is assumed to be 15% after the introduction of the GMT. Whether this ETR is achieved via a QDMTT, the IIR, or the UTPR does not impact the change in profit shifting incentives.

58. **The difference in ETRs before and after the introduction of the GMT is the same as the GloBE top-up tax percentage.** Equations 2.1 and 2.2 compare the pre- and post-GloBE ETRs for profit subject to the GMT. An important nuance is that top-up tax percentages are calculated using the GloBE ETR. A key difference between the GloBE ETR and the ETR on net profit is the treatment of losses.[24] Annex D shows that computing the top-up tax based on the loss-adjusted tax base and associated ETR primarily used in this paper yields the same result as using the GMT calculation which is based on gross profit. Based on this, top-up taxes in this paper are expressed as a percentage of net profit which simplifies the calculation as both pre- and post-GloBE ETRs are expressed based on net profit ETRs.

$$Pre - GMT = ETR = \frac{Taxes\ paid}{Profit - Loss} \quad (2.1)$$

$$Post - GMT = ETR + max(15\% - ETR, 0) \quad (2.2)$$

59. **Tax rate differentials between investment hubs and non-hubs are significantly reduced or even disappear after the implementation of the GMT.** The median tax rate differential with investment hubs prior to the introduction of the GMT was 14.6 percentage points (averaged between 2017-2020). After the GMT is accounted for, the median differential falls to 3.6 percentage points (see Figure B.2 in Annex B). Out of all investment hub-non hub pairs with a positive tax rate differential prior to the implementation of the GMT in any given year between 2017-2020, tax rate differentials become zero in

[22] The reason for this adjustment is that that firms have a certain stock of losses in prior years that they are able to offset in the current year against current profits. The data is aggregated at the jurisdiction level and hence firm-level adjustments are not possible. The methodology outlined in Hugger, González Cabral and O'Reilly (2023[22]) corrects profits to account for losses and estimates ETRs which are commensurately adjusted using the net profit base.

[23] Figure D.1 in Annex D Panel 1 and Panel 3 compares the distribution of the ETR on net profits and the ETR on positive profits, respectively, showing significantly lower ETRs in the absence of a loss correction.

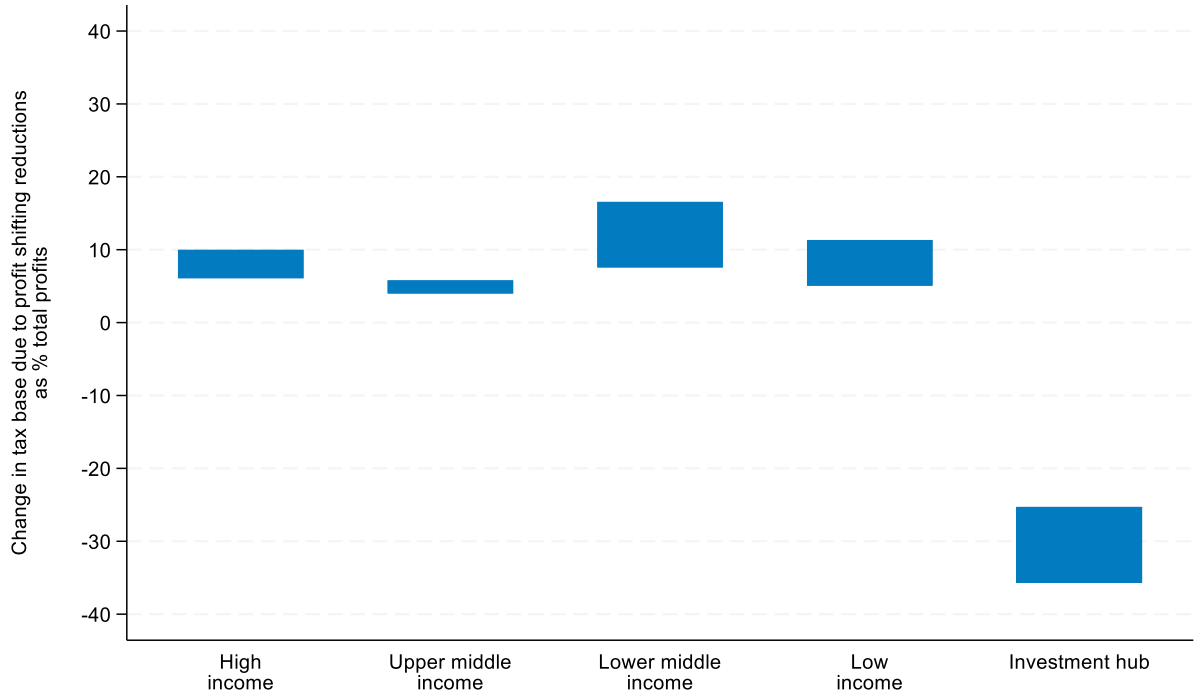
[24] This is a simplification as data does not allow for the different treatment of temporary and permanent differences in the GloBE Rules. This is discussed further in Section 0.604.13

33% of cases. The narrowing of tax rate differentials should translate into lower profit shifting incentives, as discussed below.

5.4. Reduction in shifted profit

60. **Profit shifting is estimated to be reduced by about half as a result of the GMT.** The reduction in tax rate differentials is estimated to reduce the stock of shifted profit from USD 698.4 billion to USD 356.4 billion.[25] The share of shifted profit in total profit in investment hubs falls by 30.6 percentage points, from 62.5% of total profit to 31.9% (Figure 6) translating into a loss in taxable base for this jurisdiction group.

Figure 6. Change in tax base due to profit shifting reductions, % of total profits



Note: Average changes in total profit by income group following the implementation of the GMT. Bounds are constructed using six scenarios with different assumptions regarding profit shifting reductions. Data includes non-Inclusive Framework member jurisdictions. Profit from investment funds in UPE jurisdictions are assumed to be unaffected by the decline in profit shifting incentives. This is because investment funds as UPEs are excluded from the GMT. Other exclusions apply but are not modelled in this paper (Section 3). Total profit is profit before accounting for profit shifting.

61. **The reduction in profit shifting generates tax base gains for all jurisdictions except investment hubs.** Figure 6 shows the net gain from the reduction in profit shifting relative to total profit. Across all income groups, the share of shifted profit decreases after the implementation of the GMT. For example, high income jurisdictions were estimated to lose about 14.3% of their tax base due to profit

[25] These figures represent an average over time, and an average across the six different scenarios on profit shifting incentives discussed in Section 5.2 Table C.3 in Annex B presents the results of the tax base changes by income group for all years for all combinations of profit shifting functions and tax rate differential cases considered.

shifting before the GMT. The implementation of the GMT reduces this tax base loss by 8 percentage points or 57% on average in this estimation.

62. **While the GMT will significantly reduce profit shifting, these reductions may take time to materialise, and it is likely that not all forms of profit shifting will be eliminated.** Profit shifting strategies of MNEs vary widely, and MNE restructuring or transfer pricing adjustments may take time to occur after the introduction of the GMT. Moreover, even after the introduction of the GMT, the model continues to show some shifted profit in investment hubs. This is linked to two factors. First, positive tax rate differentials continue to exist after the introduction of the 15% GMT rate. Second, some profit is excluded from the scope of the GMT and are therefore assumed to be unaffected by the change in profit shifting incentives through the GMT. This relates, for instance, to shifted profit attributed to investment fund UPEs in this estimation. The fact that profit shifting is reduced but not completely eliminated highlights the continued relevance of certain anti-base erosion measures.

6 Impact on the taxation of low-taxed profit

63. **The second key impact of the GMT discussed in this paper is its impact on global low-taxed profit.** The GMT increases the taxation of low-taxed profit in two ways. First, as discussed in Section 5, it is expected to reduce corporate profit shifting which leads to a higher share of profit being reported in jurisdictions with higher ETRs on average. Second, it raises top-up taxes whenever in-scope profit is taxed at ETRs below the agreed minimum of 15%.

64. **The current stock of low-taxed profit stems in part from the global decline in both statutory and effective CIT rates over recent decades.** Average STRs have declined globally from an average of 28.2% in 2000 to an average of 21.3% in 2020, and 21.1% in 2023 for the 141 jurisdictions covered in Corporate Tax Statistics (OECD, 2023[67]), though there is some evidence that this decline may have lessened in recent years. A similar picture emerges in the case of effective tax rates (Devereux et al., 2002[23]; González Cabral et al., 2023[26]). These findings not only been linked to tax competition through tax rates, but also through the narrowing of CIT bases, e.g., through the implementation of tax incentives (Rincke and Overesch, 2011[24]; Devereux, Lockwood and Redoano, 2008[68]).

65. **The use of tax incentives for investment is often associated with low-taxed profit.** Tax incentives in the form of full exemptions or accelerated depreciation are common tools among developing countries often used to promote foreign direct investment (OECD, 2022[69]). R&D tax incentives have also been increasingly used over the past two decades (González Cabral et al., 2023[26]; OECD, 2023[70]). There is a large body of evidence that tax incentives can deliver very low ETRs (Botman, Klemm and Baqir, 2008[71]; González Cabral, Appelt and Hanappi, 2021[72]; Celani, Dressler and Hanappi, 2022[73]; Egger, Strecker and Zoller-Rydzek, 2020[28]).

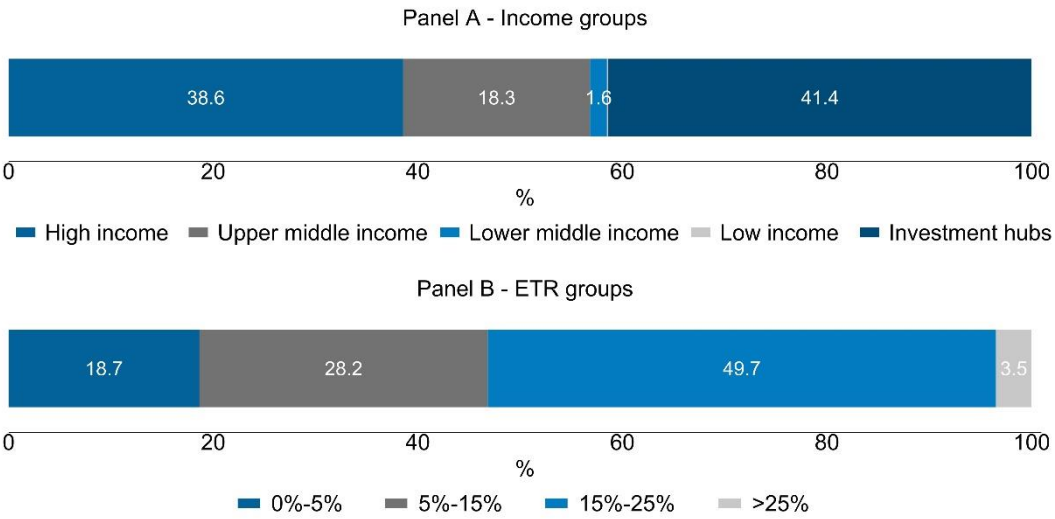
66. **This section estimates the impact of the GMT on global low-taxed profit.** Section 6.1presents evidence on the current stock and distribution of low-taxed profit. Section 6.2discusses the adjustments required to approximate GloBE Income. Section 6.3estimates the extent to which the GMT reduces the stock of low-taxed profit.

6.1. Stock, location and distribution of low-taxed profit

67. **A companion paper estimates the global stock and location of the low-taxed profit of large MNEs.** Using a novel approach that aims to describe the heterogeneity of ETRs within jurisdictions, Hugger, González Cabral and O'Reilly (2023[22]) estimate the extent to which MNE profit is subject to low ETRs. By going beyond average ETRs, their proposed approach is not restricted to the measurement of low-taxed profit in jurisdictions with low tax rates, i.e., those with average ETRs below 15%, but is also able to capture low-taxed profit in high tax jurisdictions, i.e., those with average ETRs above 15%. The paper estimates that, on average over the four years in the sample, USD 2,143 billion (36.1%) of total profit of MNEs with revenues above EUR 750 million are subject to ETRs below 15%. Over one-third (35.1%) of low-taxed profit is taxed at ETRs below 5%.

68. **Investment hubs have high shares of low-taxed profit compared to total profit, but substantial low-taxed profit also exists among other jurisdiction groups.** Low-taxed profit is present in all income groups due to either low baseline CIT rates or the presence of tax incentives and other base narrowing provisions. As a proportion of total low-taxed profit, 58.6% of low-taxed profit is located outside of investment hubs – almost 40% of total low-taxed profit is located in high income jurisdictions (Figure 7 Panel A).

Figure 7. Distribution of low-taxed profit, by income groups and ETR groups



Note: Distribution of low-taxed profit of large MNEs over income groups (Panel A) and ETR groups (Panel B). Annex E shows the allocation of jurisdictions to income groups and ETR groups. Low-taxed profit is defined as all profit taxed at ETRs <15%. Labels for values <0.5% are supressed to improve readability. The value for low income jurisdictions in Panel A is 0.1%.
Source: Hugger, González Cabral and O'Reilly (2023[22]).

69. **The analysis shows a significant amount of low-taxed profit outside of low tax jurisdictions**. While it is expected that jurisdictions that have on average low ETRs should make up a higher share of low-taxed profit, low-taxed profit does arise in jurisdictions that are on average high tax (Figure 7 Panel B). More than half of total low-taxed profit (53.2%) is located in jurisdictions that have average ETRs above 15%. The evidence displayed in this section highlights two key points. First, low-taxed profit can be found even in jurisdictions with high average ETRs; second, low-taxed profit is present across all income groups. The variation in the stock of low-taxed profit across jurisdictions will translate into differing impacts of the GMT.

6.2. Calculation of GloBE Income and excess profit

70. **To assess the impact of the GMT on low-taxed profit, it is necessary to estimate the size of the tax base under the GloBE Rules, taking several key aspects of the GloBE Rules into account. Since** the definition of the tax base under the GloBE Rules follows commonly agreed adjustments to financial accounts (Section 3), the estimates of low-taxed profit from Section 6.1need to be revisited in the light of the GloBE Rules. Not all low-taxed profit identified in Section 6.1may be subject to top-up taxes. Several methodological adjustments are performed to approximate the GloBE tax base, particularly with respect to differences in scope and in the accounting of timing differences, and the SBIE.

Scope exclusions

71. **The analysis relies on data of MNEs with revenues above the EUR 750 million threshold which needs to be adjusted to account for some specifics of the scope of the GloBE Rules.** As discussed in Section 4the analysis is based on CbCR data and other data that was adjusted to match the EUR 750 million revenue threshold. However, the GloBE Rules provide for certain scope exclusions (see Section 2). The analysis captures the exclusion of investment funds whenever they are the UPE of an in-scope MNE.[26] The reason for focusing on this exclusion is that investment fund activities tend to be relatively concentrated in investment hubs. Failing to account for their exclusion may lead to an overestimation of the extent of low-taxed profit that would be subject to the GMT. As cross-country data on the profit realised by investment fund UPEs is not readily available, the analysis relies on additional data provided by jurisdictions to correct for the share of profit of investment funds in UPE jurisdictions. Where no additional data is available the activity of investment funds is proxied using data on holding activities from aggregated CbCR data. Corrections are only applied to the profit reported in investment hubs that have an above median presence of holding entities. Note that the correction only applies to funds with UPEs in investment hubs, and that it only applies to profit in the UPE jurisdiction. No correction is applied to account for funds headquartered outside of hubs, which are also less likely to be subject to low ETRs. This correction is applied to twelve investment hubs, where the median correction removes around 20% of profit in the UPE jurisdiction.[27] Overall, this correction reduces total loss adjusted profit by an average of 0.3% over the four sample years.

72. **The GMT excludes certain entities and certain forms of income from its scope which are not captured in this analysis, but these are expected to have limited impact on the results.** Other exclusions from the GMT include an exclusion for international shipping income. Based on aggregated sectoral data, the relevance of the shipping sector in overall MNE activity seems limited. Given the additional lack of appropriate data on the exact types of income excluded from the GMT, the modelling of these exclusions was not pursued in this paper. While the exclusions may be of relevance for individual jurisdictions, their impact on the global results is likely to be extremely minor.

GloBE Income and adjustments for temporary differences

73. **GloBE Income is approximated using data for MNE subgroups with positive profit.[28]** In order to approximate the tax base under the GloBE Rules, the paper follows the adjustments based on deferred tax accounting specified in the rules (Box 1 in Section 3). A particularly relevant adjustment performed in this paper refers to the treatment of losses under the GMT. As discussed in Section 4, the baseline profit matrix used for this paper is adjusted to account for the carry-over of losses. To approximate the tax base under the GloBE Rules, this adjustment is reversed. This is because instead of adjusting the tax base to

[26] This exclusion only refers to the entity that is the UPE and not to the rest of the MNE, see Article 1.5 in OECD (2021[2]).

[27] While holding activities also take place in UPE jurisdictions outside of investment hubs, the share of entities performing holding functions in investment hubs is greater than in any other income group. In the sample, the share of entities performing holding activities in the UPE is on average 27% for investment hubs while they only represent between 6.5-9.8% in high and upper middle income jurisdictions, and less than 5% in low and lower middle income jurisdictions (2.3% and 3.3%, respectively). These are averages across the 2017-2020 data. Data may be incomplete for certain jurisdictions. A list of corrected jurisdictions is contained in Annex C.

[28] Data at the subgroup level approximates jurisdictional blending under the GloBE Rules. Only subgroups with positive profits are used in the estimation of the GMT as those subgroups are the ones for which the GloBE ETR would be calculated, and on whose profits top-up tax may be due. The possibility that positive subgroups may have losses (from prior years or loss-making entities in the current year) is accounted for through the loss adjustment explained in Section 4

account for losses, losses are accounted for in the numerator of the GloBE ETR valued at the minimum rate of 15% (see Section 2 Box 1 and Annex D for the mechanics of this adjustment and valuation of losses).

74. **Other adjustments to financial accounts to obtain GloBE Income are not accounted for in the analysis.** One example includes accelerated depreciation or expensing of tangible assets for tax purposes that may lead to top-up tax in earlier years of an investment where capital allowances for tax purposes would be more generous than captured in financial accounts. The GloBE Rules adjust the numerator of the GloBE ETR based on deferred tax accounting to avoid this outcome. Over the lifetime of an investment project, the key economic benefit of accelerated depreciation or expensing is the time value of money. Not adjusting for such provisions in the modelling may inflate top-up tax percentages for firms in early phases of their investment cycle, but conversely underestimate the top-up tax in later years.[29] The data used in this study is aggregated across firms in many jurisdictions in a given year and across four years of data and therefore includes firms that are likely to be in many different stages of their investment cycles. Both the cross-sectional and panel dimension are likely to smooth out the relevance of such temporary differences on the overall GloBE ETR in the jurisdiction. The assumption is that low observed GloBE ETRs are more likely related to the presence of tax incentives that cause permanent differences, than to those that cause only temporary differences.[30] Potential impacts of one-off events such as capital acquisitions, mergers, takeovers, or disposals are also not accounted for.

75. **The calculation of GloBE Income and the GloBE ETR are the basis for the estimates of top-up taxes in this paper.** The estimation approach approximates the GMT calculation as closely as possible. The GloBE ETR and GloBE Income are used to estimate top-up taxes due on profit in each jurisdiction. GloBE ETR and GloBE Income differ from the baseline ETR, and profit variables used in the previous sections. The baseline profit variable in Section 4includes an adjustment for prior year losses. The corresponding baseline ETR hence includes this adjustment for losses in its denominator. In contrast, under the GMT, losses are corrected for in the numerator of the ETR rather than in the denominator while GloBE Income does not account for prior-period losses (Box 1). In other words, GloBE ETRs are expressed with respect to profits gross of losses, while the ETRs in Section 5are expressed net of losses.[31] To estimate the effect of top-up taxation, this paper proceeds in two steps: 1) top-up taxes are calculated using the GloBE ETR to compute the top-up tax percentage and GloBE Income to compute excess profit; 2) top-up taxes and remaining results are expressed with respect to baseline profit to improve comparability across the paper. Annex B compares the size of the GMT base to baseline profit and Figure D.1 compares the GloBE ETR to the baseline ETR.

The Substance-Based Income Exclusion

76. **The Substance-Based Income Exclusion implies that not all low-taxed profit will be subject to top-up tax, requiring a three-step adjustment to compute the tax base of the GMT.** As discussed in Section 3, the SBIE carves out a share of profit equal to a percentage of the assets and payroll in the

[29] Early years refer to those years during which a DTA is generated and added as a positive value to the numerator of the GloBE ETR to compensate for lower taxes paid. Later years refers to the years during which the DTA is reverting and hence reduce the numerator. Across all years during which the DTA exists, its sum adds up to zero. There is no effect on the sum taxes paid, except for the benefits derived from the time value of money due to the ability to postpone the payment of some taxes.

[30] Technically, the GloBE Rules allow accelerated depreciation for tangible assets to be unaffected. For other assets (i.e., intangibles), if the timing difference lasts longer than four years, top up tax may be due.

[31] Annex D shows that top-up taxes computed using GloBE ETRs and GloBE Income yield equivalent results to computing them based on the measures of ETRs and profits described above.

jurisdiction from the GMT base. Only profit in excess of the SBIE is subject to top-up tax.[32] The effect of the SBIE on the tax base under the GloBE Rules varies across jurisdictions with the share of profit to payroll and assets of a subgroup. The modelling of the SBIE proceeds in three steps.

77. **First, the modelling of the SBIE relies on the profit matrix to inform the pre-SBIE tax base, and the payroll and the asset matrices to calculate the size of the SBIE.** As discussed in Section 3, there is a transitional period in the GloBE Rules that affects the value of the SBIE. The modelling considers two main SBIE scenarios. The first scenario reproduces the year-one SBIEs, i.e., where only profit exceeding 8% of assets plus 10% of payroll are subject to the GMT. The second scenario takes the values of the year-ten SBIE at the end of the transitional period, i.e., where profit exceeding 5% of assets and 5% of payroll are subject to the GMT. The SBIE is calculated at the jurisdiction level.

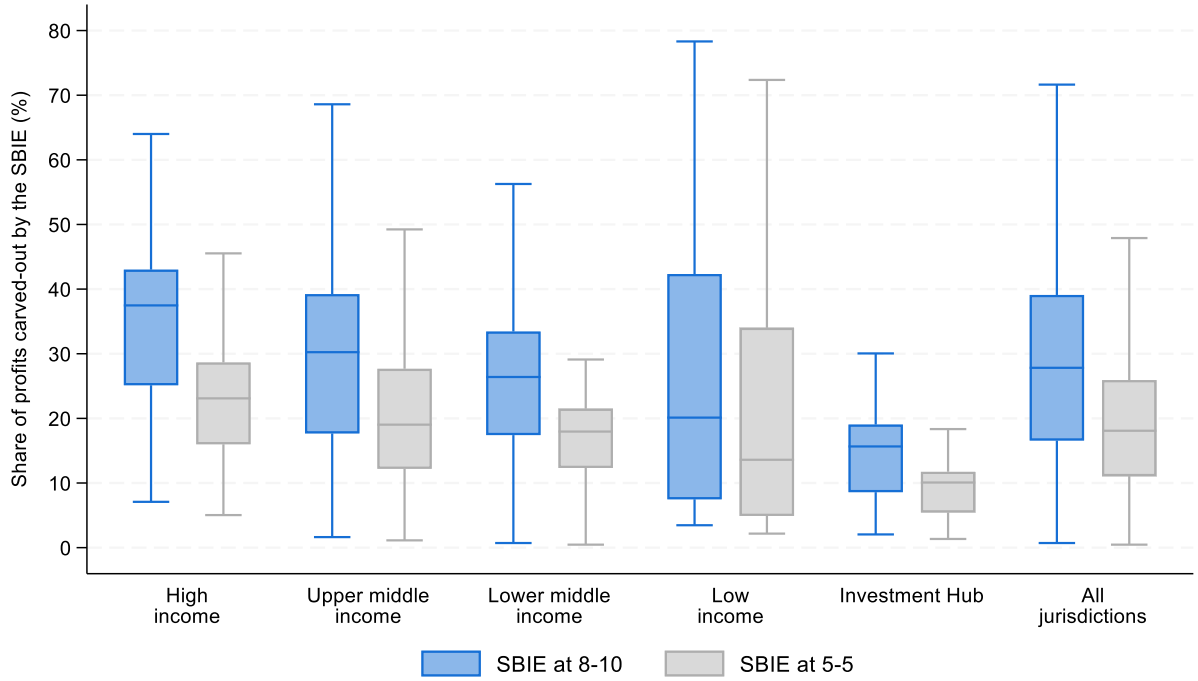
78. **Second, the modelling adjusts the value of the SBIE at the aggregate level to account for differences in the use of the SBIE to carve out profit from the GloBE tax base at the firm level.** The modelling is based on aggregated data at the UPE-affiliate jurisdiction level, but the ratio of substance to profit may not be homogeneous across firms. Some of the substance reported in a jurisdiction may be attributable to subgroups with very little positive profit, while other subgroups in the same jurisdiction may have little substance, but high profit. This would mean that some substance cannot be used to reduce the tax base under the GloBE Rules. To account for such patterns, unconsolidated Orbis data is used to inform the actual use of the SBIE at the affiliate jurisdiction level (see Annex C for additional details). On average, the estimates suggest that between 95% and 100% of the economic substance located in a jurisdiction is available to carve out positive profit under the year-ten SBIE. For the more generous year-one SBIE, this share is typically between 90% and 100%.

79. **Finally, the SBIE is assumed to apply proportionally across the distribution of profit within jurisdictions.** This means that the SBIE does not change the distribution of ETRs in a jurisdiction, but rather reduces profit proportionally across the ETR distribution. This approach requires the assumption that low-taxed and high-taxed profit within a given jurisdiction have a similar substance intensity. This is in line with the assumptions taken in OECD (2020[15]).

80. **On average over the sample period, the year-ten SBIE carves out 20.5% of total profit and the more generous year-one SBIE carves-out 29.8%.** The share of profit carved out varies substantially across jurisdictions, depending on the ratio of profit to substance. Figure 8 shows the distribution of the share of total profit excluded through the SBIE for all jurisdictions, and by income group. The average year-one SBIE, for instance, varies between 0.7% and 87.8% of all profit reported in an affiliate jurisdiction between 2017 and 2020. The median year-one SBIE is 27.8% in the full sample but tends to be lower in particular in investment hubs (median 15.7%) due to higher ratios of profit to substance and also due to the greater ability to use the SBIE in full to reduce the GMT base. In high income jurisdictions, the effect of the SBIE is large with a median of 37.5% of total profit carved out using the year-one SBIE. The share of profit carved-out does not mean that revenue from the minimum tax is reduced by the same share. This is because carved out profit is higher in higher tax jurisdictions than in investment hubs which tend to have more low-taxed profit.

[32] The calculation of the SBIE differs from OECD (2020[15]), where the SBIE was modelled based on percentages of payroll and depreciation reflecting the uncertainty around the design of the SBIE at the time of the modelling.

Figure 8. Profit excluded through the SBIE as a percentage of total profit, 2017-2020



Note: Distributions of the share of loss-adjusted profit that is carved out via the SBIE for all jurisdictions and by income group. The profit is adjusted for reduced profit shifting as discussed in Section 5Profit from investment fund UPEs are excluded from this chart as they are outside the base of the GMT. Annex E shows the allocation of jurisdictions to income groups. The boxes illustrate the 25th to 75th percentile; the horizontal line within the boxes indicates the median. Whiskers mark 1.5 times the interquartile ranges, but are capped respectively at the maximum observation (for the upper whisker) and the minimum observation (for the lower whisker). Outliers are not plotted in the chart. Values reported are averages over the years 2017-2020 and across the different profit shifting scenarios discussed in Section 5.2

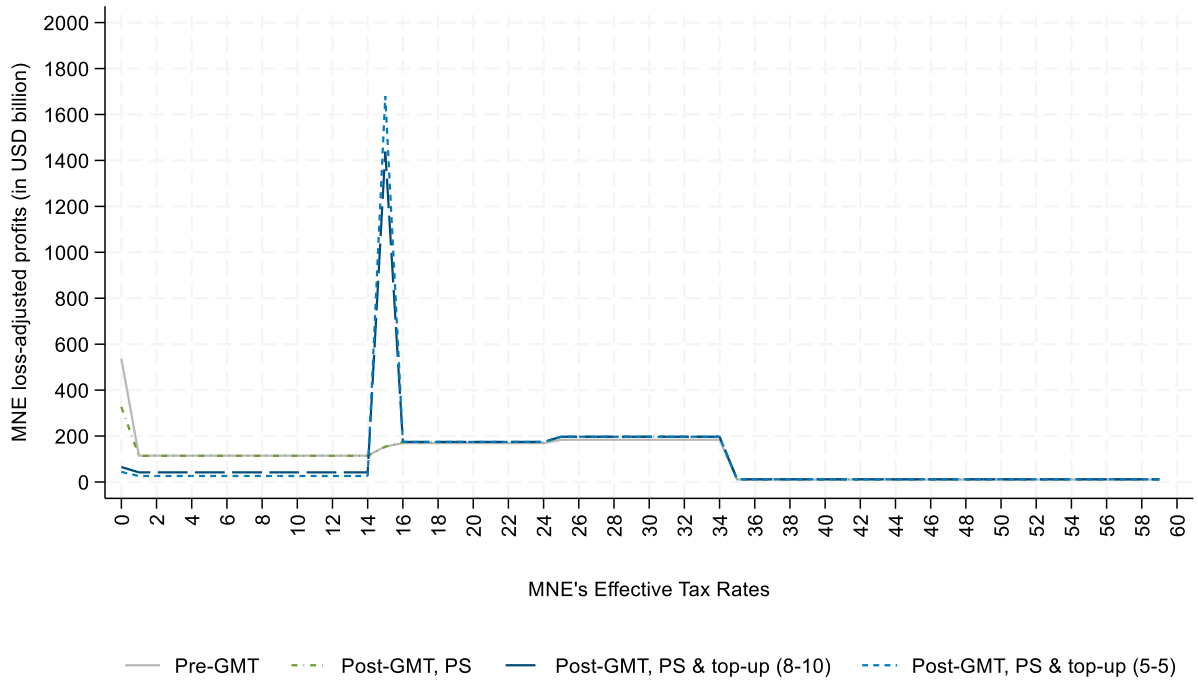
6.3. Changes to the taxation of MNE profit

81. **The GMT increases the average taxation of MNE profit in two ways: first, indirectly by increasing the taxation of previously shifted profit; and second, directly, by application of top-up taxes.** The application of the GMT thus ensures that a significant proportion of low-taxed profit are subject to higher tax rates. Both effects can be seen in Figure 9. Compared to the distribution of profit across different ETRs before the introduction of the GMT, there is a reduction of profit subject to low ETRs after the introduction of the GMT, particularly at zero, reflecting the reduction in profit shifting. In addition, there is an increase in profit subject to higher ETRs, as reduced profit shifting increases profit reported in higher tax jurisdictions.[33] After accounting for the reduction in profit shifting incentives, there is still a portion of profit taxed at low ETRs, because some tax rate differentials continue to exist after the GMT is in place. The second effect, the direct impact of the GMT, moves a significant portion of previously low-taxed profit to a 15% ETR. This creates the spike seen in Figure 9. Some low-taxed profit is not subject to the GMT, either because it accrues in excluded industries, or because it is carved-out by the SBIE. This is reflected

[33] Within those non-hub jurisdictions, profits that were previously shifted are taxed at the average effective tax rate in the jurisdiction which implies that the profits are allocated proportionally to the distribution of ETRs within a jurisdiction (Section 4.1

by the portion remaining at rates below 15% after the application of the GMT. Nevertheless, the GMT substantially reduces low-taxed profit via its direct and indirect effects.

Figure 9. Distribution of total profit across ETR bins (simplified, 2017-2020), before and after GMT introduction



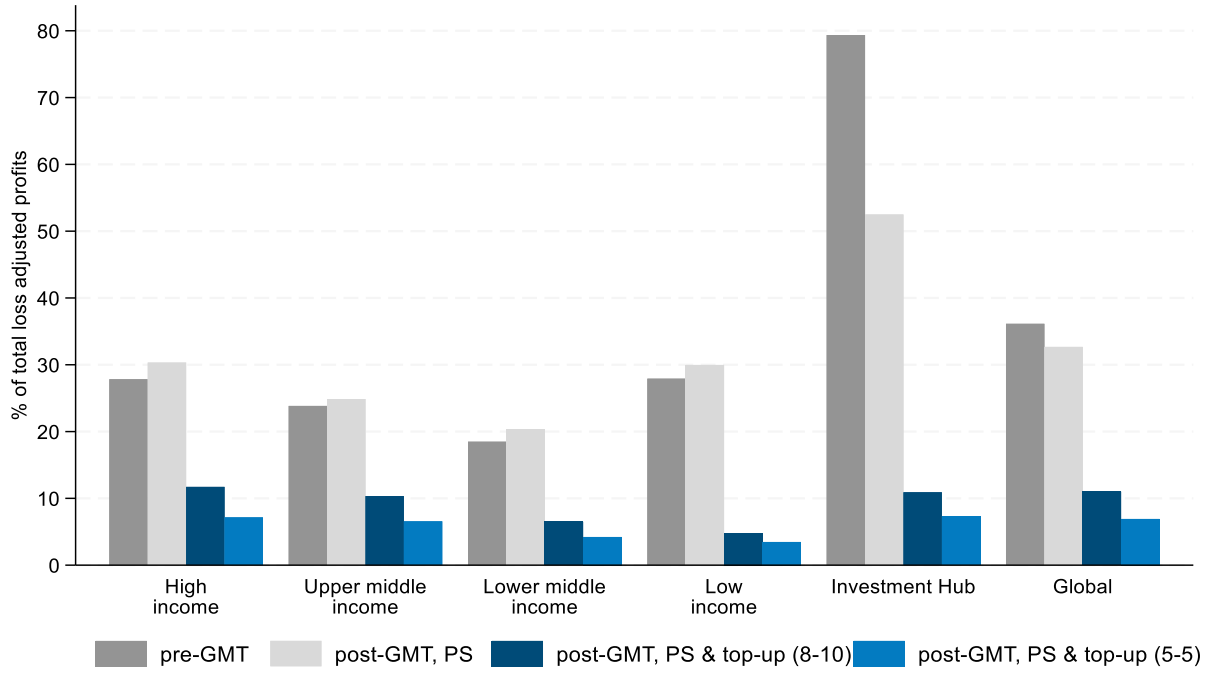
Note: Distribution of profit by effective tax rates bins in three states of the world. The 'Pre-GMT' scenario reflects the current distribution of loss adjusted profit absent any GMT effects. The 'Post-GMT, PS' scenario captures the distribution of profit once profit shifting incentives are reduced due to the implementation of the GMT. The 'Post-GMT, PS and top-up (8-10)' and (5-5) scenarios reflect the distribution of profit once the GMT has applied to low-taxed profit accounting for the year-one and year-ten SBIE, respectively. Profits are computed as averages across ETR bins to ensure a smooth representation.

82. **The GMT reduces the stock of low-taxed profit globally.** Figure 10 displays the share of low-taxed profit across jurisdiction groups under various scenarios as in Section 6.3: first before the introduction of the GMT, then after profit shifting falls, then including both the profit shifting reduction and top-up taxation. While 36.1% of total profit were considered low-taxed before the implementation of the GMT, only 11.0% of total profit remain low-taxed after the implementation of the GMT under the more generous year-one SBIE. This amounts to a 69.5% reduction in global low-taxed profit, from an average of USD 2,142.5 billion between 2017-2020 to USD 652.7 billion. Under the year-ten SBIE, low-taxed profit is reduced further to 6.9% of total profit which implies an 80.8% reduction in global low-taxed profit. The GMT effectively lifts the floor of taxation on a significant share of low-taxed profit.

83. **Most of the decrease in low-taxed profit can be attributed to the direct application of the GMT, not to reduced profit shifting.** Focusing on the effect under the year-one SBIE in the first year, out of the total 69.5% reduction in the global stock of low-taxed profit due to the introduction of the GMT, 9.5 percentage points (13.8%) can be attributed to increase in the taxation of previously shifted profit, and 60 percentage points (86.2%) is attributed to the application of top-up taxes. In other words, the change that the GMT induces in the profit shifting behaviour of MNEs results in a much lower reduction in low-taxed profit than the direct effects. This is because there are stocks of low-taxed profit for reasons other than

profit shifting. In addition, some profit that is no longer shifted can benefit from low-taxed rates in the jurisdiction, e.g., through tax incentives. The application of the GMT is more effective in lifting the level of taxation of all previously low-taxed profit, independent of the reason that resulted in low taxation.

Figure 10. Share of low-taxed profit as a percentage of total profit, by jurisdiction group



Note: The chart refers to the extent to which total profit is low taxed by income groups. Global refers to all jurisdictions. Low taxed profit is defined as those with ETR (loss-adjusted) lower than 15%. The 'Pre-GMT' scenario reflects the current distribution of profit absent any GMT effects. The 'Post-GMT, PS' scenario captures the distribution of profit once profit shifting incentives are reduced due to the implementation of the GMT. The remaining scenarios reflect the distribution of profit once the GMT has applied to low-taxed profit accounting for the year-one and year-ten SBIE, respectively.

84. **A decline in low-taxed profit is observed in all jurisdiction groups**. This is the case as even within jurisdictions that are high-tax on average, low-taxed profit still exists due to base narrowing provisions, e.g., tax incentives. Using the year-one SBIE scenario, the stock of low-taxed profit in total profit is estimated to fall from 27.8% to 11.7% in high income jurisdictions; from 23.8% to 10.3% in upper middle income jurisdictions; from 18.5% to 6.5% in lower middle income jurisdictions; and from 28% to 4.8% in low income jurisdictions. (Figure 10). In investment hubs, the share of low-taxed profit that cease to be low-taxed is even greater as most profit in these jurisdictions is generally subject to low ETRs (Section 6.1). The share of low-taxed profit in total profit in investment hubs falls by 68.5 percentage points, from 79.4 % to 10.9%. After application of the GMT, any profit that remains taxed at ETRs below 15% in this estimation is profit excluded by the SBIE or low-taxed profit that is out of the scope of the GMT.[34]

[34] In this estimation, profits that are subject to low ETRs are only those that are protected by the SBIE or are excluded from the tax base under the GloBE Rules (Section 6.2). Certain types of tax incentives may also enable firms to observe low ETRs on some profits. This is linked to the treatment of certain tax provisions under the GloBE Rules (OECD, 2022[6]). The approach in this paper cannot discern the reason for observed low ETRs in jurisdictions. This means that it is not possible to assess whether low GloBE ETRs arise from tax incentives or other provisions for which the GloBE Rules apply specific adjustments, e.g., where they arise from certain temporary differences or Qualified Refundable Tax Credits.

7 Impacts on tax rate differentials and potential implications for economic efficiency

85. **The third key impact analysed in this paper is the impact of the GMT on tax rate differentials across and within jurisdictions, which can affect both MNEs profit shifting behaviour as well as real investment.** Section 6.3showed an increase in the taxation of low-taxed profits as a result of the GMT. This section analyses how this increase affects the average ETRs faced by MNEs within a given jurisdiction and tax rate differentials across jurisdictions. Absent other behavioural reactions, higher ETRs on previously low-taxed profits may reduce tax rate differentials as discussed in Section 5Beyond lower incentives to shift profit, reduced tax rate differentials may also favour a more balanced role of the tax system in promoting investment as well as favouring a more efficient global allocation of capital.

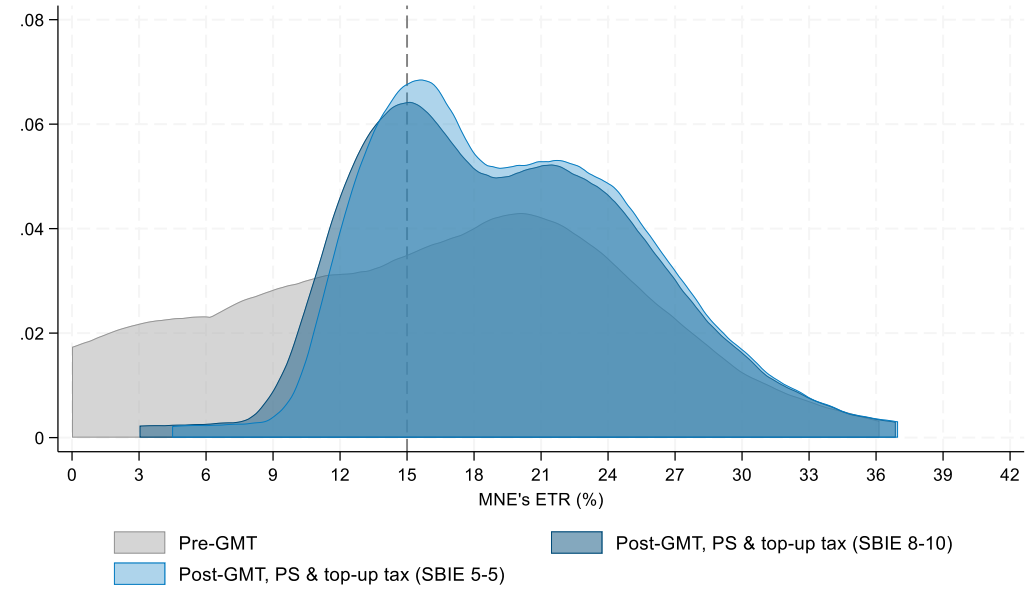
86. **The tax rate differentials relevant for firms' investment decisions may differ from those relevant for firms' profit shifting decisions.** The reduced tax rate differentials in this section differ from those in Section 5.3This is because the relevant ETR from the perspective of an MNE considering shifting profit differs from the relevant ETR of an MNE considering an investment. Specifically, investing firms are likely to have more profit protected by the SBIE. Thus, the ETRs that form the basis of the tax rate considered in this section include the SBIE, unlike those in Section 5.3

7.1. Changes to MNE taxation

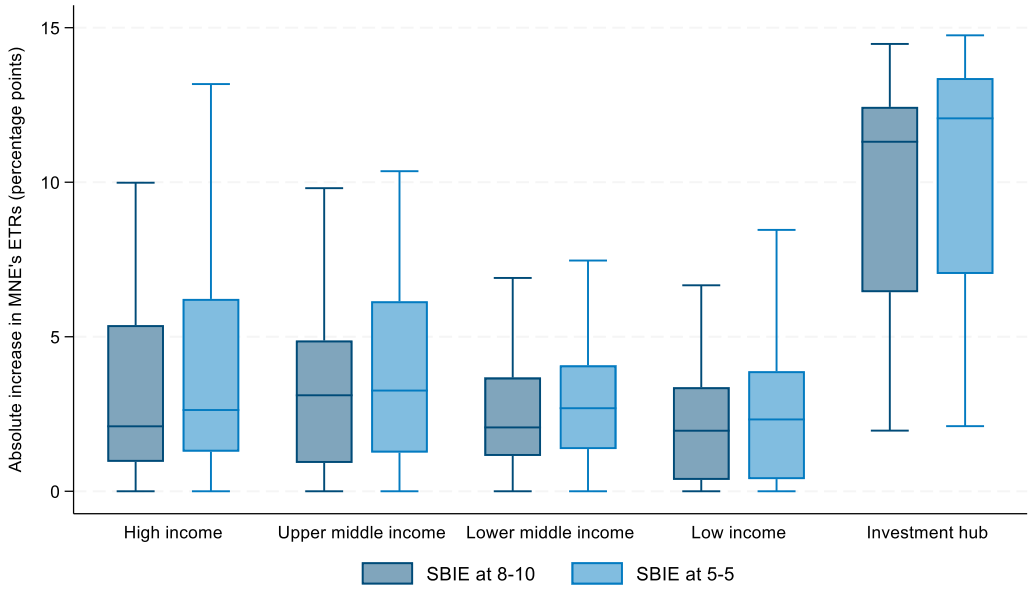
87. **The GMT increases the average taxation of MNE profits across the distribution of ETRs and lifts the floor of the ETR distribution.** Figure 11 Panel A illustrates the increase in average ETRs faced by MNEs in the different jurisdictions. ETRs shown are jurisdiction specific average ETRs that include top-up taxes due. Since most jurisdictions have some stock of low-taxed profits that are subject to a top-up tax (Figure 10), the GMT shifts the distribution to the right as average ETRs increase. The median ETR before the introduction of the GMT is 16.7% while the median ETR after accounting for the GMT is 18.9% under the year-one SBIE. Under the year-ten SBIE, the median rises further to 19.2%. At the same time, the GMT does not affect average ETRs in all jurisdictions equally, such that the shift in the distribution shown in Figure 11 Panel A is asymmetric. The increase is more pronounced at the bottom of the distribution where profits were taxed at particularly low average ETRs. The fact that the GMT is effective in reducing the extent to which low-taxed profits arise is reflected by the disappearing portion of profits at very low ETRs in the 'post-GMT' distribution.

Figure 11. Changes to the distribution of ETRs, before and after the GMT, 2017-2020

Panel A: Distribution of ETRs



Panel B: Absolute increase in ETRs from the introduction of the GMT

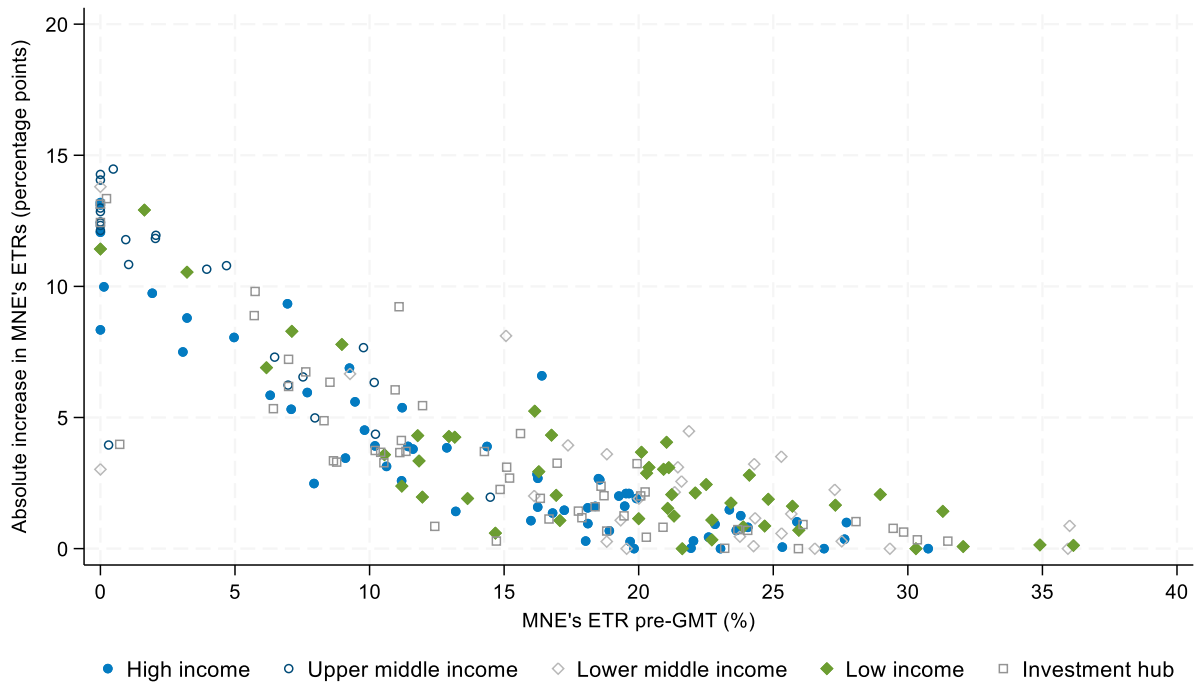


Note: ETRs under the 'post-GMT, PS & top-up tax' scenarios account for the impact of top-up taxation and account for the SBIE at the beginning of the transitional period (8/10: 8% carrying value of assets; 10% payroll) and at its end and permanent value (5/5: 5% carrying value of tangible assets and payroll). In Panel A., the distributions of ETRs are weighted by profit under each scenario. The 'Pre-GMT' scenario considers the current allocation of loss-adjusted profit. The scenarios 'Post-GMT, PS' considers the distribution of profit accounting for the reduction in profit shifting incentives which returns profit currently located in investment hubs to other jurisdictions. In this paper, profit shifting only causes a redistribution of profits from investment hubs to other jurisdictions. The absolute increase in ETRs is computed by subtracting the ETR before the GMT and the ETR after the GMT. Data is averaged for years 2017-2020. The boxes illustrate the 25th to 75th percentile; the horizontal line within the boxes indicates the median. Whiskers mark 1.5 times the interquartile ranges but are capped respectively at the maximum observation (for the upper whisker) and the minimum observation (for the lower whisker).

88. **The increase in the ETRs faced by MNEs in different jurisdictions is heterogenous both within and between jurisdiction groups.** Figure 11 Panel B shows significant differences in the extent to which the GMT increases ETRs faced by MNEs. The impact is sizeable even within the same income group and higher after the SBIE transitional period is over. The observed variation shows that the GMT impacts are MNE- and jurisdiction-specific, creating variation on the effect of the GMT on the taxation of different MNEs.

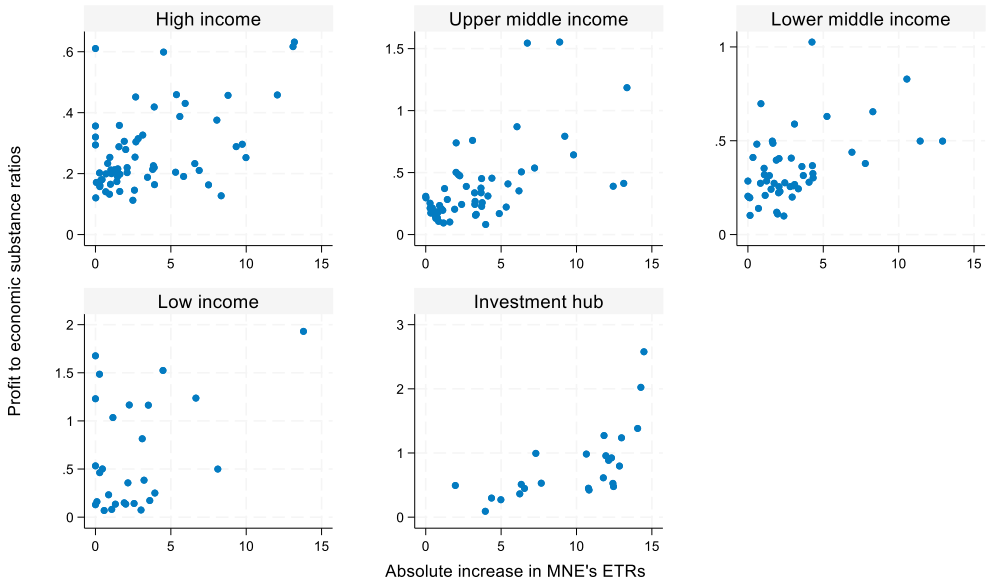
89. **The extent to which the GMT increases the taxation of MNEs depends on the stock of low-taxed profit and the amount of substance in the jurisdiction.** The increase in ETRs is greater in jurisdictions with lower average ETRs before accounting for the GMT (Figure 12). Figure 13 shows a positive correlation between the ratio of profit to substance and the increase in ETRs for all income groups. The SBIE concentrates top-up taxes, and hence ETR increases, in jurisdictions where MNEs have little substance compared to profit booked. The greater the MNE's footprint is in the jurisdiction, the lower its excess profit and hence the lower the increase in ETRs following the application of the GMT. This means that, among all income groups, investment hubs are the jurisdictions facing the greatest increases in ETRs.

Figure 12. Change in ETRs from the introduction of the GMT, by ETR pre-GloBE, 2017-2020



Note: The absolute increase in ETRs is computed by subtracting the ETR before the GMT and the ETR after the GMT. The chart considers the most generous SBIE scenario, i.e., at the beginning of the transitional period (8% carrying value of assets; 10% payroll). The slope is slightly more pronounced when the SBIE at the end of the transitional period is considered (5% carrying value of tangible assets and payroll). Data is averaged for years 2017-2020.

Figure 13. Increase in ETRs compared to profit to substance ratios, by income group



Note: Economic substance is proxied by the value of tangible assets and payroll in the jurisdiction, which forms the base of the SBIE. Profit is loss adjusted profit. The absolute increase in ETRs is computed as the difference between the pre-GloBE ETR and the post-GloBE ETR in this case for the most generous SBIE scenario (8-10). The absolute difference reflects the effect of top-up taxes. The figures exclude the top 2% of observations with the highest profit to substance ratios in each income group for readability. The correlation in the total sample between the two variables is of 51.5%. The y-axis varies across income groups. Data is averaged for years 2017-2020.

7.2. Reductions in tax rate differentials

90. **The GMT generally narrows tax rate differentials.** While average ETRs in almost all jurisdictions face increases from the introduction of the GMT, the GMT increases the taxation of low-taxed profit at the bottom of the ETR distribution more strongly (Figure 11). Assuming high tax jurisdictions do not raise their tax rates in response,[35] tax rate differentials will narrow as ETRs become less dispersed. Comparing the distribution of average ETRs in Panel A of Figure 11, the interquartile range falls from 13.3 percentage points to 9.5 percentage points using the year-one SBIE and to 9.6 using the year-ten SBIE. Figure 14 looks at bilateral tax rate differentials in more detail and displays all jurisdiction pairs' tax rate differentials (Panel A) and the tax rate differentials between investment hubs and non-hubs before and after the GMT (Panel B). The distribution of ETR differentials shifts to the left and becomes less dispersed. The 25th and 75th percentile of the distribution of tax rate differentials in Panel A falls from 4.1 percentage points and 15.7 percentage points, respectively, to 2.6 percentage points and 10.3 percentage points in the year-one SBIE scenario (2.4 and 9.9 using the year-ten SBIE). The median of the distribution is reduced from 9.2 percentage points to 6 percentage points using the year-one SBIE (5.7 using the year-ten SBIE). The

[35] Some theoretical contributions have explored potential behavioural reactions of higher-taxed jurisdictions following the implementation of the GMT. Hebous and Keen (2021[19]) argue that under certain circumstances higher taxed jurisdictions may have an incentive to increase their ETR. Some other papers have explored these incentives in the context of domestic policies, e.g., Buettner and Poehnlein (2022[74]) find that higher taxed municipalities in Germany increase their tax rate in response to the introduction of a domestic minimum tax at the municipality level. The context of the GMT and the coordinated increase in ETRs provides a unique setting that has not occurred previously and hence governments' incentives may differ. Reactions are uncertain and given that the implementation of the GMT is still underway at the time of writing, these behavioural reactions are not accounted for.

average tax rate differential falls from 10.6 percentage points to 7.1 percentage points using the year-one SBIE (it falls further to 6.8 percentage points in the year-ten SBIE) in Panel A. A similar but more acute pattern is observed when measuring tax rate differentials between hub and non-hub jurisdictions with hubs (Panel B). The average tax rate differential between non-hubs and hubs falls from 14.2 percentage points to 7.5 percentage points using the year-one SBIE in Panel B (7.2 percentage points using the year-ten SBIE). Out of all 4,752 investment hub–non-hub pairs in the sample, tax rate differentials narrow in 88% of cases.[36]

91. **Reduced tax rate differentials can have important effects for the impact of domestic and international CIT policy making.** Section 5discussed that reduced tax rate differentials reduce profit shifting of MNEs, which ensures a more even playing field among businesses. This section discusses two additional implications of narrower tax rate differentials: a less distortive CIT environment for investment decisions and reduced incentives to compete through the tax system.

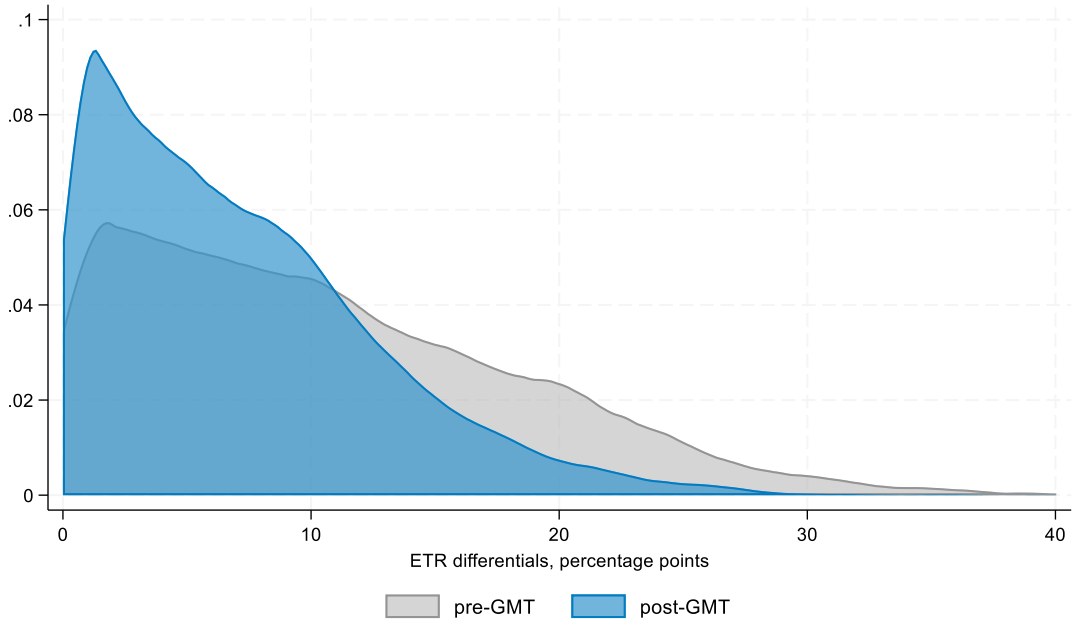
92. **Reduced tax rate differentials are associated with lower distortions from the CIT system which can lead to a better allocation of capital.** Taxation is one of the factors affecting investment decisions, both in relation to its extent and location. As ETRs become less dispersed, taxation may play a less distortive role in influencing investment decisions. Capital may be more likely to flow to those jurisdictions where it is most productive, rather than where its returns are taxed at the lowest rate. Other non-tax factors such as the availability of skilled human capital or infrastructure may gain increasing relevance in influencing investors' decisions. An allocation of investment that is less impacted by tax motives is likely to be more efficient and could therefore support economic growth (Keen, Liu and Pallan, 2023[17]).

93. **Lower tax rate differentials may also reduce incentives to compete through the tax system, effectively placing limits on tax competition.** The ability to tax mobile MNE profit has been a key concern for many tax policy makers. To deal with the increased mobility of profit, many jurisdictions introduced anti-avoidance rules that sought to top-up low-taxed profit or have resorted to providing tax incentives to retain such tax bases (or both). The absence of a multilaterally agreed floor made jurisdictions vulnerable to tax competition with other jurisdictions contributing to increased pressures on CIT systems due to international tax spillovers. The GMT introduces a multilaterally agreed floor to the taxation of MNEs. Lower tax rate differentials may dampen the effects of international spillovers that can at times hinder domestic tax policy making. All in all, the GMT may facilitate a more balanced use of the tax system and a reconsideration of its role in the overall investment policy mix.

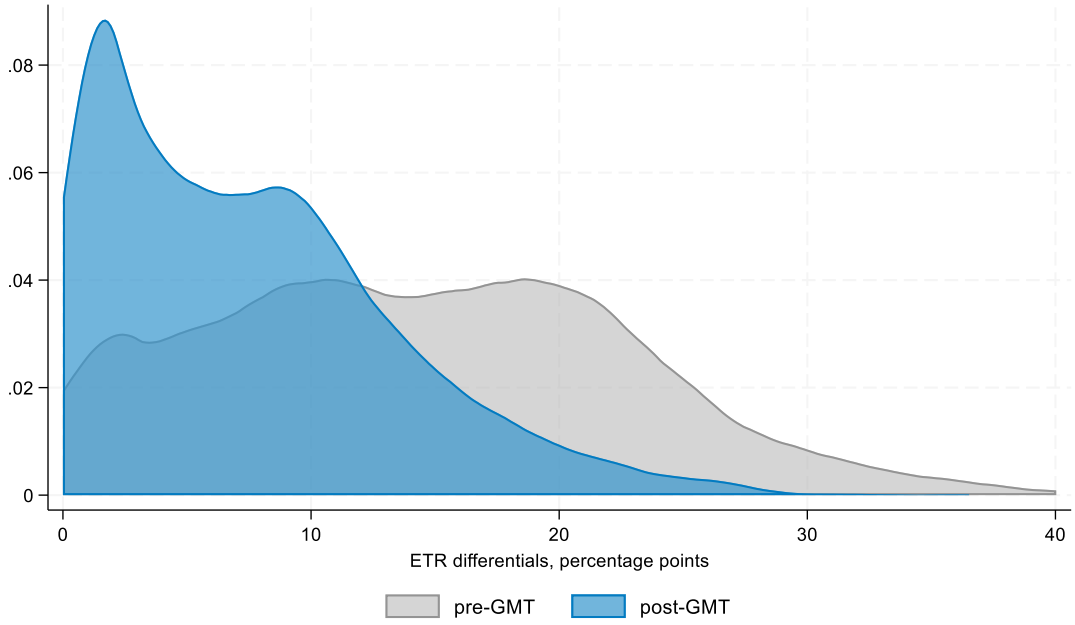
[36] Increases in tax rate differentials can occur due to differences in excess profits across jurisdictions.

Figure 14. Size of ETR differentials, absolute values, before and after the GMT

Panel A: Tax rate differentials between all jurisdiction pairs



Panel B: Tax rate differentials between jurisdictions other than investment hubs and investment hubs



Note: ETR differentials are calculated as the absolute difference between each unique jurisdiction-pair in the sample averaged over 2017-2020. Panel B includes only differentials with investment hubs as opposed to all jurisdictions covered in Panel A.

8 Impacts on corporate income tax revenues

94. **The fourth key impact of the GMT analysed in this paper is its effect on CIT revenues.** Section 6described the ability of the GMT to increase the taxation of low-taxed profits. This section translates this higher taxation of low-taxed profits into estimates of direct and indirect revenue gains across jurisdictions. Direct revenue gains arise from the application of top-up taxes that are due whenever the GloBE ETR in a jurisdiction falls below the 15% minimum tax rate and profit exceeds the SBIE. The calculation of direct gains from the GMT are based on the GloBE ETR and GloBE tax base presented in Section 5.3and Section 6, respectively. Indirect revenue gains are attributable to the reduction in profit shifting incentives that increases the tax base in non-hub jurisdictions (Section 5).

95. **The distribution of revenue gains will depend on the implementation of the GMT globally, given the agreed rule order that is part of the GloBE Rules.** The assumptions regarding how implementation determines the distribution of direct gains from the GMT and the interaction with other provisions are discussed in Section 8.1The results on revenue gains are presented in Section 8.2This analysis does not consider any impacts of the implementation of the GloBE Rules on real economic activity such as investment, productivity or wages.

8.1. Distribution of top-up taxes

96. **This paper makes assumptions on jurisdictions' implementation decisions regarding the GMT, which has implications for the distribution of revenues.** These implementation assumptions affect the allocation of top-up tax revenue but do not affect the total amount of revenue gains. As discussed in Section 3, the GloBE Rules define the order in which top-up taxes are collected. Under the GMT, implementing affiliate jurisdictions have the primary allocation of top-up taxes over low-taxed profit in their jurisdictions under a QDMTT, followed by UPE jurisdictions, followed by other affiliate jurisdictions under the UTPR (Section 3.4). Since almost all jurisdictions have some low-taxed profits, affiliate jurisdictions have an incentive to introduce domestic minimum taxes to capture any domestic tax revenue that arises from the GMT. This includes both investment hubs that tax most profits at low rates and high tax jurisdictions that only tax some profits at rates below 15%.[37]

97. **At the time of writing, many jurisdictions have already announced their intention to introduce the GloBE Rules and a QDMTT but uncertainty about the scale of implementation remains.** The modelling assumes that the number of jurisdictions implementing the GloBE Rules will

[37] The OECD (2020[15]) study was based on the Pillar Two Blueprint, which did not explicitly provide for QDMTTs. However, the 2020 study did assume that some jurisdictions with low-taxed profit would increase their effective rates to collect taxes on low-taxed profits in their jurisdictions. In this paper, QDMTTs are modelled as mirroring the GloBE Rules and hence contain a SBIE. The difference between the QDMTT and the increase in tax rates modelled in the 2020 study lies in the taxation of profits that fall under the SBIE. In the 2020 study, these were assumed to be taxed at the minimum tax rate while in the present paper they are not subject to any top-up tax.

continue to expand given that incentives to implement a QDMTT are strong. Nevertheless, the implementation decisions and responses of governments to the GMT are a source of continued uncertainty, which is reflected in the analysis.[38]

98. **To capture uncertainty about the scale of implementation of the GloBE Rules, the modelling considers several implementation scenarios.** The modelling considers two states of the world. One where some Inclusive Framework members implement with differing degrees of probability ('partial implementation') and another state where all jurisdictions worldwide implement ('global implementation').[39] Under partial implementation, three scenarios are examined in which each Inclusive Framework member introduces an IIR, UTPR, and a QDMTT with a probability of 70%, 85%, or 100%, with the exception of jurisdictions that do not have a CIT system and have not announced their intention to introduce the GloBE Rules.[40] Under global implementation, all jurisdictions including non-Inclusive Framework members implement a QDMTT, which means that all top-up tax is captured by affiliate jurisdictions, eliminating all IIR and UTPR revenue.[41] Differences in the distribution of revenue gains across jurisdictions from alternative implementation assumptions feed into the uncertainty bounds around the revenue estimates.

99. **The allocation of top-up taxes is modelled at the UPE-affiliate jurisdiction level, following the rule order set out by the GloBE Rules.** This implies that a given amount of top-up tax revenue attributed to a UPE-affiliate pair is distributed among eligible jurisdictions depending on their implementation status and the GloBE rule order:

1. **QDMTT:** If a jurisdiction implements a QDMTT, it receives the top-up tax created from all domestic MNE affiliates.
2. **IIR:** If the affiliate jurisdiction does not implement a QDMMT, the UPE jurisdiction or the IPE receives the top-up tax through the implementation of an IIR.
3. **UTPR:** If neither the affiliate nor the UPE jurisdiction implement a top-up tax, the GMT revenue is distributed through the UTPR key.[42]

100. **Implementation probabilities between zero and one are modelled by distributing shares of top-up tax from individual UPE-affiliate pairs.** If, for instance, the affiliate jurisdiction implements with 70% probability, 70% of top-up tax is attributed to the affiliate jurisdiction through the QDMTT. The remaining 30% of top-up tax are distributed either via the IIR, or the UTPR, depending on whether the UPE jurisdiction implements. If the UPE jurisdiction also implements with 70% probability, then 70% of the remaining top-up tax is assigned to the UPE jurisdiction, and the rest is distributed via the UTPR. If the UPE jurisdiction does not implement, all remaining top-up tax is allocated via the UTPR key.[43] Annex C provides some stylised examples on this allocation of top-up taxes to jurisdictions.

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[38] Governments may also raise their ETRs through means other than implementing a QDMTT (i.e., through reforming tax incentives or raising statutory rates). This paper focuses only on QDMTT implementation.

[39] Membership to the Inclusive Framework on BEPS is held constant on 14 November 2023.

[40] The underlying assumption is that introducing the GloBE Rules requires some administrative capacity which may not exist in jurisdictions without a CIT system, or that the costs of introducing the GloBE Rules and/or a QDMTT may be prohibitively high in these jurisdictions.

[41] While implementation by zero-tax Inclusive Framework members impacts the results, implementation by non-Inclusive Framework members has a modest impact, as Inclusive Framework members account for more than 90% of global GDP.

[42] The UTPR key is based on the shares of assets and employees across the implementing jurisdictions in a column.

[43] In the logic of the underlying data matrices, this means that the QDMTT concerns the rows of the matrices as it allocates the top-up tax to all low-taxed profit in a row to the affiliate jurisdiction. The IIR concerns the matrix columns

101. **The GMT interacts with controlled foreign corporation (CFC) rules implying that some low-taxed profit may already be subject to higher tax rates.** Some jurisdictions have CFC rules in place that levy top-up taxes on certain forms of income that are subject to low taxation (OECD, 2023[67]).[44] This implies that some low-taxed profit identified in Section 6may already be subject to some top-up taxes under CFC rules. Due to the lack of data on the tax revenue generated from these provisions, CFC regimes other than GILTI cannot be taken into account in the estimation of the GMT revenue effects, despite potential interaction effects that could reduce the net revenue gains from the GMT (see Annex C for details on the modelling of the GILTI interaction). Anecdotal evidence from tax administrations also suggests that CFC revenues are typically small, limiting the impact of the interaction.

102. **Revenue estimates are reported in bounds to capture uncertainty in the behavioural reactions of MNEs and on the implementation of the GMT by governments.** To create uncertainty bounds around the estimates, the modelling proceeds as follows. For direct revenue gains via QDMTTs, IIR, and UTPR, bounds of plus or minus 10% are created around the baseline estimate.[45] For indirect gains from reduced profit shifting, bounds are created based on the six different approaches on profit shifting incentives as described in Section 5.2For partial implementation, the different assumptions on implementation probabilities are also factored into the calculation of the bounds.[46]

8.2. Tax revenue gains

103. **The estimates suggest that the GMT would raise global revenues by between USD 155-192 billion on average per year under the year-one SBIE.** This represents between 6.5 and 8.1% of global CIT revenues on average during the 2017-2020 period.[47] Omitting 2020 which may be strongly affected by the COVID-19 crisis, the estimates are USD 161-200 billion (6.8%-8.4% of CIT revenues). These estimates are significantly larger than previously estimated in OECD (2020[15]) where revenue gains were estimated to be 2.7-4.6% of global CIT revenues based on 2016 data.[48]

104. **The changes in revenue gains compared to previous OECD estimates are the result of several factors.** These include better data on global low-taxed profit, due to the expansion of anonymised and aggregated CbCR data coverage, as discussed in Section 4New modelling also assumes consistent

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as it allocates all remaining top-up tax in a column to the UPE jurisdiction. All top-up tax in cells that are in a row without a QDMMT and a column without IIR are distributed via the UTPR.

[44] The definition of control under a CFC, the types of income that are in scope, and the rates vary substantially across jurisdictions.

[45] This baseline estimate corresponds to a distribution of profits after a reduction in profit shifting where profit shifting incentives are assumed to be proportional relative to tax rate differentials, and tax rate differentials are calculated between ETRs of hub and non-hub jurisdictions.

[46] Table C.3 and Table C.4 show the results for the individual scenarios.

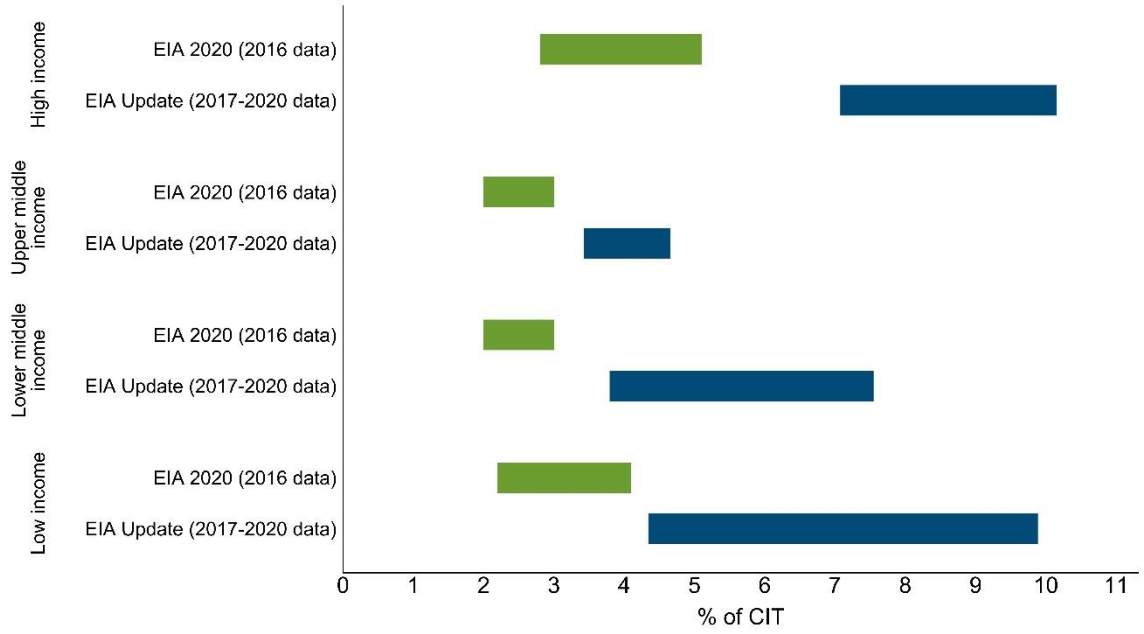
[47] The estimates in this section are presented as an average of the 2017-2020 results unless otherwise specified. A year-by-year breakdown of the results is presented in Figure B.4 of Annex B. Estimates are presented for IF member jurisdictions only. Estimates include both direct and indirect revenue gains, unless otherwise specified. The estimates account for the variation in the sensitivity of profit shifting. Estimates are presented based on the 'partial implementation' scenario discussed in Section 8.1, unless otherwise specified. Under this scenario, 70-100% of all IF member jurisdictions implement IIR, UTPR and QDMTT, except for zero-tax jurisdictions who (i) do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023. Non-IF member jurisdictions do not implement. Estimates are presented for the year-one SBIE (10% on payroll and 8% on tangible assets) unless otherwise specified. Estimates are presented net of any lost revenue from CFC regimes modelled (Section 8.1).

[48] These estimates from OECD (2020[15]) are based on a 15% minimum tax rate, see Table 3.16, page 119.

application of the GloBE Rules across all jurisdictions, affecting the distribution and the rate at which profits are being taxed. As addressed in Section 6, accounting for low-taxed profit in high tax jurisdictions results in higher revenue gains for these jurisdictions. In the baseline 'partial implementation' scenario, the majority of IF member jurisdictions are assumed to implement IIR, UTPR, and QDMTT. Accordingly, the results presented on revenue gains in this paper focus on IF member jurisdictions only. In contrast, in OECD (2020[15]) revenue gains also include non-IF member jurisdictions. This means that the updated estimates are not directly comparable with those of OECD (2020[15]).

105. **Revenue gains accrue to all jurisdiction groups.** The overall pattern of jurisdiction-group results remains broadly similar to OECD (2020[15]), with differences explained by the assumptions regarding implementation and a more comprehensive modelling of low-taxed profit. Results show broad gains across all jurisdictional groups, with higher gains for high income jurisdictions relative to lower and upper middle income (see Figure 15).[49] Low income jurisdictions also gain from the GMT but given that they account for small share of global GDP and have a relatively small tax base, revenue gains are more volatile and more strongly affected by profit shifting assumptions compared to other jurisdictional groups.

Figure 15. Revenue gains by jurisdiction group, compared to previous OECD impact assessment

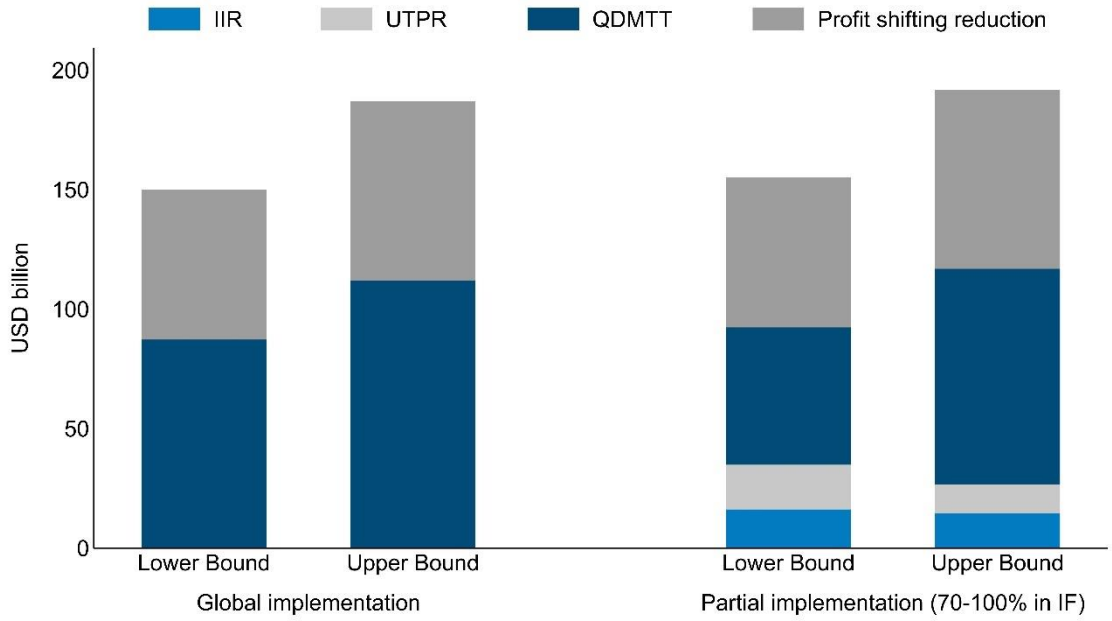


Note: The estimates are presented as an average of the 2017-2020 results. A year-by-year breakdown of the results is presented in Figure B.4 of Annex B. Estimates for the EIA Update (2017-2020) are presented for IF member jurisdictions only. Estimates include both direct and indirect revenue gains. The estimates account for the variation in the sensitivity of profit shifting. Estimates are presented based on the 'partial implementation' scenario discussed in Section 8.1Under this scenario, 70-100% of all IF member jurisdictions implement IIR, UTPR, and QDMTT, except for zero-tax jurisdictions who (i) do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023. Non-IF member jurisdictions are assumed not to implement. Estimates are presented for the year-one SBIE scenario (10% on payroll and 8% on tangible assets). Estimates are presented net of any lost revenue from CFC regimes modelled (Section 8.1). Annex E shows the allocation of jurisdictions to income groups. Investment hubs are excluded from the chart for readability, but they are included in a similar chart in Annex B. The EIA 2020 results refer to the year 2016 are based on results from OECD (2020[15]), are presented for IF and non-IF member jurisdictions, and incorporate a 15% minimum rate and a 10% carve-out on payroll and depreciation.

[49] Results for investment hubs are presented in the Annex as they generally involve a higher degree of uncertainty than other results and because investment hubs are a relatively heterogeneous group. Results show revenue gains for investment hubs.

106. **Revenue gains from the GMT stem mostly from the top-up taxation of low-taxed profit, which strongly accrue to implementing jurisdictions.** Figure 16 shows estimates of global revenue gains for 'global implementation' and 'partial implementation'. Revenue gains are broken down by source of the revenue gain. Direct gains are further broken down by the rule that attributes the revenues to the jurisdiction, i.e., QDMTT, IIR or UPTR. Reduced profit shifting accounts for about one third of the revenue gains overall, with the split of the remaining two thirds across QDMTT, IIR and UTPR depending on implementation assumptions. If all jurisdictions implement a QDMTT ('global implementation'), all direct revenue gains accrue to affiliate jurisdictions. If 'partial implementation' is assumed, direct gains occur through a mix of QDMTT, IIR and UTPR. The importance of these components depends on the assumptions on implementation probabilities. The higher the probability of implementation, the higher the share of QDMTT revenues, and the lower the amount of revenues collected through the IIR and UTPR (Section 3).

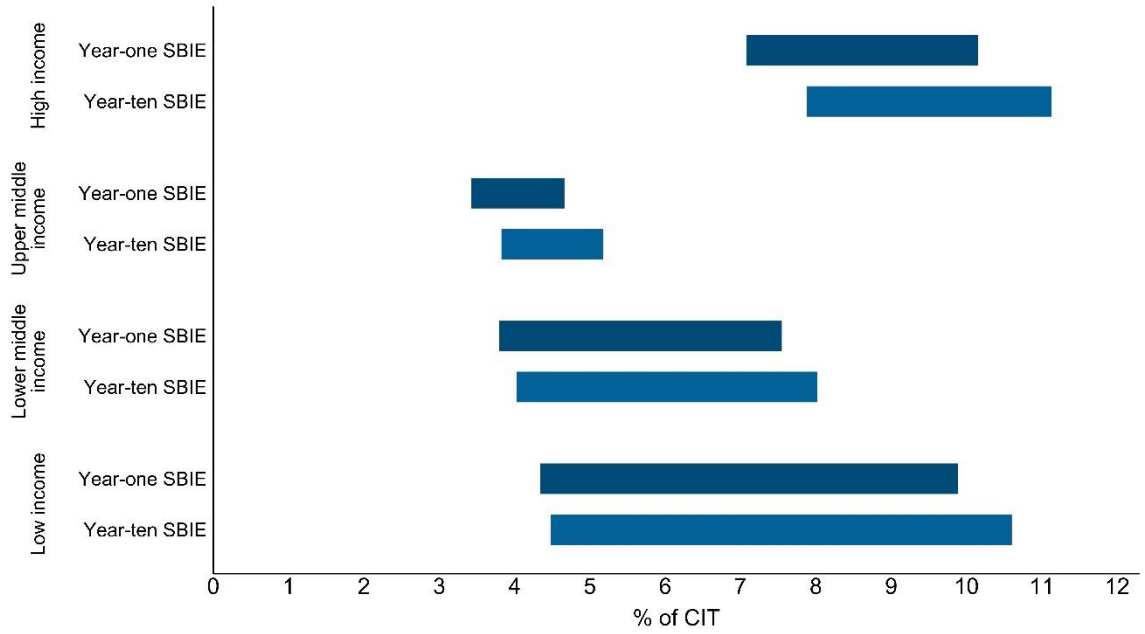
Figure 16. Global revenue gains by implementation scenario



Note: The estimates are presented as an average of the 2017-2020 results. A year-by-year breakdown of the results is presented in Figure B.4 of Annex B. Estimates are presented for IF member jurisdictions only. Estimates include both direct and indirect revenue gains. The estimates account for the variation in the sensitivity of profit shifting. Implementation scenarios are discussed in Section 8.1Estimates for the 'partial implementation' scenario assume that 70-100% of all IF member jurisdictions implement IIR, UTPR, and QDMTT, except for zero-tax jurisdictions who (i) do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023. Non-IF member jurisdictions are assumed to not implement. Estimates for the 'global implementation' assume that all IF and non-IF members implement IIR, UTPR and QDMTT. Estimates are presented for the SBIE year-one scenario (10% on payroll and 8% on tangible assets). Estimates are presented net of any lost revenue from CFC regimes modelled (Section 8.1).

107. **The reduction of the scale of the SBIE over time implies that annual revenue gains may rise.** Figure 17 shows the impact of the year-ten SBIE on the revenue potential of the GMT when the rates of the carveout decrease to 5% of tangible assets and 5% of payroll. A broader GMT base means higher tax revenues accruing to all jurisdictions. In our modelling, the SBIE is assumed to reduce profit proportionally across the ETR distribution. Therefore, lower SBIE percentages mean that more low-taxed profit will be subject to the GMT suggesting that expected revenue gains from GMT will be higher at the end of the SBIE transitional period.

Figure 17. Revenue gains by jurisdiction group, year-one vs. year-ten SBIE



Note: The estimates are presented as an average of the 2017-2020 results. A year-by-year breakdown of the results is presented in Figure B.4 of Annex B. Estimates are presented for IF member jurisdictions only. Estimates include both direct and indirect revenue gains. The estimates account for the variation in the sensitivity of profit shifting. Estimates are presented based on the 'partial implementation' scenario discussed in Section 8.1Under this scenario, 70-100% of all IF member jurisdictions implement IIR, UTPR, and QDMTT, except for zero-tax jurisdictions who (i) do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023. Non-IF member jurisdictions are assumed to not implement. Estimates for the SBIE year-one scenario include a carve-out of 10% on payroll and 8% on tangible assets. Estimates for the SBIE year-ten scenario include a carve-out of 5% on payroll and 5% on tangible assets. Estimates are presented net of any lost revenue from CFC regimes modelled (Section 8.1). Annex E shows the allocation of jurisdictions to income groups. Investment hubs are excluded from the chart for readability, but they are included in a similar chart in Annex B.

9 Concluding remarks

108. **This paper has examined the role of the GMT in reducing global low-taxed profit and discusses some of the key changes it introduces to the international CIT system.** The paper updates previous OECD work (OECD, 2020[15]) and extends it to incorporate the latest design of the GMT and to capture the most up to date data available on MNE profit and activity covering the years 2017-2020. It also includes an expanded accounting for low-taxed profit in high tax jurisdictions. The analysis captures the effects of the GMT on low-taxed profit, on profit shifting incentives, on tax rate differentials, and corporate tax revenues.

109. **The results presented are estimates and subject to various caveats and assumptions.** The analysis relies on data that is aggregated at the macroeconomic level, some of which is based on imputations. Therefore, the analysis may miss much of the variation at the MNE and affiliate level. While many aspects of GloBE Income and the GloBE ETR have been modelled, some features could not be modelled due to data limitations. The GMT introduces an unprecedented tax policy change that strongly impacts MNE and government incentives. Modelling the impact of such a change requires reliance on a number of assumptions regarding future changes in behaviour, since there are severe limitations in the extent to which previous academic literature, which have not estimated the impact of a coordinated increase in effective taxation to a multilaterally agreed floor, can inform on these behavioural reactions. While GMT implementation is currently underway, significant uncertainty still remains around governments' decisions to implement the GMT. The results presented in this paper reflect such uncertainty by creating different scenarios of MNE and government responses.

110. **The results show significant impacts of the GMT in reducing global low-taxed profit, particularly in jurisdictions with comparatively little substance compared to profit.** The paper estimates that the GMT will reduce global low-taxed profit by 69.5%, from an average of USD 2,143 billion between 2017-2020 to USD 653 billion. The reduction in low-taxed profit affects all jurisdiction groups, as low-taxed profit also exists in jurisdictions with high average tax rates. The GMT falls strongly on jurisdictions with higher levels of low-taxed profits and a lower level of economic substance. The jurisdiction group with the greatest decline in low-taxed profit is investment hubs where the share of low-taxed profit in total profit falls by 68.5 percentage points, from 79.4% to 10.9%.

111. **The GMT contributes to reducing international tax spillovers which can reduce distortions in MNE activity.** Estimated average tax rate differentials fall by 30% from 10.6 to 7.1 percentage points following the implementation of the GMT. Differentials between investment hubs and other jurisdictions fall by 50%, from 14.2 percentage points to 7.5 percentage points. By reducing tax rate differentials across jurisdictions, the GMT reduces incentives for profit shifting, reducing estimated global shifted profit by around 50%. Even though the GMT is expected to substantially reduce profit shifting incentives, some profit-shifting incentives will remain. The GMT places multilaterally agreed limits on competition for investment through the tax system and can enable a better allocation of capital across jurisdictions.

112. **The results also highlight the revenue raising capacity of the GMT that can be key for domestic resource mobilisation.** The paper finds that the GMT can raise between USD 155-192 billion of additional CIT revenues per year, with revenue gains accruing to all jurisdiction groups. As all jurisdictions have some stock of low-taxed profit, QDMTT implementation allows all jurisdiction groups to capture revenues arising from low-taxed profit in their own jurisdiction.

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Annex A. Methodology underlying the preparation of the matrices

113. **The general approach to construct the matrices for the years 2017-2020 follows OECD (2020[15]).** In this economic impact assessment (EIA) of the two-pillar solution, matrices on profit, revenues, assets, and payroll were constructed for the year 2016. Changes in the design of the substance-based income exclusion required the addition of an employee matrix. At the same time, the methodology of OECD (2020[15]) has been updated to take advantage of additional data that has become available recently, particularly in the form of new vintages of anonymised and aggregated CbCR statistics. The additional employee matrix allowed for an entirely new methodology for the payroll matrix based on a combination of employee data and wages paid by MNEs at the jurisdictional level. This and other methodological improvements lead to an increase in the overall data quality across all matrices. The data sources used and the main changes in the preparation of the data relative to OECD (2020[15]) are summarised below. The methodology underlying the double counting correction and the loss adjustment which both only apply to the profit matrix is summarised in more detail in Hugger, González Cabral and O'Reilly (2023[22]).

Anonymised and aggregated CbCR data

114. **Anonymised and aggregated CbCR statistics contain bilateral information on revenues, profits, assets, and employees.** The underlying reporting framework was introduced as part of the BEPS Project and requires MNE groups with consolidated revenues exceeding EUR 750 million to report on their global activities. The size threshold is therefore aligned with the GMT threshold. The level of reporting is the subgroup level, where a subgroup comprises all entities of an MNE operating in a tax jurisdiction. The jurisdictional blending applies in the calculation of the GMT means that the subgroup level is the appropriate level of aggregation. Typically, the individual CbC reports are submitted to the tax authorities in the UPE jurisdiction which provide the OECD with anonymised and aggregated statistics combining all CbCRs received. These anonymised and aggregated CbCR statistics are currently available for up to 52 UPE jurisdictions per year. We focus in the first instance on information for profitable subgroups**,** reflecting the focus of the GMT on these entities. This information is taken from Panel AI of Table I of the aggregated CbCR statistics for the years 2017-2020.[50] In a later step, the analysis also accounts for the treatment of losses under the GMT.

115. **Aggregated CbCR data is the preferred data source and is used to fill columns of the matrices.** To further improve the data quality of this key data source, several adjustments to the data cleaning and preparation methodology were made. The individual matrices are constructed using data recorded in Panel AI of Table I in the aggregated CbCR data, which contains information on profitable subgroups following the approach of OECD (2020[15]). To expand the coverage of the CbCR data, imputations of missing information in Panel AI were added based on using data on all subgroups (Panel A of Table I) and loss-making subgroups (Panel AII of Table I). If both, Panel A and AII are available, values for profitable MNEs are imputed by combining this information. If only values for all subgroups are available

[50] While data for the year 2016 is also available, the analysis focuses on the later years since the first year of reporting may suffer from quality issues.

– which is the more frequent case – the median ratio of values for profitable subgroups to all subgroups by affiliate jurisdiction and year from other CbCRs is used to scale data on all subgroups. If information is available from less than three UPE jurisdictions, the global median by year is used for the scaling. Before the scaling, outliers are excluded, and the resulting ratios are winsorised at the 5% level.

116. **The foreign jurisdiction total reported in aggregate CbCR data is used to scale all imputed data in the revenue, profit, asset, and employee matrices.** This scaling also includes data taken from Orbis (see below). The scaling works at the column level, i.e., at the UPE jurisdiction level for any jurisdiction where some CbCR data is available. This ensures that the column total matches the total reported in the aggregate CbCR data. Stateless income is excluded from the foreign jurisdiction total for this scaling. To avoid large relative changes in cells with small absolute amounts, the multipliers resulting from the column scaling are winsorised at the 10th and 90th percentiles across all jurisdictions.

117. **The availability of several vintages of aggregate CbCR data allows forward and backward extrapolations to be added to the matrices.** This is done based on residence jurisdiction-specific yearly growth rates. It allows cells to be filled in cases where a UPE jurisdiction only provided aggregate CbCR data for a subset of the years 2017-2020. Lastly, improved data cleaning to exclude implausible data points based on the benchmarking of aggregate CbCR data against macroeconomic indicators and across years further strengthens data quality.

Additional data sources

118. **The CbCR data is combined with additional sources of hard data on MNE activities to maximise coverage.** Unconsolidated firm-level data from Bureau van Dijk's Orbis database covers all five matrix variables and is aggregated at the UPE-affiliate level to fill cells in the matrices where CbCR data is not available. Further information comes from the OECD AMNE database and the OECD Analytical AMNE database (for revenues, employees, and payroll), Eurostat FATS (for revenues), the US Bureau of Economic Analysis (for payroll).

Orbis data

119. **The Orbis database is compiled by Bureau van Dijk (BvD) and provides extensive information on ownership structures and financial accounts of firms at the consolidated and unconsolidated level.** The coverage of consolidated data of ultimate parents is mostly good, in particular for revenues and profit. Accordingly, this consolidated data is used to scale column totals of the revenue and profit matrices for each year. This is done by comparing the column totals from the matrices with the sum of consolidated revenue or profit of firms with a UPE in each jurisdiction. Firms with negative profit are excluded before the column total from consolidated Orbis is calculated to align with the use of profitable subgroups from CbCR. The scaling itself now proportionally affects all estimated cells, not just the diagonal cells (i.e., the UPE cells in the matrices). The scaling is not applied for columns for which we have CbCR information, since the column total is defined by the sum of domestic and foreign jurisdiction total values on CbCR in these cases. The Orbis-based column scaling is also not applied when the UPE jurisdiction is an investment hub since the coverage of Orbis is not deemed reliable enough for these jurisdictions.

120. **A more comprehensive version of Orbis has been used to improve coverage relative to the previous impact assessment, with several additional quality checks included.** The year definition was shifted from July-June to the calendar year to better match the year definition in most macro data and further improvements were made to the duplicate and outlier cleaning procedure. Additional imputations at the firm level in case of individual missing variables reduce the need for revenue-based scaling of aggregate totals used for matrix cells. The removal of observations where the ultimate parent can be identified and has revenues below EUR 750 million ensures a closer alignment with CbCR data. The

summed-up unconsolidated Orbis is now used more broadly if the coverage is deemed good enough at the cell level.

AMNE and AAMNE

121. **Further aggregate data sources are used to complement the information on MNE activities.** The OECD database on the Activities of Multinational Enterprises (AMNE) and the Analytical AMNE (AAMNE) database contain information on the activities of foreign-owned affiliates in destination jurisdictions (inward data) as well as foreign activities of affiliates of by headquarter jurisdiction (outward data). This data is used fill cells in the revenue, employee, and payroll matrices. In contrast to the OECD (2020[15]), this data has been complemented with revenue information from Eurostat's Foreign Affiliates Statistics (FATS) to expand the coverage, especially in the later years of the sample period. To further increase coverage, missing data is imputed as far as possible using jurisdiction-specific growth rates for each variable available over time. Since both OECD AMNE and Eurostat FATS contains information on companies with revenues less than EUR 750 million, totals from these data sources are scaled down to align with the scope of CbCR and the GMT. The scaling is based on the ratio of in-scope versus out-of-scope values for each of profit, revenue, assets, payroll and employees in the Orbis data for each year and variable.

Further remarks on data preparation

122. **While the different data sources account for the bulk of profit and economic activity represented in the datasets, some information, especially for smaller jurisdictions, is based on extrapolations.** These extrapolations rely on macroeconomic data, such as FDI, GDP, population, or wage levels taken from the IMF, the World Bank, or the ILO. The extrapolations fill all remaining gaps in the matrices and make use of the hard data available to ensure consistency within each matrix.

123. **The general approach to impute missing data points based on macroeconomic data closely follows OECD** (2020[15]) **with some updates.** The move towards a panel dataset covering 4 years allowed for a more thorough cleaning of outliers in the extrapolations used. Wherever possible, absolute cut-offs used in OECD (2020[15]) were replaced by distribution points to exclude outliers. Extrapolations based on the return on FDI stocks were also adapted to better account for differences across income groups. Reflecting the focus on profitable subgroups, negative returns to FDI are now replaced with zeros resulting in a profit matrix without negative entries.

124. **Additional information from jurisdictions that do not host any ultimate parent entity of a large MNE group have been incorporated.** Based on information provided by some jurisdictions who reported that they had zero CbCR filers in their jurisdictions, certain columns of the matrices have been set to zero. The assumption is that for all non-hub jurisdictions with an average GDP below USD 10 billion over the period 2017-2020, there is no in-scope MNE with a UPE in that jurisdiction. All cells in the matrix-columns of these jurisdictions are set to zero. Cells are also set to zero if there is no information of any MNE activities in the aggregate CbCR data of a UPE jurisdiction for which the sum of data reported equals the foreign jurisdiction total. Since there are additional sources available for revenues that do not contain profit information such as the OECD AMNE and Analytical AMNE databases or Eurostat FATS, this revenue information is likely to be more reliable than imputed profit data. For this reason, profits are set to zero for UPE-affiliate jurisdiction pairs if there are no revenues recorded for the same UPE-affiliate pair.

Employee matrix

125. **To add a further dimension to the global activities of large MNEs, an additional matrix with information on the allocation of employees was constructed.** This data is used directly in the

estimation of the UTPR and in the estimation of the changes to global profit shifting through the GMT. This additional matrix is also used indirectly as it is a crucial source of information for the construction of the payroll matrix.

126. **The preferred data source for the employee matrix is aggregated CbCR data for sub-groups with positive profit.** The cleaning and preparation procedure of the aggregated CbCR data is the same as for the profit, revenue, and tangible asset matrices. This data is also complemented with information from AMNE, AAMNE, and Orbis. The corresponding data cleaning follows the same approach as for the other relevant matrices. The extrapolations used to fill cells for which no hard data is available is similar to the approach taken for the tangible assets matrix using the revenue matrix as starting point as outlined in OECD (2020[15]). The underlying assumption is that, in a similar manner to tangible assets, employees are an important input to production, meaning that revenue and the number of employees are correlated. This assumption is also confirmed in aggregate CbCR data, where the correlation between revenues and employees is 0.97. To allow for heterogeneity in the ratio of revenues to employees, the approach considers how the average ratio of employees to revenue varies across headquarter jurisdictions (columns) and destination jurisdictions (rows). To ensure these adjustments do not result in extreme values, they are winsorised at the 10th and 90th percentile. As in the other matrices, estimated data in all columns for which some CbCR data is available is rescaled to match the sum of domestic and foreign jurisdiction total in CbCR. All cells in a column are set to zero if the headquarter jurisdiction is unlikely to be the residence of any ultimate parent entity of a large MNE.

Payroll matrix

127. **The addition of the employee matrix allows for a new methodology for the payroll matrix to be used as compared to OECD** (2020[15])**, which substantially increases data quality.** Since CbCR does not contain information on payroll, hard data on payroll comes from the US BEA which is used for the US column, Orbis, and the OECD's AMNE database. Totals from AMNE are scaled down to account for the focus on large MNEs as described above. Missing data for individual years is imputed based on yearly growth rates at the jurisdiction level wherever possible.

128. **In contrast to the OECD** (2020[15])**, all remaining cells are filled by multiplying the number of employees from the new employee matrix with destination-jurisdiction-specific MNE wages.** The primary source for these MNE wages is US BEA which records information on the number of employees and the total compensation of employees of US MNEs in many destination jurisdictions. This data is used to calculate yearly average wages by destination jurisdiction. Some of the resulting wage information is excluded if rounding in the baseline data leads to an insufficient level of accuracy in the resulting wages. In case of missing data for individual years, extrapolations are based on yearly growth rates. While BEA data focuses on US MNEs, MNE wages are assumed to depend primarily on the destination jurisdiction. Wages paid by US MNEs in a destination jurisdiction are therefore assumed to be largely comparable to wages paid in the same jurisdiction by MNEs headquartered in other countries. Additional data on wages comes from the ILO. Since these wages are not specific to MNEs but also reflect wages from local employers, ILO wages are scaled based on income-group specific median ratio of ILO to BEA wages of observations for which both data sources are available. The resulting MNE wages from BEA and ILO are compared against GDP per capita to identify outliers that are e.g., due to very high wages potentially driven by a small number of MNEs represented in BEA which is the case in some lower income jurisdictions. Such outliers are capped at the 90th percentile of the wage to GDP per capita ratio. Taken together, BEA and ILO provide information of wages for around three quarters of jurisdictions in the matrices. The remaining missing wages are imputed based on the income-group specific median ratio of GDP per capita to payroll after the regression-based exclusion of outliers. As in the other matrices, all cells in a column are set to zero if the headquarter jurisdiction is unlikely to be the residence of any ultimate parent entity of a large MNE. Payroll in individual cells is set to zero if the number of employees is zero for the same cell.

Preference order and coverage of data sources

129. **A preference order is established to decide which source to use in cases where there is data from several sources available for a matrix cell.** This preference order is determined for each matrix, depending on the availability of sources and their deemed data quality. Across the different sample years (2017-2020), the preference order is kept constant within each matrix type (profit, revenue, asset, employee, and payroll matrix). To ensure consistency across the matrices, sources have been ordered as consistently as possible across the matrix types. Table A.1 summarises the data sources used for each set of matrices that is constructed. First, aggregated CbCR data is the preferred choice whenever available (all matrices except for payroll). For payroll, the preferred choice is US BEA data. The second preferred option is Orbis, followed by hard data from other aggregate data sources such as the OECD AMNE database. The payroll matrix is again the exception since here, AMNE data is preferred over Orbis due to the relatively limited coverage of payroll in Orbis compared to the other four variables. Lastly, when no source of hard data is available, extrapolations are used to fill all remaining cells in the matrices as described above. As discussed, irrespective of the availability of other sources, all cells in a column are set to zero if a jurisdiction is not expected to host any ultimate parent entity of a large MNE group.

Table A.1. Overview and preferences order of data sources underlying the matrices

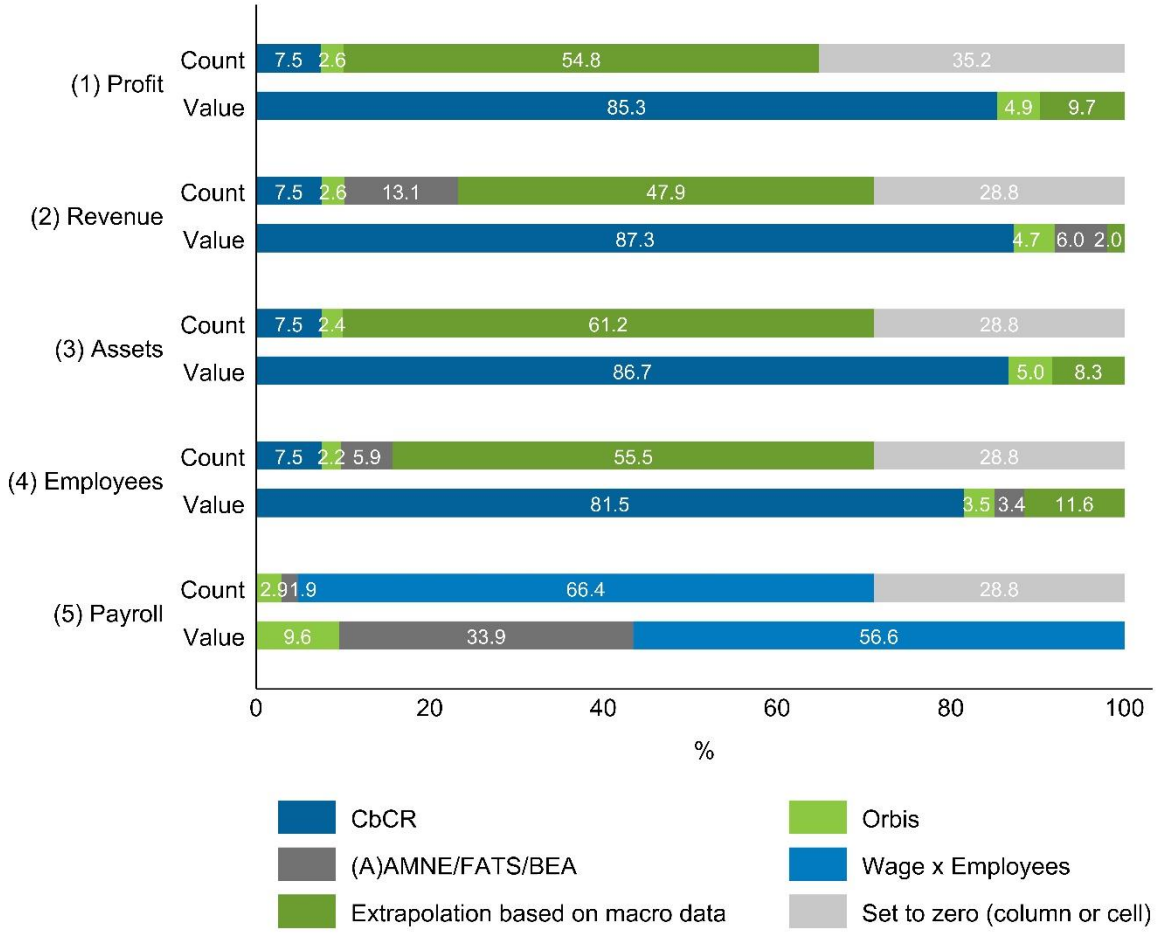
Order of preference	Profit matrices	Revenue matrices	Asset matrices	Employee matrices	Payroll matrices
1	CbCR	CbCR	CbCR	CbCR	BEA
2	Orbis	Orbis	Orbis	Orbis	OECD AMNE
3	Extrapolations based on macro data (e.g., FDI)	Eurostat FATS	Extrapolations based on revenue matrix	OECD AMNE	Orbis
4		OECD Analytica AMNE		Extrapolations based on revenue matrix	MNE wages x employees
5		OECD AMNE			
6		Extrapolations based on macro data (e.g., gravity model)			

Note: The order of preference is necessary to decide on which source to use to fill the matrix cells for which several sources are available. The ordering is as consistent as possible across the matrices to ensure greater consistency across the matrices. Finally, there is for each matrix an extrapolation method (involving more uncertainty than hard data) that ensures that all matrix cells can ultimately be filled.

130. **The preferred CbCR data is only available for around 7.5% of cells, but accounts for the majority of the totals of the revenue, profit, asset, and employee matrices.** Figure A.1 summarises the coverage data sources for the different matrices in terms of the number of cells filled and the share of variable totals. To assess the relative importance of the different data sources, we consider the first measure to be more informative. As shown in Figure A.1, cells filled with CbCR data represent most of the totals in the profit, revenue, asset, and employee matrices, even though this primary source of data is only available for relatively small shares of all cells. While most cells are filled with extrapolations, these only account for small shares of the totals. It is important to note that the share of cells filled with extrapolations is typically higher for lower income jurisdictions than for higher income jurisdictions reflecting the gaps in the existing hard data in lower income jurisdictions. In the payroll matrix, a large share of the total comes from cells in which the number of employees from the employee matrix is multiplied with an estimate of jurisdictional-specific MNE wages. The data quality of these extrapolations is therefore relatively high. Since each matrix comprises almost 50,000 UPE-affiliate pairs for each year reflecting the large number of jurisdictions covered, many cells contain very small absolute values or zeros. This can be due to

jurisdictions that are not home to any large MNE – in these cases, full columns are set to zero; or because there is little economic relationship for a particular UPE-affiliate pair, e.g., because of a large geographic distance. Cells explicitly set to zero account for 30-35% in the different matrices.[51]

Figure A.1. Coverage of data sources for the matrices



Note: Coverage of data sources for each matrix. Values shown are averages across the years 2017-2020. The combination of sources differs across matrices, reflecting differences in the variables available. Profit values are adjusted for losses. Labels for values <0.5% are supressed to improve readability.

[51] The shares of cells "set to zero" shown in Table A.1 do not include all cells for which the sources of hard data or extrapolations yield a zero value, but only cells which are explicitly set to zero as described above. The overall share of cells with zero-values lies between 40% and 60% across the different matrices.

Annex B. Additional figures and tables

B1. Additional figures and tables from Section 4

Table B.1. Global distribution of MNE activities by UPE and affiliate jurisdiction, 2017

UPE jurisdiction group	Affiliate jurisdiction group	Profit	Profit (unadjusted for losses)	Revenue	Assets	Employees	Payroll
High income	High income	3126.2	3813.5	40551.5	13067.1	66.9	4345.6
High income	Upper middle income	289.0	333.4	3783.4	999.2	14.9	300.2
High income	Lower middle income	63.1	75.3	693.7	259.5	6.0	84.1
High income	Low income	1.4	1.7	29.5	12.0	0.2	1.2
High income	Investment hub	570.6	741.1	3982.5	793.7	2.3	152.5
High income	Total	4050.4	4965.0	49040.6	15131.5	90.4	4883.6
Upper middle income	High income	61.2	76.2	1042.4	380.7	1.6	83.3
Upper middle income	Upper middle income	857.5	949.0	10751.3	6307.5	32.2	691.3
Upper middle income	Lower middle income	8.8	10.6	150.7	107.2	0.8	16.6
Upper middle income	Low income	1.2	1.5	15.8	10.1	0.1	0.7
Upper middle income	Investment hub	83.6	110.0	817.0	403.3	0.2	18.2
Upper middle income	Total	1012.3	1147.3	12777.3	7208.8	35.0	810.1
Lower middle income	High income	6.8	8.9	262.0	95.0	0.6	39.2
Lower middle income	Upper middle income	2.9	3.3	120.5	55.3	0.5	11.0
Lower middle income	Lower middle income	85.7	102.8	1308.2	962.4	8.4	136.2
Lower middle income	Low income	0.3	0.3	5.1	2.3	0.0	0.2
Lower middle income	Investment hub	3.8	4.6	46.6	23.5	0.0	3.3
Lower middle income	Total	99.5	119.9	1742.4	1138.6	9.6	190.0
Low income	High income	0.0	0.0	28.9	9.8	0.1	3.4
Low income	Upper middle income	0.0	0.0	12.1	5.4	0.0	1.1
Low income	Lower middle income	0.0	0.0	4.8	2.8	0.0	0.5
Low income	Low income	5.9	7.1	10.4	4.1	0.0	0.4
Low income	Investment hub	0.0	0.0	4.1	1.1	0.0	0.3
Low income	Total	6.0	7.1	60.4	23.2	0.2	5.8
Investment hub	High income	176.1	221.6	3028.5	701.1	5.0	295.1
Investment hub	Upper middle income	211.2	231.2	1938.8	897.9	6.3	126.8
Investment hub	Lower middle income	20.2	23.6	180.4	80.5	1.4	17.4
Investment hub	Low income	0.2	0.2	7.7	4.6	0.0	0.4
Investment hub	Investment hub	324.0	408.2	1937.4	810.4	1.7	139.2
Investment hub	Total	731.7	884.9	7092.8	2494.5	14.4	578.9
Total	High income	3370.3	4120.2	44913.3	14253.7	74.2	4766.6
Total	Upper middle income	1360.7	1517.0	16606.1	8265.3	53.9	1130.4
Total	Lower middle income	177.8	212.3	2337.7	1412.4	16.7	254.9
Total	Low income	9.1	10.8	68.6	33.1	0.4	3.0
Total	Investment hub	982.1	1264.0	6787.7	2032.1	4.3	313.5
Total	Total	5899.9	7124.3	70713.3	25996.6	149.5	6468.4

Note: Values shown are in USD billion for profit, profit (unadjusted for losses), revenue, assets, and payroll and in million for employees. Annex E shows the allocation of jurisdictions to income groups.

Table B.2. Global distribution of MNE activities by UPE and affiliate jurisdiction, 2018

UPE jurisdiction group	Affiliate jurisdiction group	Profit	Profit (unadjusted for losses)	Revenue	Assets	Employees	Payroll
High income	High income	2873.2	3478.2	42416.8	13473.8	68.1	4516.6
High income	Upper middle income	339.6	389.9	4082.7	981.5	14.9	297.4
High income	Lower middle income	75.4	90.0	784.0	274.8	6.6	94.2
High income	Low income	3.0	3.4	37.7	14.6	0.2	1.2
High income	Investment hub	783.0	1010.2	4590.9	672.4	2.4	157.4
High income	Total	4074.3	4971.7	51912.1	15417.1	92.2	5066.8
Upper middle income	High income	66.9	90.1	873.8	333.3	1.4	92.9
Upper middle income	Upper middle income	1027.0	1130.6	11908.4	6828.2	32.9	710.1
Upper middle income	Lower middle income	9.2	11.0	159.0	98.6	0.8	16.1
Upper middle income	Low income	2.1	2.4	49.8	23.7	0.1	0.9
Upper middle income	Investment hub	98.5	128.9	817.1	377.4	0.2	18.2
Upper middle income	Total	1203.7	1362.9	13808.1	7661.1	35.5	838.2
Lower middle income	High income	4.9	6.5	246.1	73.3	0.5	44.1
Lower middle income	Upper middle income	2.3	2.7	124.2	52.3	0.5	10.8
Lower middle income	Lower middle income	72.5	86.9	1055.2	452.1	6.9	108.0
Lower middle income	Low income	0.3	0.3	4.7	2.0	0.0	0.2
Lower middle income	Investment hub	2.9	3.6	49.6	22.2	0.0	2.9
Lower middle income	Total	83.0	99.9	1479.8	601.9	8.0	165.9
Low income	High income	0.0	0.0	29.7	9.9	0.1	3.5
Low income	Upper middle income	0.0	0.0	12.2	5.4	0.0	1.0
Low income	Lower middle income	0.0	0.0	4.8	2.3	0.0	0.5
Low income	Low income	5.5	6.5	9.4	4.1	0.0	0.4
Low income	Investment hub	0.0	0.0	4.4	1.0	0.0	0.2
Low income	Total	5.6	6.6	60.5	22.6	0.2	5.7
Investment hub	High income	219.6	277.2	3686.4	834.7	5.4	323.3
Investment hub	Upper middle income	257.8	282.6	2292.6	1041.5	7.1	149.5
Investment hub	Lower middle income	23.9	27.9	237.3	110.6	1.7	22.5
Investment hub	Low income	0.2	0.3	9.5	5.6	0.0	0.4
Investment hub	Investment hub	361.8	455.8	2436.8	839.9	1.9	171.5
Investment hub	Total	863.3	1043.7	8662.6	2832.3	16.1	667.2
Total	High income	3164.6	3852.0	47252.9	14724.9	75.5	4980.4
Total	Upper middle income	1626.9	1805.7	18420.1	8908.9	55.4	1168.9
Total	Lower middle income	181.0	215.8	2240.2	938.4	16.0	241.3
Total	Low income	11.1	12.8	111.0	49.9	0.4	3.1
Total	Investment hub	1246.2	1598.6	7898.8	1912.8	4.6	350.2
Total	Total	6229.8	7484.9	75923.0	26535.0	151.8	6743.9

Note: Values shown are in USD billion for profit, profit (unadjusted for losses), revenue, assets, and payroll and in million for employees. Annex E shows the allocation of jurisdictions to income groups.

Table B.3. Global distribution of MNE activities by UPE and affiliate jurisdiction, 2019

UPE jurisdiction group	Affiliate jurisdiction group	Profit	Profit (unadjusted for losses)	Revenue	Assets	Employees	Payroll
High income	High income	2713.2	3285.7	42065.0	13398.7	67.1	4487.2
High income	Upper middle income	325.7	374.0	3969.3	969.7	14.0	304.8
High income	Lower middle income	77.1	92.6	822.5	267.0	6.7	105.3
High income	Low income	2.0	2.3	37.8	18.8	0.2	1.2
High income	Investment hub	697.7	905.3	4344.1	636.5	2.4	161.4
High income	Total	3815.7	4659.9	51238.7	15290.8	90.4	5060.1
Upper middle income	High income	67.7	83.8	1109.8	355.6	1.6	121.3
Upper middle income	Upper middle income	1174.7	1291.6	14230.5	7535.7	36.9	954.2
Upper middle income	Lower middle income	14.7	17.6	170.4	94.3	0.9	17.2
Upper middle income	Low income	2.2	2.5	46.9	28.8	0.1	0.9
Upper middle income	Investment hub	108.2	142.5	1322.0	575.3	0.3	24.6
Upper middle income	Total	1367.5	1538.0	16879.6	8589.7	39.8	1118.3
Lower middle income	High income	6.0	7.9	205.6	52.9	0.5	43.5
Lower middle income	Upper middle income	1.6	1.8	119.8	71.7	0.5	11.5
Lower middle income	Lower middle income	92.8	110.9	968.3	347.8	6.4	110.2
Lower middle income	Low income	0.1	0.1	4.1	2.0	0.0	0.2
Lower middle income	Investment hub	3.5	4.1	55.8	7.2	0.0	3.4
Lower middle income	Total	103.9	124.9	1353.6	481.6	7.5	168.6
Low income	High income	0.0	0.0	28.4	9.6	0.1	3.4
Low income	Upper middle income	0.0	0.1	12.3	5.2	0.0	1.1
Low income	Lower middle income	0.0	0.0	4.9	2.2	0.0	0.6
Low income	Low income	7.2	8.5	10.4	6.1	0.1	0.5
Low income	Investment hub	0.0	0.0	4.2	0.9	0.0	0.3
Low income	Total	7.3	8.6	60.2	24.0	0.2	5.8
Investment hub	High income	174.5	221.3	2752.4	773.6	4.9	341.5
Investment hub	Upper middle income	286.6	312.3	2708.8	1518.4	7.9	204.4
Investment hub	Lower middle income	26.9	31.3	265.5	111.9	1.7	27.4
Investment hub	Low income	0.4	0.4	10.8	10.1	0.0	0.6
Investment hub	Investment hub	351.5	439.7	2866.0	1099.4	2.2	195.6
Investment hub	Total	839.9	1005.1	8603.5	3513.4	16.7	769.5
Total	High income	2961.5	3598.8	46161.2	14590.5	74.2	4996.9
Total	Upper middle income	1788.5	1979.8	21040.6	10100.7	59.3	1476.0
Total	Lower middle income	211.4	252.4	2231.5	823.2	15.8	260.7
Total	Low income	11.9	13.8	110.0	65.8	0.4	3.4
Total	Investment hub	1161.0	1491.7	8592.3	2319.5	5.0	385.2
Total	Total	6134.3	7336.5	78135.5	27899.6	154.5	7122.3

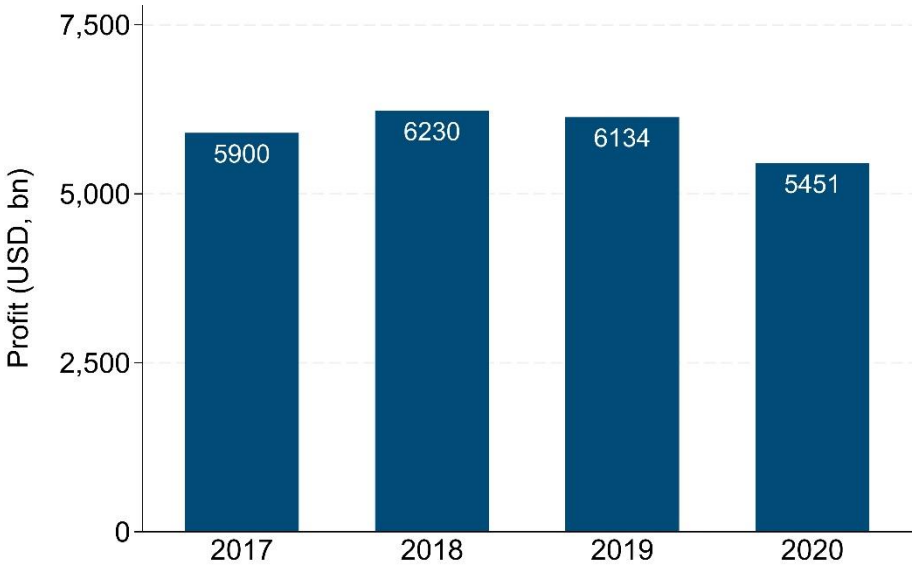
Note: Values shown are in USD billion for profit, profit (unadjusted for losses), revenue, assets, and payroll and in million for employees. Annex E shows the allocation of jurisdictions to income groups.

Table B.4. Global distribution of MNE activities by UPE and affiliate jurisdiction, 2020

UPE jurisdiction group	Affiliate jurisdiction group	Profit	Profit (unadjusted for losses)	Revenue	Assets	Employees	Payroll
High income	High income	2175.0	2635.3	37078.9	12119.7	60.7	4047.3
High income	Upper middle income	298.4	340.5	3523.5	1067.5	13.1	283.9
High income	Lower middle income	67.0	80.4	753.3	295.7	7.0	103.5
High income	Low income	1.7	1.9	29.7	14.4	0.2	1.4
High income	Investment hub	657.7	834.9	4160.4	619.5	2.3	160.8
High income	Total	3199.8	3893.1	45545.8	14116.8	83.3	4596.9
Upper middle income	High income	49.4	62.0	804.7	334.9	1.5	67.3
Upper middle income	Upper middle income	1160.3	1271.0	13757.7	6979.7	33.2	860.1
Upper middle income	Lower middle income	10.9	12.8	161.7	129.9	1.0	21.7
Upper middle income	Low income	1.5	1.8	35.5	31.0	0.3	3.8
Upper middle income	Investment hub	86.2	112.0	1110.4	398.7	0.4	28.3
Upper middle income	Total	1308.3	1459.5	15870.0	7874.2	36.5	981.2
Lower middle income	High income	3.9	5.0	194.5	79.0	0.5	35.5
Lower middle income	Upper middle income	2.0	2.3	135.2	66.1	0.5	12.3
Lower middle income	Lower middle income	93.5	111.5	950.3	754.2	6.5	116.4
Lower middle income	Low income	0.1	0.1	4.0	2.2	0.0	0.2
Lower middle income	Investment hub	2.6	3.2	53.1	19.9	0.0	3.7
Lower middle income	Total	102.1	122.0	1337.1	921.4	7.6	168.2
Low income	High income	0.0	0.0	26.7	9.5	0.1	3.3
Low income	Upper middle income	0.0	0.0	11.5	5.4	0.0	1.0
Low income	Lower middle income	0.0	0.0	4.7	2.5	0.0	0.6
Low income	Low income	6.1	7.3	9.4	6.2	0.1	0.6
Low income	Investment hub	0.0	0.0	4.2	0.9	0.0	0.2
Low income	Total	6.2	7.4	56.4	24.5	0.2	5.7
Investment hub	High income	146.2	183.8	2581.5	729.7	4.7	271.4
Investment hub	Upper middle income	334.0	362.8	3018.5	1789.1	8.3	216.9
Investment hub	Lower middle income	20.6	24.0	227.1	110.8	1.6	29.5
Investment hub	Low income	0.4	0.5	10.4	11.5	0.0	0.6
Investment hub	Investment hub	333.5	424.2	2348.3	955.4	1.9	166.8
Investment hub	Total	834.6	995.2	8185.9	3596.5	16.5	685.3
Total	High income	2374.5	2886.1	40686.4	13272.8	67.4	4424.8
Total	Upper middle income	1794.7	1976.7	20446.4	9907.8	55.2	1374.3
Total	Lower middle income	191.9	228.7	2097.1	1293.1	16.2	271.7
Total	Low income	9.8	11.6	89.0	65.3	0.6	6.6
Total	Investment hub	1080.0	1374.2	7676.4	1994.5	4.6	359.9
Total	Total	5451.0	6477.3	70995.2	26533.4	144.0	6437.3

Note: Values shown are in USD billion for profit, profit (unadjusted for losses), revenue, assets, and payroll and in million for employees. Annex E shows the allocation of jurisdictions to income groups.

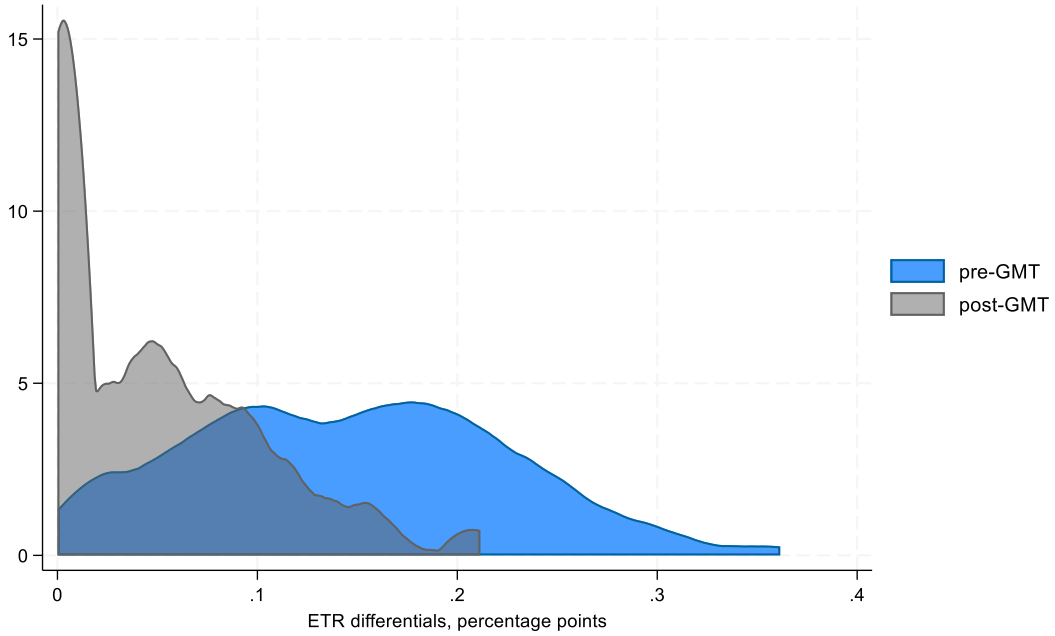
Figure B.1. Total profit of large MNEs by year



Note: Values shown are in USD, billion and represent total global profit of large MNEs, adjusted for losses.

B2. Additional figures and tables from Section 5

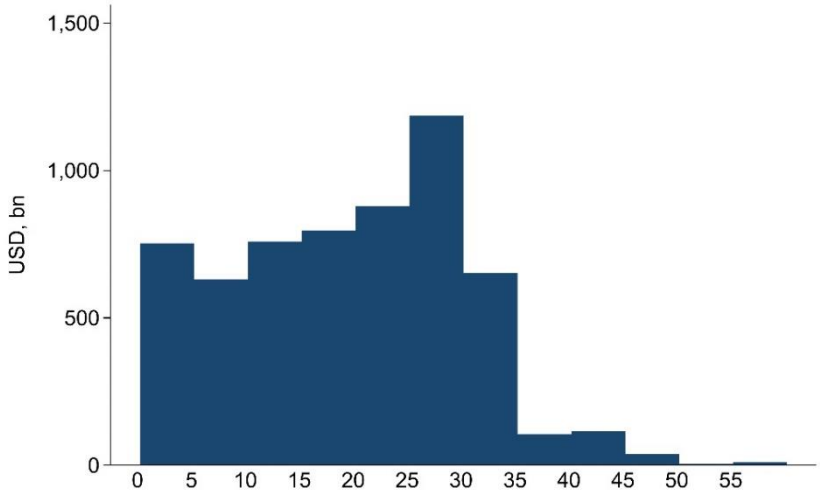
Figure B.2. Distribution of ETR differentials with investment hubs, before and after GMT



Note: The ETR differentials are computed using the ETRs on net profit as described in Section 5.2The SBIE is not accounted for. All value are averages over 2017-2020.

B3. Additional figures and tables from Section 6

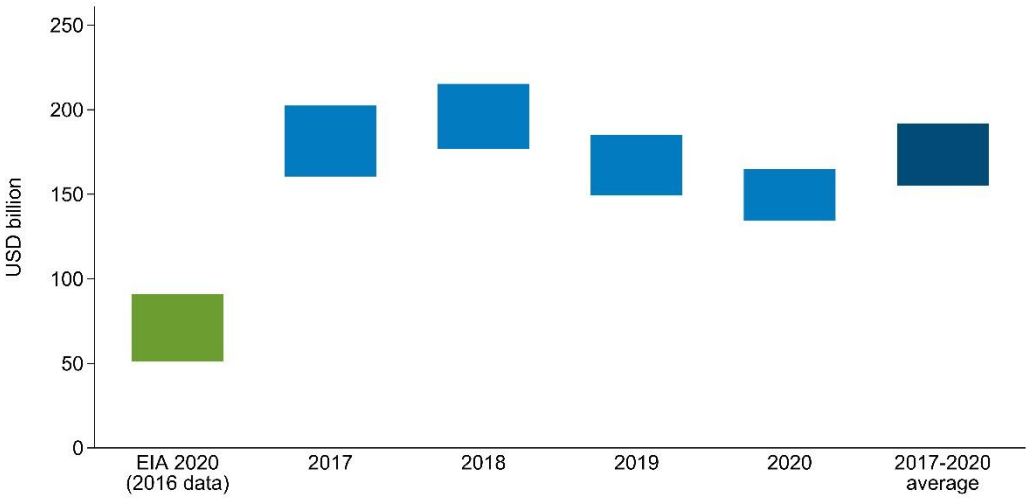
Figure B.3. Distribution of global MNE profit, MNEs with revenue above EUR 750 million



Note: Distribution of ETRs over global MNE profit in billion USD, averaged over years 2017-2020. Bins have a width of five percentage points.
Source: Hugger, González Cabral and O'Reilly (2023[22]).

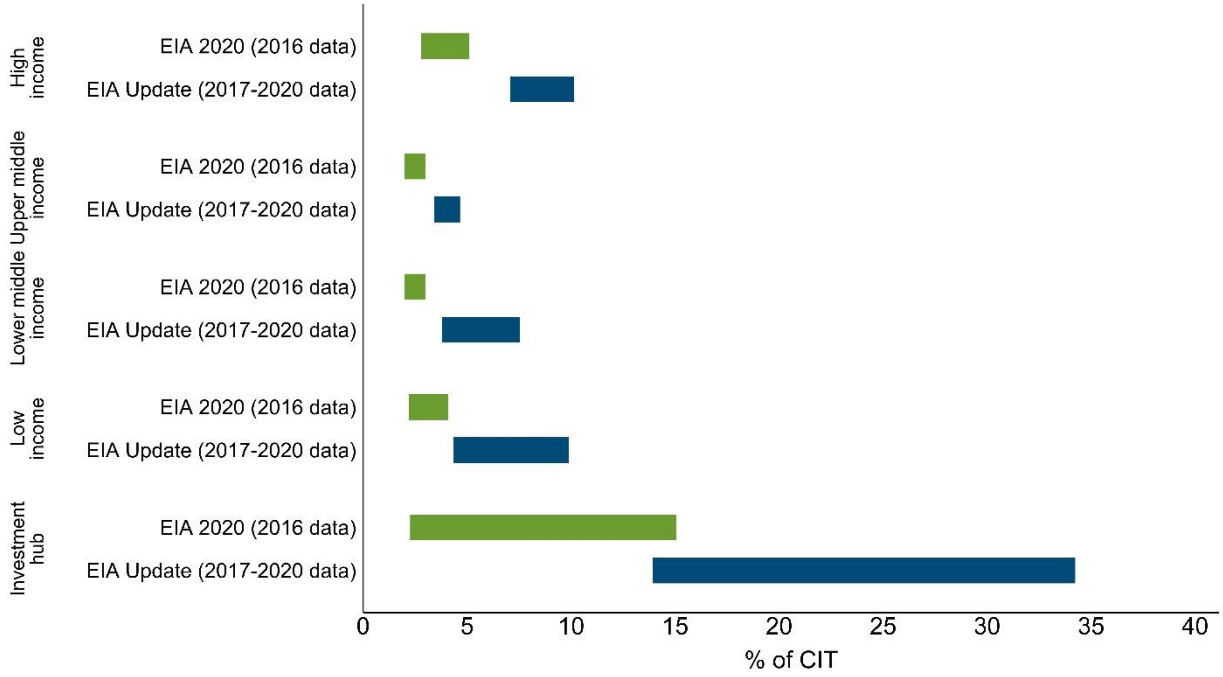
B4. Additional figures and tables from Section 8

Figure B.4. Global revenue gains, years 2016 and 2017-2020



Note: Bars indicate the evolution of lower and upper bound global estimates for years 2016, 2017-2020, and the average across 2017-2020. The result for 2016 is based on OECD (2020[15]) and incorporates a 15% minimum rate and a 10% carve-out on payroll and depreciation. For 2017-2020, estimates are presented for IF member jurisdictions only. Estimates include both direct and indirect revenue gains. The estimates account for the variation in the sensitivity of profit shifting. Estimates are presented based on the 'partial implementation' scenario discussed in Section 8.1Under this scenario, 70-100% of all IF member jurisdictions implement IIR, UTPR and QDMTT, except for zero-tax jurisdictions who (i) do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023. Non-IF member jurisdictions are assumed not to implement. Estimates are presented for the year-one SBIE scenario (a carve-out of 10% on payroll and 8% on tangible assets). Estimates are presented net of any lost revenue from CFC regimes modelled (Section 8.1). Annex E shows the allocation of jurisdictions to income groups.

Figure B.5. Revenue gains by jurisdiction group, compared to previous OECD impact assessment, with investment hubs



Note: The estimates are presented as an average of the 2017-2020 results. A year-by-year breakdown of the results is presented in Figure B.4. Estimates for the EIA Update (2017-2020) are presented for IF member jurisdictions only. Estimates include both direct and indirect revenue gains. The estimates account for the variation in the sensitivity of profit shifting. Estimates are presented based on the 'partial implementation' scenario discussed in Section 8.1Under this scenario, 70-100% of all IF member jurisdictions implement IIR, UTPR and QDMTT, except for zero-tax jurisdictions who (i) do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023. Non-IF member jurisdictions are assumed not to implement. Estimates are presented for the year-one SBIE scenario (a carve-out of 10% on payroll and 8% on tangible assets). Estimates are presented net of any lost revenue from CFC regimes modelled (Section 8.1). Annex E shows the allocation of jurisdictions to income groups. The EIA 2020 results refer to the year 2016 are based on results from OECD (2020[15]), are presented for IF and non-IF member jurisdictions, and incorporate a 15% minimum rate and a 10% carve-out on payroll and depreciation.

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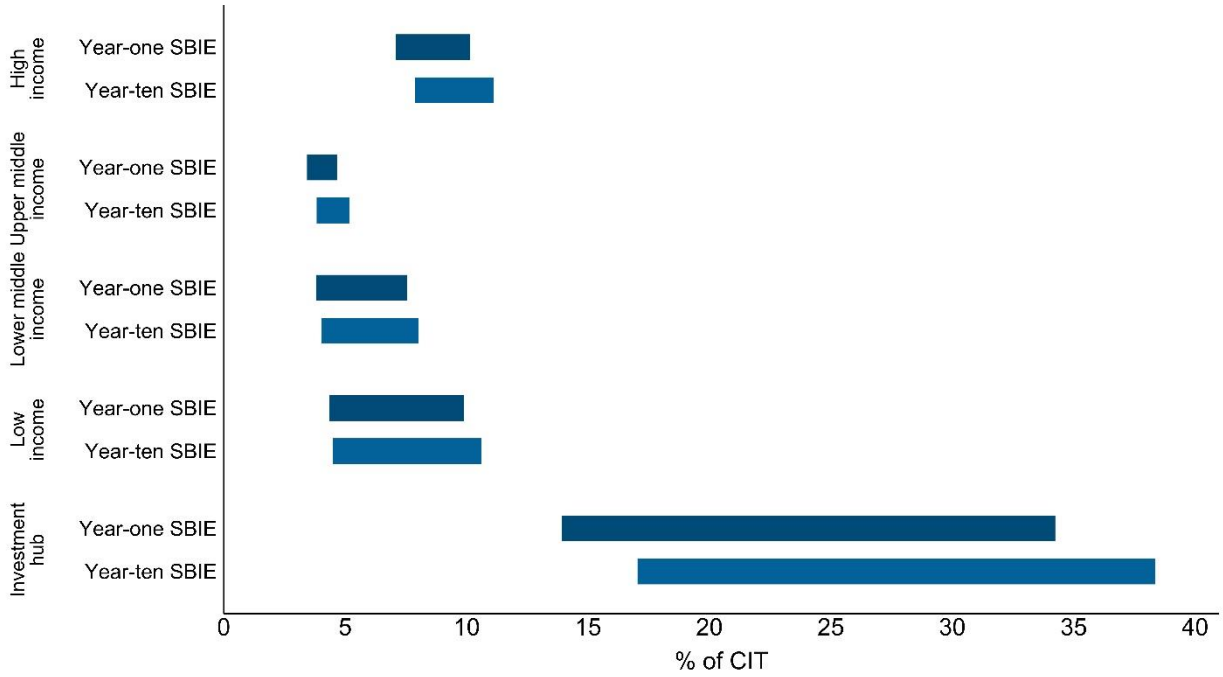
Figure B.6. Revenue gains by jurisdiction group, year-one vs. year-ten SBIE, with investment hubs



Note: The estimates are presented as an average of the 2017-2020 results. Estimates are presented for IF member jurisdictions only. Estimates include both direct and indirect revenue gains. The estimates account for the variation in the sensitivity of profit shifting. Estimates are presented based on the 'partial implementation' scenario discussed in Section 8.1Under this scenario, 70-100% of all IF member jurisdictions implement IIR, UTPR and QDMTT, except for zero-tax jurisdictions who (i) do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023. Non-IF member jurisdictions are assumed to not implement. Estimates for the SBIE year-one scenario include a carve-out of 10% on payroll and 8% on tangible assets. Estimates for the SBIE year-ten scenario include a carve-out of 5% on payroll and 5% on tangible assets. Estimates are presented net of any lost revenue from CFC regimes modelled. Annex E shows the allocation of jurisdictions to income groups.

Annex C. Additional methodological notes and robustness checks

C.1. Profit shifting methodology

Stock of shifted profit

131. **Shifted profits in this paper are computed as those in excess of a profitability threshold.** In OECD (2020[15]) the profitability threshold is based on a return on revenues threshold computed using firm-level data from Orbis. As revenues include related party revenues that may be strongly affected by profit shifting activity, the calculation of the profitability threshold is now based on a return on depreciation and payroll (Section 5.1).

132. **To explore the sensitivity of global profit shifting estimates to the profitability measure used, alternative measures of profitability are explored.** Figure C.1 shows estimates for the sum of global shifted profit over time for different profitability measures. Besides the baseline measure of return on depreciation and payroll used in this paper, estimates are shown based on the ratio of profit to tangible assets, to revenues, and to payroll. Shifted profits are assumed to be those in excess of the 75th percentile of the distribution of the profitability measure chosen. Investment hubs are excluded for the computation of the percentile as they are not considered representative for a profitability metric in the absence of profit shifting and might skew the profitability distribution. However, Figure C.1 shows that the results are not sensitive to this assumption. For completeness, the results are also computed using the same profitability threshold as in OECD (2020[15]) (i.e., a fixed profit to revenues threshold).

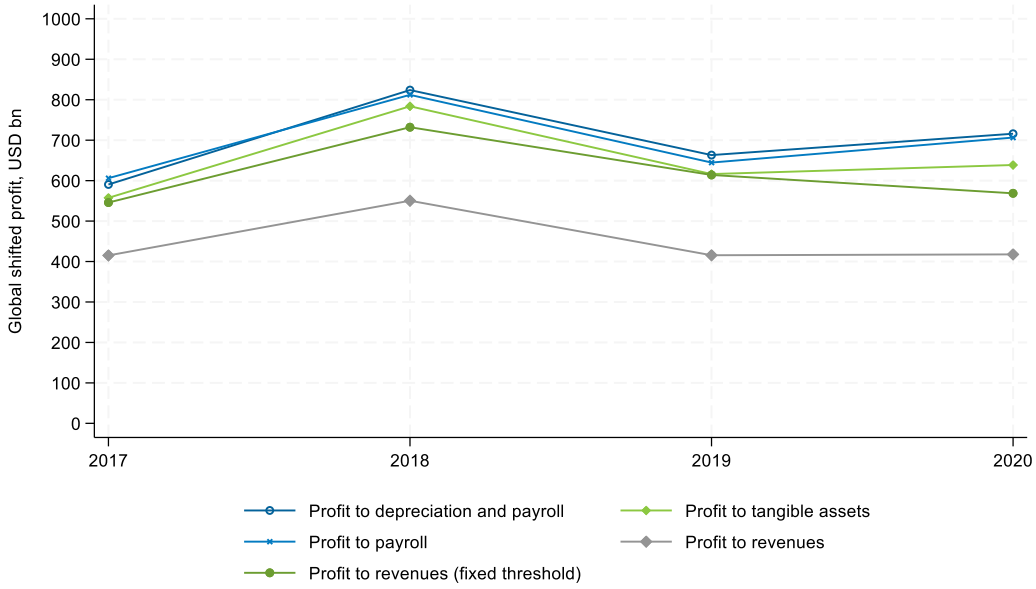
133. **Alternative methods of computing the profitability threshold result in estimates of global shifted profits that are of similar magnitudes.** All measures of profitability provide similar levels of global shifted profits and the different measures of profitability are highly correlated, implying that they provide a similar distribution of shifted profits across the individual investment hubs (Figure C.2). Global profit shifting estimates are slightly lower when the ratio of profit to revenues is used as the profitability measure. As discussed above, this variable may be affected by profit shifting activity making it less suitable as a basis on which to compute global shifted profits.

134. **Profit is assumed to be shifted to investment hubs only.**[52] In OECD (2020[15]), it was assumed that shifted profit could also be located in jurisdictions other than hubs. Jurisdictions where profits had been shifted to were defined as those jurisdictions with FDI-to-GDP ratios over 100% and ETRs below 17.5% which gave a total of 39 jurisdictions. In this paper, profit shifting is assumed to be concentrated in investment hubs only (24 jurisdictions). Using the same criterion as in OECD (2020[15]), a total of 31 jurisdictions would qualify as potential profit shifting destinations. The contribution of the potential additional non-investment hub profit shifting destinations following this classification to global shifted profits is negligible. The investment hubs on the list of 31 jurisdictions account for 99.7% of global shifted profit. This

[52] Profits above the profitability cut-off in non-investment hub jurisdictions are assumed not to be shifted profits.

concentration of shifted profit is in line with the high concentration of shifted profits among investment hubs (Figure 5).[53]

Figure C.1. Estimates of global profit shifting, 2017-2020, alternative profitability measures



Note: Estimates of global shifted profit based on alternative profitability measures. The profit to revenues (fixed threshold) case uses a 7.9% profitability threshold as in OECD (2020[15]) for comparability. For the remaining profitability measures, the threshold is equal to the 75th percentile of the variable excluding investment hubs.

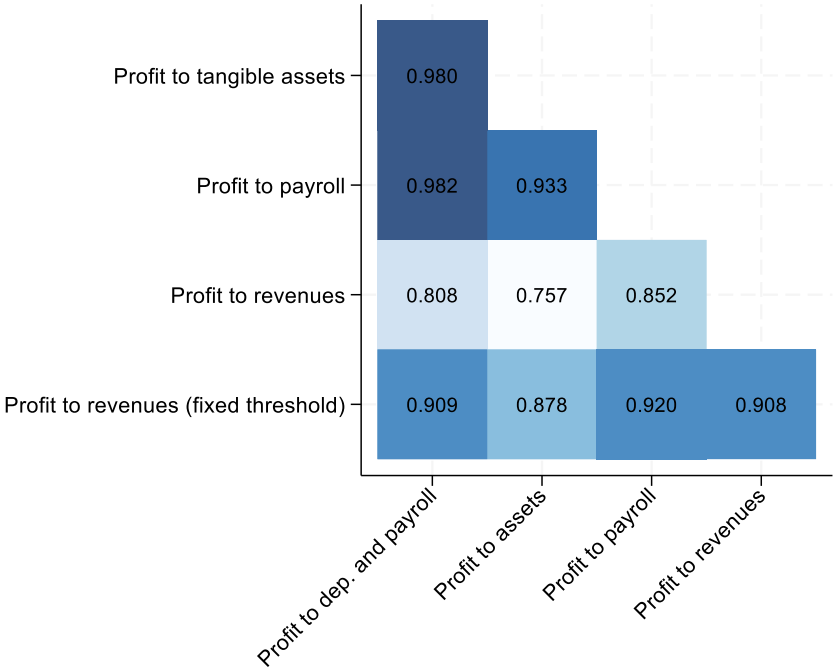
Table C.1. Global profit shifting estimates, alternative measures

		Panel A: Threshold based on non-hubs only				Panel B: Threshold based on all jurisdictions				
	Profit to revenues (fixed threshold)	Profit to depreciation and payroll	Profit to assets	Profit to payroll	Profit to revenues	Profit to depreciation and payroll	Profit to assets	Profit to payroll	Profit to revenues	Profit
2017	545.8	590.5	557.5	606.1	415.2	530.1	521.6	551.1	385.8	5899.9
2018	732.1	823.9	783.8	812.1	550.4	755.9	716.6	733.2	516.6	6229.8
2019	614.0	663.2	616.3	644.7	415.6	596.6	573.9	584.9	374.0	6134.3
2020	568.7	716.0	638.7	706.5	417.8	652.7	600.8	632.8	402.9	5451.0
Average	615.2	698.4	649.1	692.3	449.7	633.8	603.2	625.5	419.8	5928.8

Note: Estimates of global shifted profit based on alternative profitability measures. The profit to revenues (fixed threshold) case uses a 7.9% profitability threshold as in OECD (2020[15]) for comparability. For the remaining profitability measures, the threshold is equal to the 75th percentile of the ratio excluding investment hubs (Panel A) as their values skew the profitability distribution; and computed using all jurisdictions (Panel B). Any profits in excess of such thresholds in investment hubs is considered shifted profit.

[53] Instead of considering 17.5% as the ETR cut-off, the same exercise has been reproduced with the median in the period which is 16.7%. The results are invariant.

Figure C.2. Correlation of alternative profit shifting estimates across jurisdictions



Note: Each variable compares the distribution of shifted profits in investment hubs using alternative profit shifting measures. Profit to revenues (fixed threshold) uses the fixed profitability profit to revenue threshold at 7.9% as in OECD (2020[15]). For the remainder, the profitability threshold is defined as the 75th percentile of the distribution excluding investment hubs. Any profits in excess of such thresholds in investment hubs is considered shifted profit.

Estimating the source of shifted profit

135. **Once the stock of shifted profit is estimated, the location of profits prior to reduced shifting is determined.** To do so, the methodology reallocates profit back to jurisdictions based on tax rate differentials with investment hubs and on a proxy of economic activity with the UPE jurisdiction (as discussed in Section 5.2). The number of employees and the value of tangible assets are assigned equal weights. As the methodology already considers different scenarios for the computation of tax rate differentials and to the sensitivity of profits to tax rate differentials, this annex carries out some sensitivity analysis on the allocation of profit shifting with respect to the economic variable used to return profits.

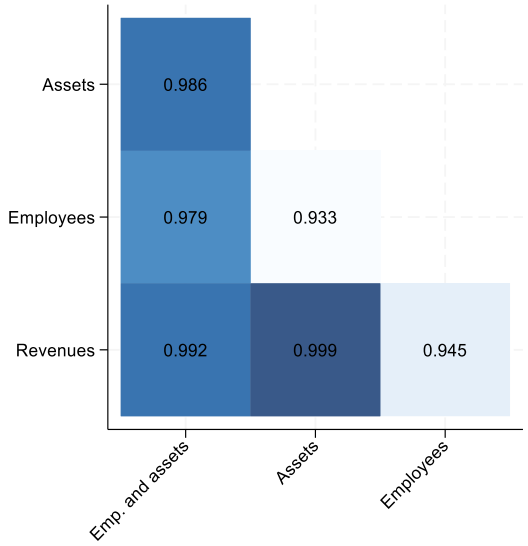
136. **Using alternative proxies for economic activity to find the source of shifted profits provides similar results regarding tax base gains from profit shifting.** Table C.2 compares the use of employees and assets as the proxy for economic activity to three other variables: assets and employees as independent keys and revenue as in OECD (2020[15]). Table C.2 shows that the results are robust to the economic activity variable used. This is also the case when comparing individual-level results rather than aggregate income group. Figure C.3 shows that jurisdiction-specific tax base gains from reduced profit shifting are also highly correlated for all measures of economic activity examined.

Table C.2. Changes to the stock of shifted profits and to the tax base gains from profit shifting, alternative economic activity proxies

		Tax base gains (% total profits)		
Income group	**Proxy for economic activity**	**Min**	**Max**	**Avg.**
High income	Employees and assets	6.2%	10.2%	8.3%
High income	Assets	7.1%	11.7%	9.5%
High income	Employees	5.3%	8.6%	7.1%
High income	Revenues	6.9%	11.6%	9.4%
Upper middle income	Employees and assets	4.0%	5.8%	4.8%
Upper middle income	Assets	3.5%	5.1%	4.2%
Upper middle income	Employees	4.5%	6.5%	5.3%
Upper middle income	Revenues	3.7%	5.4%	4.5%
Lower middle income	Employees and assets	7.6%	16.6%	11.1%
Lower middle income	Assets	4.2%	8.8%	6.0%
Lower middle income	Employees	11.0%	24.4%	16.3%
Lower middle income	Revenues	3.5%	7.9%	5.1%
Low income	Employees and assets	5.1%	11.4%	7.6%
Low income	Assets	4.7%	10.9%	7.2%
Low income	Employees	5.4%	11.9%	8.1%
Low income	Revenues	2.8%	6.3%	4.1%
Investment hub	Employees and assets	-35.5%	-25.0%	-30.4%
Investment hub	Assets	-37.9%	-25.4%	-31.8%
Investment hub	Employees	-33.2%	-24.6%	-29.0%
Investment hub	Revenues	-37.8%	-25.3%	-31.7%

Note: The profit shifting methodology is outlined in Section 5.2Profits are deemed to be shifted from jurisdictions based on the tax rate differentials and with which the MNE has more intense economic activity. In Section 5., economic activity was proxied using the number of employees and value of tangible assets. This table tests the robustness of the results to alternative ways of proxying economic activity, outlining also the case used in the main paper (employees and assets) for comparability.

Figure C.3. Correlation of jurisdiction-specific tax base gains (% total profits) for alternative economic activity measures to define the source of shifted profits



Note: Each variable compares the distribution of tax base gains from profit shifting using alternative measures of economic activity (employees and assets as used in the main text, assets, employees and revenue) to find the source of shifted profits.

C.2. Estimating the impact of the SBIE

137. **An uneven distribution of profit and substance across MNE subgroups within a jurisdiction may result in situations, where not all substance can be used to reduce the tax base under the GloBE Rules at an aggregate level.** Most substance reported in a jurisdiction could be concentrated in subgroups with little profit, while most profit could be concentrated in subgroups with little substance. As discussed in Section 0.604.1, the modelling based on aggregate data may therefore overestimate the effect of the SBIE if all substance is used to reduce the GloBE tax base under the SBIE. The model therefore aims to capture the degree of "SBIE usage" at the jurisdiction level by using unconsolidated Orbis data. This firm-level data is used to estimate a relationship between profitability observed at the jurisdiction level and an average "SBIE usage" rate in three steps.

138. **First, the "SBIE usage" is estimated at the subgroup level.** For this, unconsolidated affiliate-level data from Orbis is combined into subgroups by combining affiliates with identical UPEs at the jurisdiction level. Affiliates of UPEs with revenues below EUR 750 million are excluded from the analysis. The impact of the SBIE within subgroups is then calculated based on payroll (costs of employees in Orbis) and tangible assets (tangible fixed assets in Orbis). This calculation is done separately for the year-one SBIE, and the year-ten SBIE. For each MNE subgroup, the extent to which substance can be used to offset profit is calculated. If all substance can be used to carve out profit from the GloBE tax base, this "SBIE usage" is set to 1. If the maximum possible SBIE exceeds profits at the subgroup level, then the "SBIE usage" is smaller than 1. In these cases, the "SBIE usage" is calculated as the share of the substance needed to offset all profits. For jurisdictions for which the coverage of Orbis is comparably high, a profit weighted average "SBIE usage" rate is finally calculated across all subgroups which is considered representative for the affiliate jurisdiction. The list of jurisdictions for which Orbis coverage is deemed sufficient is the same as the list used in the construction of the baseline data matrices.

139. **Second, a regression model is used to estimate the relationship between "SBIE usage" and profitability.** Specifically, the average "SBIE usage" at the affiliate jurisdiction level calculated from Orbis data is regressed on the average profitability observed in these jurisdictions in Orbis. Profitability in these regressions is defined as profit over the sum of tangible assets and payroll, in line with the substance definition of the SBIE. The resulting regression coefficient on profitability is positive and statistically significant at the 0.1% level, meaning that "SBIE usage" is higher in jurisdictions with higher levels of profitability. In other words, a larger share of the substance can be used to carve out profits if the profit to substance ratio is higher. In contrast, in jurisdictions with high levels of substance relative to profits, less substance can be used to carve out profit from the GloBE tax base.

140. **Third, the extent of "SBIE usage" is estimated for all UPE-affiliate pairs at the aggregate level based on the profit to substance ratio.** For this, the regression coefficient obtained is multiplied with the specific profitability at the UPE-affiliate level calculated based on the profit, asset, and payroll matrices. This yields a value for the share of substance used to carve out GloBE tax base for each UPE-affiliate jurisdiction pair. Resulting values are limited at zero at the bottom and 1 at the top and used to calculate the GloBE tax base remaining after the application of the SBIE for each UPE-affiliate pair.

C.3. Estimating GILTI interaction

141. **The GMT interacts with CFC tax regimes, including the US GILTI regime**. Given the comprehensive nature of this CFC regime, and the availability of some estimates of the tax revenue it currently generates, the interaction between the GMT and GILTI was included in the modelling of the GMT. Any revenue gains presented in this paper take potential losses to US GILTI revenues into account.

142. **The estimation of the effect of the interaction between GILTI and the GMT proceeds in three steps**. First, we estimate current GILTI revenue for the sample period. Total current-law GILTI revenue in

the years 2018-2020 is estimated based data from the IRS Statistics of Income (SOI) on foreign income of US MNEs. Since GILTI also applies to MNEs with revenues below EUR 750 million, these revenues are slightly reduced to account for the GMT revenue threshold. Total GILTI revenue is also adjusted to account for domestic losses, since these are not reflected in the IRS SOI data, but can potentially result in a zero current year GILTI liability.[54] After the two adjustments, USD 13.4, 19.7 and 17.2 bn in total GILTI revenue are considered for the interaction effects with the GMT for the years 2018-2020. These values are rough approximations of GILTI liability and potentially understate or overstate current and post-GMT GILTI liability. For example, they do not account for potential reductions in GILTI revenues due to lower profit shifting brought about by the GMT and in this sense potentially overstate GILTI liabilities after the GMT.

143. **Second, total GILTI revenue of P2 in-scope MNEs is allocated to source jurisdictions.** In the absence of more detailed data, current GILTI revenues are allocated on a pro rata basis, based on each jurisdiction's hypothetical top-up tax before the reallocation of profits due to reduced profit shifting. The underlying assumption is that low-taxed profit in a jurisdiction creates both a GILTI liability and top-up taxes under GloBE Rules.

144. **Third, we estimate the interaction between current-law GILTI and the GMT.** QDMTTs do not take CFCs into account when calculating top-up taxation, while the IIR and the UTPR consider the effect of CFCs on effective tax rates. From this follows a rank order of the different tax rules: any QDMTTs come first, reducing potential CFC revenue; the IIR and UTPR follow the application of CFC taxes meaning that GILTI reduces IIR revenue in the case of the US. For simplicity, we assume that the tax bases of GILTI and the GMT are identical.[55] Under this assumption, every dollar of QDMTT revenue raised in a jurisdiction that currently also generates GILTI revenue, reduces GILTI revenue by the one dollar. Similarly, every dollar of remaining GILTI revenue reduces US IIR revenue by one dollar. Therefore, under this assumption, the relatively widespread introduction of QDMTTs outside the US in most scenarios reduces remaining GILTI revenues from MNEs in scope of P2 substantially. These rough interaction effects between GILTI and the GMT are taken into account in all results on GMT revenue gains presented in Section 7. However, it is important to note that the modelling of the interaction between GILTI and the GMT abstracts from several key details of the two minimum taxes and therefore only serves as a very rough approximation. In particular, US foreign tax credit limitations due to the allocation of expenses to foreign income cannot be taken into account due to the lack of available data. This implies that the reduction in GILTI revenue due to the GMT is very likely be overstated, potentially significantly.

C.4. Implementation assumptions and top-up collection

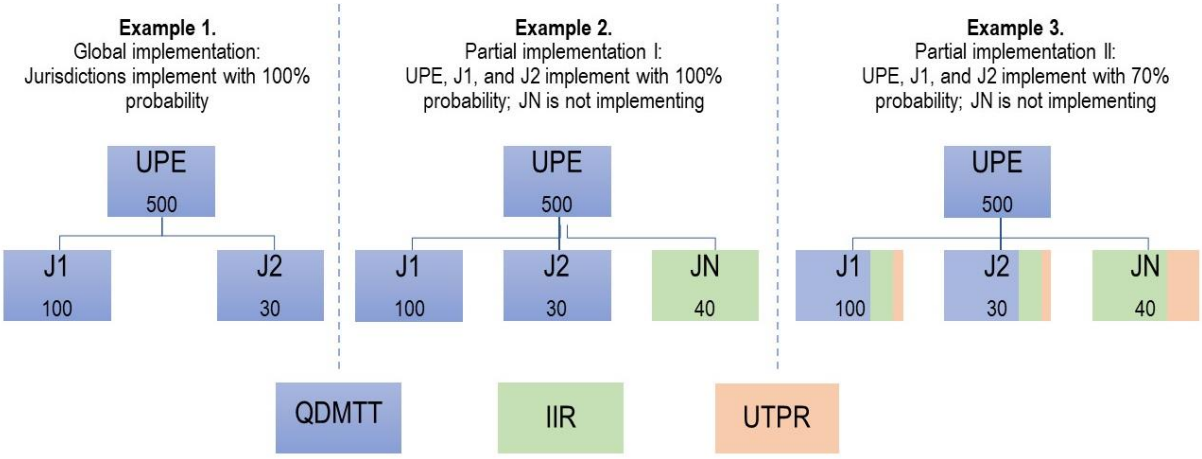
145. **The allocation of top-up taxes depends on the assumptions around implementation.** Since there is considerable uncertainty about the implementation of the GloBE Rules and QDMTTs, the modelling considers several scenarios. In a ‘global implementation’ scenario, all jurisdictions worldwide are assumed to implement an IIR, UTPR, and a QDMTT. In three ‘partial implementation’ scenarios Inclusive Framework members that have a CIT system implement with differing degrees of probability

[54] The reduction of GILTI revenue to account for the exclusion of MNEs with revenues below EUR 750 million accounts for 4.7% of total GILTI revenue. This is based on Orbis data but takes into account the fact that GILTI is held disproportionately by larger MNEs. The adjustment to account for domestic losses is based on the share of losses in positive domestic profits reported by US MNEs in aggregated CbCR statistics but takes into account additional anecdotal information that GILTI is held disproportionately by MNEs with positive taxable income in the United States.

[55] In practice, the calculation of the tax base for both GILTI and the GMT have carve-outs which are based on economic substance. For GILTI the carve-out is 10% of tangible assets. According to the data compiled in the matrices used for this paper, the year-one GMT SBIE would be on average comparable to a 10%-11% carve-out on assets and is thus slightly more generous than the GILTI carve-out. The year-ten GMT SBIE is on average comparable to a 6%-7% carve-out on assets and is therefore somewhat less generous than the GILTI carve-out.

(70%, 85%, 100%), while non-Inclusive Framework members and members that do not have any CIT infrastructure and (ii) have not taken any public steps to implement as of 27 October 2023 do not implement. The stylised examples discussed below are intended to clarify how the top-up tax arising is collected by jurisdictions, depending on the implementation assumptions.

Figure C.4. Schematic representation of implementation assumptions and rule order



Note: UPE stands for ultimate parent entity. J1 and J2 stand for affiliates in jurisdictions that are implementing the GloBE Rules and a QDMTT. JN stands for an affiliate jurisdiction that does not implement the GloBE Rules or a QDMTT. The numbers indicate the amount of top-up tax created on profit reported in the different jurisdictions. The colours show under which rules the top-up tax is collected in the different implementation scenarios.

146. **In the 'global implementation' scenario shown in Example (1), all jurisdictions, including non-Inclusive Framework members and zero tax jurisdictions, are assumed to implement a QDMTT.** Consequently, each jurisdiction collects the top-up tax on all low-taxed profit created from all domestic MNE affiliates. In Example (1) shown Figure C.4, this means that the UPE collects the full 500 in top-up taxes created by MNE affiliates in its jurisdiction via the QDMTT. Similarly, J1 collects 100 in top-up taxes, and J2 collects 30, both from their respective QDMTTs.

147. **In the Example (2), the UPE jurisdiction, J1, and J2 are implementing the IIR, the UTPR, and a QDMTT with 100% probability, but jurisdiction JN is not implementing.** JN could be an Inclusive Framework member without a CIT system, or a non-member jurisdiction. In this example the UPE jurisdiction as well as J1 and J2 collect all top-up tax on all low-taxed profit created from all domestic MNE affiliates via QDMTTs. In addition, the UPE jurisdiction collects all top-up tax created from affiliates in jurisdiction JN via the IIR, since JN is not implementing a QDMTT. As a result, the UPE jurisdictions collects 500 in top-up taxes via its QDMTT and another 40 from the IIR, resulting in a total revenue gain of 540. J1 and J2 collect 100 and 30 via QDMTTs.

148. **Finally, in Example (3), the UPE jurisdiction, J1, and J2 all implement the IIR, the UTPR, and a QDMTT with a probability of 70%, while JN is again not implementing.** The probability is modelled in terms of shares of top-up tax collection. In the third example shown in Figure C.4, this means that the UPE jurisdiction, J1, and J2 collect 70% of the top-up tax generated by domestic MNE affiliates via QDMTTs. Top-up tax collected under the QDMMT therefore equals:

$$500 * 70\% = 350 \text{ for the UPE jurisdiction,}$$

$$100 * 70\% = 70 \text{ for J1, and}$$

$$30 * 70\% = 21 \text{ for J2.}$$

Following the rule order, the IIR applies next meaning that the UPE jurisdiction collects 70% of all top-up tax remaining in the affiliate jurisdictions. In J1 and J2 this remaining profit is equal to 30% of all profit; in JN this is all profit generated in that jurisdiction since no QDMTT is implemented. Total to-up tax collected by the UPE jurisdiction under the IIR is then calculated as follows:

$$(100 * 30\% * 70\%) + (30 * 30\% * 70\%) + (40 * 70\%) = 55.3$$

Lastly, all remaining top-up tax is collected under the UTPR. Total top-up tax collected under the UTPR equals:

$$(500 * 30\%) + (100 * 30\% * 30\%) + (30 * 30\% * 30\%) + (40 * 30\%) = 173.7$$

The exact distribution of this remaining top-up tax that is collected under the UTPR depends on the exact distribution of substance (tangible assets and employees) across all implementing jurisdictions.

Table C.3 and Table C.4 present additional results on the impact of profit shifting assumptions and test for the impact of alternative implementation assumptions on revenues.

Table C.3. Effect of the profit shifting reductions, by income group

Income group	Elasticity Model	Tax Rate Differential	Tax base change in % of pre-GMT tax base	Revenue gain in % of CIT revenue
Global	ps0	ETR	N/A	2.4
Global	ps1	ETR	N/A	2.7
Global	ps2	ETR	N/A	2.6
Global	ps0	STR	N/A	2.4
Global	ps1	STR	N/A	2.6
Global	ps2	STR	N/A	2.4
High income	ps0	ETR	7.2	3.8
High income	ps1	ETR	9.7	5.1
High income	ps2	ETR	9.7	5.1
High income	ps0	STR	5.9	3.6
High income	ps1	STR	7.7	4.8
High income	ps2	STR	7.2	4.3
Investment Hub	ps0	ETR	-31.1	-12.7
Investment Hub	ps1	ETR	-34.6	-14.3
Investment Hub	ps2	ETR	-34.0	-14.2
Investment Hub	ps0	STR	-25.2	-9.9
Investment Hub	ps1	STR	-28.3	-11.3
Investment Hub	ps2	STR	-26.4	-10.8
Low income	ps0	ETR	10.3	3.1
Low income	ps1	ETR	6.6	2.0
Low income	ps2	ETR	5.8	1.7
Low income	ps0	STR	8.7	3.1
Low income	ps1	STR	5.8	2.1
Low income	ps2	STR	4.6	1.6
Lower middle income	ps0	ETR	16.1	4.2
Lower middle income	ps1	ETR	10.3	2.8
Lower middle income	ps2	ETR	8.3	2.1
Lower middle income	ps0	STR	13.5	4.1
Lower middle income	ps1	STR	8.9	2.7
Lower middle income	ps2	STR	7.3	2.1
Upper middle income	ps0	ETR	4.7	1.9
Upper middle income	ps1	ETR	3.7	1.6

Income group	Elasticity Model	Tax Rate Differential	Tax base change in % of pre-GMT tax base	Revenue gain in % of CIT revenue
Upper middle income	ps2	ETR	3.6	1.5
Upper middle income	ps0	STR	3.7	1.8
Upper middle income	ps1	STR	3.3	1.6
Upper middle income	ps2	STR	3.1	1.5

Note: Estimated tax base change and revenue effects of the reduction in profit shifting due to the Global Minimum Tax, by income group and globally. Values shown are weighted averages by income group and averages across the years 2017 -2020. The column `Tax rate differential' shows whether tax rate differentials are computed using the statutory tax rate (STR) or effective tax rates (ETR) for non-hub jurisdictions. For investment hubs, the ETR is always used. The column 'Elasticity model' displays which shapes of the profit shifting function is considered from OECD (2020[15]). `Ps0' assumes that profit shifting is proportional to tax rate differentials; `Ps1' assumes that profit shifting is non-linear and exists in low income and lower middle income countries also at low tax rate differentials. `Ps2' assumes that profit shifting is non-linear but the intensity of profit shifting tends to decline when tax rate differentials are sufficiently high. See Section 5and Annex C for details on the profit shifting methodology.

Table C.4. Revenue effect of the GMT, by income group

			Year-one SBIE				Year-ten SBIE			
			Partial imp., 70%	Partial imp., 85%	Partial imp., 100%	Global imp.	Partial imp., 70%	Partial imp., 85%	Partial imp., 100%	Global imp.
Income group	Elasticity Model	Tax Rate Diff.	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT
Global	ps0	ETR	7.4	7.4	7.4	7.4	8.4	8.4	8.4	8.4
Global	ps1	ETR	7.6	7.6	7.6	7.6	8.6	8.6	8.6	8.6
Global	ps2	ETR	7.5	7.5	7.5	7.5	8.5	8.5	8.5	8.5
Global	ps0	STR	7.6	7.6	7.6	7.6	8.6	8.6	8.6	8.6
Global	ps1	STR	7.8	7.8	7.8	7.8	8.8	8.8	8.8	8.8
Global	ps2	STR	7.6	7.6	7.6	7.6	8.6	8.6	8.6	8.6
High income	ps0	ETR	7.6	7.4	7.1	6.4	8.5	8.2	7.9	7.2
High income	ps1	ETR	8.8	8.6	8.3	7.8	9.7	9.5	9.2	8.6
High income	ps2	ETR	8.8	8.6	8.3	7.8	9.7	9.5	9.2	8.6
High income	ps0	STR	7.7	7.4	7.0	6.2	8.5	8.3	7.9	7.0
High income	ps1	STR	8.7	8.4	8.1	7.4	9.5	9.3	9.0	8.2
High income	ps2	STR	8.3	8.1	7.8	6.9	9.2	9.0	8.6	7.7
Investment Hub	ps0	ETR	22.3	25.3	28.2	36.5	26.6	29.4	32.2	40.9
Investment Hub	ps1	ETR	18.8	21.4	23.9	30.8	23.0	25.6	27.9	35.1
Investment Hub	ps2	ETR	19.2	21.8	24.4	31.6	23.5	26.0	28.4	36.0
Investment Hub	ps0	STR	28.0	31.4	34.8	45.3	32.3	35.6	38.9	49.6
Investment Hub	ps1	STR	25.0	28.2	31.3	40.5	29.3	32.4	35.3	44.9
Investment Hub	ps2	STR	26.4	29.7	33.0	43.3	30.7	33.9	37.0	47.7
Low income	ps0	ETR	4.1	3.7	3.3	5.3	4.4	3.8	3.4	5.4
Low income	ps1	ETR	3.1	2.7	2.3	4.2	3.3	2.8	2.3	4.3
Low income	ps2	ETR	2.7	2.3	2.0	3.9	3.0	2.4	2.0	4.0
Low income	ps0	STR	4.1	3.7	3.3	5.3	4.4	3.8	3.3	5.4
Low income	ps1	STR	3.1	2.7	2.3	4.3	3.3	2.8	2.3	4.3
Low income	ps2	STR	2.7	2.2	1.9	3.8	2.9	2.4	1.9	3.9
Lower middle income	ps0	ETR	6.6	6.2	6.0	6.5	7.1	6.6	6.3	6.9
Lower middle income	ps1	ETR	5.1	4.8	4.5	5.0	5.6	5.2	4.8	5.4
Lower middle income	ps2	ETR	4.4	4.1	3.8	4.2	4.9	4.4	4.1	4.7
Lower middle income	ps0	STR	6.6	6.1	5.9	6.4	7.1	6.5	6.2	6.7
Lower middle income	ps1	STR	5.1	4.7	4.4	4.9	5.6	5.1	4.8	5.3

			Year-one SBIE				Year-ten SBIE			
			Partial imp., 70%	Partial imp., 85%	Partial imp., 100%	Global imp.	Partial imp., 70%	Partial imp., 85%	Partial imp., 100%	Global imp.
Income group	Elasticity Model	Tax Rate Diff.	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT	% of CIT
Lower middle income	ps2	STR	4.5	4.1	3.8	4.2	5.0	4.5	4.1	4.6
Upper middle income	ps0	ETR	5.6	5.7	5.8	5.6	6.5	6.6	6.8	6.6
Upper middle income	ps1	ETR	5.2	5.3	5.4	5.2	6.1	6.2	6.4	6.1
Upper middle income	ps2	ETR	5.1	5.2	5.3	5.0	6.0	6.1	6.3	6.1
Upper middle income	ps0	STR	5.5	5.6	5.6	5.4	6.4	6.5	6.7	6.4
Upper middle income	ps1	STR	5.3	5.3	5.4	5.2	6.2	6.3	6.4	6.2
Upper middle income	ps2	STR	5.2	5.3	5.4	5.1	6.1	6.2	6.3	6.0

Note: Estimated revenue effects of the Global Minimum Tax by income group and globally as a percentage of CIT revenue. Results are shown separately for the year-one SBIE (8% of tangible assets and 10% of payroll) and the year-ten SBIE (5% of tangible assets and 5% of payroll. Values shown are weighted averages by income group and averages across the years 2017 -2020. The column `Tax rate differential' shows whether tax rate differentials are computed using the statutory tax rate (STR) or effective tax rates (ETR) for non-hub jurisdictions. For investment hubs, the ETR is always used. The column 'Elasticity model' displays which shapes of the profit shifting function is considered from OECD (2020[15]). `Ps0' assumes that profit shifting is proportional to tax rate differentials; `Ps1' assumes that profit shifting is non-linear and exists in low income and lower middle income countries also at low tax rate differentials. `Ps2' assumes that profit shifting is non-linear but the intensity of profit shifting tends to decline when tax rate differentials are sufficiently high. See Section 5and Annex C for details on the profit shifting methodology.

Annex D. GMT calculation

149. **This annex shows that under certain circumstances top-up taxes calculated on profits adjusted for losses yield equivalent results as the calculation based on the GloBE ETR.** The estimation of the impact of the GMT on the taxation of low-taxed profit in Section 6relies on ETRs based on profits that were adjusted for losses. In contrast, the calculation of top-up taxes is based on the difference between the 15% minimum tax rate and the estimated GloBE ETR. This GloBE ETR adjusts for losses by an adjustment to the numerator instead of adjusting profits which enter in the denominator (see Section 3.2). This annex presents the computation of both ETRs and shows that under certain conditions both calculations yield equivalent top-up tax results.

150. **The GloBE ETR and the ETR based on loss-adjusted profits calculated in this paper differ in the treatment of losses**. Equation D.1 shows the calculation of the ETR on loss-adjusted profits which is computed by dividing taxes accrued by profits which are adjusted by an estimate of carry-over losses (Hugger, González Cabral and O'Reilly, 2023[22]). The GloBE ETR is also adjusted to take for prior-period losses into account. For this, as for other temporary differences, the GloBE Rules rely on deferred tax accounting principles. The reversal of the deferred tax asset (DTA) is added to the numerator in the calculation of the GloBE ETR when losses are used and such deferred tax asset revert. That DTA and its reversal are taken into account at the maximum rate of 15%.[56] Equation D.2 shows the GloBE ETR calculation. The GloBE ETR is computed by dividing adjusted covered taxes by GloBE Income. Under the assumption that the CIT base in all jurisdictions matches the GMT base, GloBE Income is just equal to profit (without any adjustments for losses that arose in prior fiscal years). Adjusted covered taxes equal taxes paid plus an adjustment for prior-period losses valued at the minimum rate. The sole difference between the GloBE ETR and ETR on net profits is therefore the way losses enter the calculation.

$$ETR = \frac{Taxes\ paid}{Profit - Loss} \tag{D.1}$$

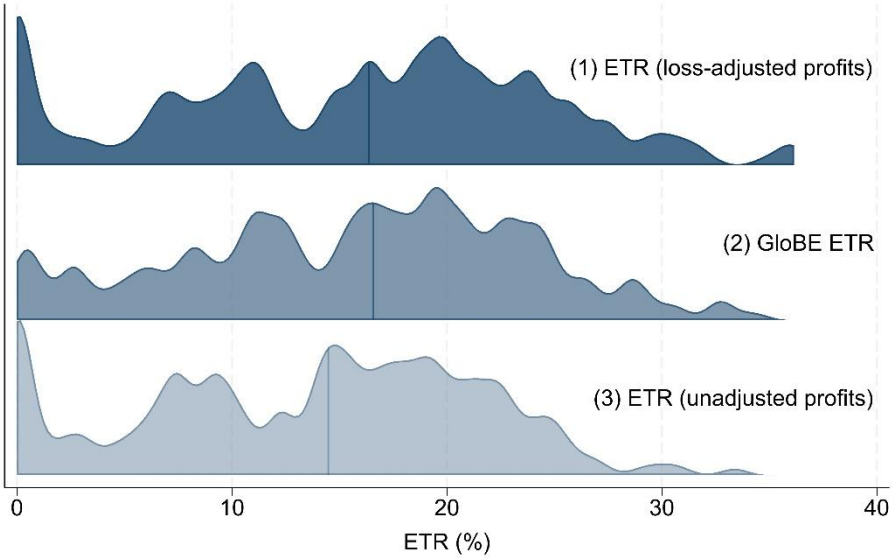
$$GloBE\ ETR = \frac{Adjusted\ covered\ taxes}{GloBE\ Income} = \frac{Taxes\ paid + 15\% * Loss}{Profit} \tag{D.2}$$

151. **The distribution of the resulting ETR on loss-adjusted profits and the GloBE ETR are different across jurisdictions**. Figure D.1 illustrates the distribution of the two ETRs calculated at the jurisdiction level in Panels (1) and (2). Both distributions have the same very similar medians of (16.4% for the loss-adjusted ETR and 16.6% for the GloBE ETR) but differ particularly in their upper and lower tails. At the bottom of the distribution, the inclusion of an amount accounting for losses at 15% in the calculation of the GloBE ETR leads to higher ETRs, while these losses have little impact on the ETR on loss-adjusted profits. The opposite effect occurs at the top of the distribution. In the calculation of the GloBE ETR, the reversal of the DTA is valued at the minimum rate, and thus at a lower rate than in the calculation of the

[56] This mechanism ensures that firms get credit for the GloBE losses. The DTA for GloBE purposes is recast at the minimum tax rate of 15%, both when it is created and when it reverses, when the rate in the jurisdiction is above the minimum rate. MNEs may also opt for the GloBE loss election mechanism by which they can create a DTA for losses for GloBE purposes but would forgo the adjustments recorded under deferred tax accounting (if any). For the purpose of Equation D.2, the mechanisms are the same.

ETR on loss-adjusted profits. As a result, the GloBE ETR has slightly less dispersed distribution than the ETR on loss-adjusted profits.

Figure D.1. Distributions of alternative effective tax rates



Note: Distributions of jurisdictional ETRs in %. Panel (1) shows the distribution of ETRs on net profits, Panel (2) shows the distribution of GloBE ETRs, and Panel (3) shows the distribution of ETRs when losses are not taken into account. Values shown are averages across the years 2017-2020. The vertical lines indicate the medians of the respective distributions.

152. Top-up taxes calculated using GMT concepts yield equivalent results to using the ETR on loss-adjusted profits under certain assumptions. Assuming that the GloBE tax base is equivalent to the positive profits in a jurisdiction means that GloBE Income equals profits before the loss adjustment, and taxes paid are equal to covered taxes. As Equations D.3 and D.4 show, the calculation of top-up tax using the ETR on loss-adjusted profits and the GloBE ETR yield the same result under these assumptions.

$$\begin{aligned} \boldsymbol{Top-up\ tax_{GMT}} &= (\mathbf{15\%} - \boldsymbol{ETR_{GMT}}) * \boldsymbol{GloBE\ Income} = \\ &= \left(\mathbf{15\%} - \frac{\boldsymbol{Taxes\ Paid} + \mathbf{15\%} * \boldsymbol{Loss}}{\boldsymbol{GloBE\ Income}}\right) * \boldsymbol{GloBE\ Income} = \\ &= \mathbf{15\%} * \boldsymbol{GloBE\ Income} - \boldsymbol{Taxes\ Paid} - \mathbf{15\%} * \boldsymbol{Loss} \end{aligned} \tag{D.3}$$

$$\begin{aligned} \boldsymbol{Top-up\ tax_{Netprofits}} &= \left(\mathbf{15\%} - \boldsymbol{ETR_{netprofits}}\right) * \boldsymbol{Net\ Income} = \\ &= \left(\mathbf{15\%} - \frac{\boldsymbol{Taxes\ Paid}}{\boldsymbol{Income - Loss}}\right)(\boldsymbol{Income - Loss}) = \\ &= \mathbf{15\%} * \boldsymbol{Income} - \boldsymbol{Taxes\ Paid} - \mathbf{15\%} * \boldsymbol{Loss} \end{aligned} \tag{D.4}$$

Annex E. Definition of jurisdiction groups

153. **Jurisdictions are classified into different groups to facilitate the presentation of results.** In some cases, groups are also used in the imputation of missing data. Jurisdictions are grouped based on their GNI per capita (income groups) and average effective tax rates (ETR groups). The classification of income groups is based on the World Bank classification of 2019. Investment hubs are generally defined as jurisdictions with a total inward FDI position above 150% of GDP on average across 2017-2020. The FDI information used primarily comes from the OECD International Direct Investment Statistics database and the IMF Coordinated Direct Investment Survey (CDIS) database, complemented with extrapolations as described in OECD (2020[15]). Three manual changes are made to the resulting list of investment hubs: Mozambique and Mongolia are removed from the list since their high FDI ratios are primarily driven by natural resource investment. Puerto Rico is added to the list of investment hubs since their FDI ratio does not adequately reflect US investment. Jurisdictions are assigned to ETR groups based on their mean average effective tax rate in the period 2017-2020. Details of the ETR groups are not provided for confidentiality reasons. All groupings are kept stable over the sample period of 2017-2020 to avoid changing group compositions affecting the results.

Table E.1. Income groups

High income	Upper middle income	Lower middle income	Low income	Investment hub
Andorra	Albania	Algeria	Afghanistan	Anguilla
Antigua and Barbuda	American Samoa	Angola	Burkina Faso	Bahamas
Aruba	Argentina	Bangladesh	Burundi	Bailiwick of Guernsey
Australia	Armenia	Benin	Central African Republic	Barbados
Austria	Azerbaijan	Bhutan	Chad	Bermuda
Bahrain	Belarus	Bolivia	Democratic People's Republic of Korea	British Virgin Islands
Belgium	Belize	Cabo Verde	Democratic Republic of the Congo	Cayman Islands
Bonaire	Bosnia and Herzegovina	Cambodia	Eritrea	Curaçao
Brunei Darussalam	Botswana	Cameroon	Ethiopia	Cyprus
Canada	Brazil	Comoros	Gambia	Gibraltar
Chile	Bulgaria	Congo	Guinea	Hong Kong (China)
Chinese Taipei	China (People's Republic of)	Côte d'Ivoire	Guinea-Bissau	Hungary
Cook Islands	Colombia	Djibouti	Haiti	Ireland
Croatia	Costa Rica	Egypt	Madagascar	Isle of Man
Czechia	Cuba	El Salvador	Malawi	Jersey
Denmark	Dominica	Eswatini	Mali	Liberia
Estonia	Dominican Republic	Ghana	Mozambique	Luxembourg
Faroe Islands	Ecuador	Honduras	Niger	Malta
Finland	Equatorial Guinea	India	Rwanda	Marshall Islands
France	Fiji	Kenya	Sierra Leone	Mauritius
French Polynesia	Gabon	Kiribati	Somalia	Netherlands
Germany	Georgia	Kyrgyzstan	South Sudan	Puerto Rico

High income	Upper middle income	Lower middle income	Low income	Investment hub
Greece	Grenada	Lao People's Democratic Republic	Sudan	Singapore
Greenland	Guatemala	Lesotho	Syrian Arab Republic	Switzerland
Guam	Guyana	Mauritania	Tajikistan	
Iceland	Indonesia	Micronesia	Togo	
Israel	Iran	Moldova	Uganda	
Italy	Iraq	Mongolia	Yemen	
Japan	Jamaica	Morocco		
Korea	Jordan	Myanmar		
Kuwait	Kazakhstan	Nepal		
Latvia	Kosovo*[57]	Nicaragua		
Liechtenstein	Lebanon	Nigeria		
Lithuania	Libya	Pakistan		
Macau (China)	Malaysia	Palestinian Authority		
Monaco	Maldives	Papua New Guinea		
Montserrat	Mexico	Philippines		
Nauru	Montenegro	Sao Tome and Principe		
New Caledonia	Namibia	Senegal		
New Zealand	North Macedonia	Solomon Islands		
Northern Mariana Islands	Paraguay	Sri Lanka		
Norway	Peru	Tanzania		
Oman	Russia	Timor-Leste		
Palau	Saint Lucia	Tunisia		
Panama	Saint Vincent and the Grenadines	Ukraine		
Poland	Samoa	Uzbekistan		
Portugal	Serbia	Vanuatu		
Qatar	South Africa	Viet Nam		
Romania	Suriname	Zambia		
Saint Kitts and Nevis	Thailand	Zimbabwe		
San Marino	Tonga			
Saudi Arabia	Turkmenistan			
Seychelles	Tuvalu			
Sint Maarten	Türkiye			
Slovakia	Venezuela			
Slovenia				
Spain				
Sweden				
Trinidad and Tobago				
Turks and Caicos Islands				
United Arab Emirates				
United Kingdom				
United States				
United States Virgin Islands				
Uruguay				

[57] This designation is without prejudice to positions on status and is in line with United Nations Security Council Resolution 1244/99 and the Advisory Opinion of the International Court of Justice on Kosovo's declaration of independence.