COLLECTING THE TAX DEFICIT OF MULTINATIONAL COMPANIES: SIMULATIONS FOR THE EUROPEAN UNION

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Executive Summary

(Revised version: July 2021)

This study estimates how much tax revenue the European Union could collect by imposing a minimum tax on the profits of multinational companies. We compute the tax deficit of multinational firms, defined as the difference between what multinationals currently pay in taxes, and what they would pay if they were subject to a minimum tax rate in each country. We then consider three ways for EU countries to collect this tax deficit.

First, we simulate an international agreement on a minimum tax of the type currently discussed by the OECD, favored by a number of European Union countries, and by the United States. In this scenario, each EU country would collect the tax deficit of its own multinationals. For instance, if the internationally agreed minimum tax rate is 25% and a German company has an effective tax rate of 10% on the profits it records in Singapore, then Germany would impose an additional tax of 15% on these profits to arrive at an effective rate of 25%. More generally, Germany would collect extra taxes so that its multinationals pay at least 25% in taxes on the profits they book in each country. Other nations would proceed similarly. We find that such **a 25% minimum tax would increase corporate income tax revenues in the European Union by about €170 billion in 2021**. This sum represents more than 50% of the amount of corporate tax revenue currently collected in the European Union and 12% of total EU health spending. The revenue potential of a coordinated minimum tax is thus large. However, revenues significantly depend on the commonly agreed minimum tax rate. With a 21% minimum rate, the European Union would collect about €100 billion in 2021. **Moving from 21% to 15% would reduce the potential revenue by a factor of two to about €50 billion.**

Second, we simulate an incomplete international agreement in which only EU countries apply a minimum tax, while non-EU countries do not change their tax policies. In this scenario, each EU country would collect the tax deficit of its own

multinationals (as in our first scenario), plus a portion of the tax deficit of multinationals incorporated outside of the European Union, based on the destination of sales. For instance, if a British company makes 20% of its sales in Germany, then Germany would collect 20% of the tax deficit of this company. We find that that in such a scenario, using a rate of 25% to compute the tax deficit of each multinational, **the European Union would increase its corporate tax revenues about €200 billion.** Out of this total, €170 billion would come from collecting the tax deficit of EU multinationals; an additional €30 billion would come from collecting a portion of the tax deficit of non-EU multinationals. For the European Union, there is thus a much higher revenue potential from increasing taxes on EU companies than from taxing non-EU companies. To improve the fairness of its tax system and generate new government revenues (e.g., to pay for the cost of Covid-19), **it is essential that the European Union polices its own multinationals**.

Last, we estimate **how much revenue each EU country could collect unilaterally**, assuming all other countries keep their current tax policy unchanged. This corresponds to a "first-mover" scenario, in which one country alone decides to collect the tax deficit of multinational companies. This first mover would collect the full tax deficit of its own multinationals, plus a portion (proportional to the destination of sales) of the tax deficit of all foreign multinationals, based on a reference rate of 25%. We find that **a first mover in the European Union would increase its corporate tax revenues by close to 70% relative to its current corporate tax collection**. Although international coordination is always preferable, a unilateral move of a single EU member state (or a group of member states) would encourage other EU countries to also collect the tax deficit of multinationals—as not doing so would mean leaving tax revenues on the table for the first movers to grab. This could pave the way for an ambitious agreement on a high minimum tax, within the European Union and then globally. This analysis shows that unilateral action can play a transformative role and that **refusing international coordination is not a sustainable solution,** since other countries can always choose to collect the taxes that tax havens choose not to collect.

Our estimates are based on a transparent methodology that combines newly available macroeconomic data on the location and effective tax rates of multinational profits.

We illustrate and validate our approach by applying it to firm-level data publicly disclosed by all European banks and 16 large non-bank multinationals. We find that **European banks would have to pay 41% more in taxes if they were subject to a 25% country-by-country minimum tax.** This estimate is in line with our finding that EU multinationals as a whole (all sectors combined) would have to pay around 50% more in taxes, thus suggesting that this number is indeed the correct order of magnitude. Companies such as Shell, Iberdrola, and Allianz—who voluntarily disclose their country-by-country profits and taxes—would also have to pay 35%-50% more in taxes if they were subject to a 25% minimum tax.

This report is supplemented by a pioneering interactive website, https://tax-deficit-simulator.herokuapp.com. This new tool allows policy makers, journalists, members of civil society, and all citizens in each EU country to assess the revenue potential from minimum taxation on both domestic and foreign firms. Users can select various scenarios (e.g., international coordination or unilateral action), and a full range of minimum tax rates from 10% to 50%. All the data and computer code are available online, making our estimates fully reproducible. We plan to regularly update our findings, as improved and more comprehensive macroeconomic data sources become available, refined estimation techniques are designed, and more companies publicly disclose their country-by-country reports.

1 Introduction

Globalization has opened new ways for corporations to reduce their tax bills. As countries compete to attract investments by reducing corporate taxes, firms can move activity to low-tax places. Moreover, multinational companies can book earnings in places where they employ few workers and own little capital, by shifting paper profits to tax havens. International capital mobility and profit shifting have led to a large decline in the taxes effectively paid by multinationals globally. This evolution—which allows some of the biggest winners of globalization to pay less and less in tax—is unlikely to be sustainable, neither politically nor economically.

While there is a view that tax competition and tax avoidance are laws of nature, the reality is different. Nothing inherent in globalization prevents governments from taxing corporate profits at high rates if they so wish. Instead of competition, governments can choose coordination. Instead of letting companies book earnings in tax havens, governments can choose to tax offshore profits. These ideas have gained momentum in recent years. Since 2019 and under the auspices of the Organization for Economic Cooperation and Development (OECD), many countries have been considering an agreement on a minimum corporate tax rate for multinational profits. In the Spring of 2021, the U.S. government announced that it was favorable to a high global minimum tax.

In this report, we estimate how much tax revenue the European Union could collect by imposing a minimum tax on the profits of multinational companies. We find that the revenue potential from minimum taxation is large. With a minimum tax at a rate of 25% applied to the profits of EU multinationals, the European Union would increase its current corporate tax revenues by about 50 percent in 2021—from the €340 billion projected to be collected in 2021 under current law to about €510 billion (i.e., an increase of €170 billion). This would represent an increase in tax revenue of about 1.2% of GDP, bringing total EU corporate tax receipts from 2.4% of the European Union's GDP to 3.6%. To generate new revenues in a fair and sustainable manner, a 25% minimum tax is thus a powerful—yet realistic—instrument.

Our estimates are based on a transparent methodology that combines newly available macroeconomic data on the location and effective tax rates of multinational profits. Until recently, it was difficult to score the revenues from a minimum tax due to the lack of publicly available information on the profits booked by corporations in tax havens. This has started to change in recent years with the publication of two new macroeconomic datasets: foreign affiliates statistics (published by Eurostat in the European Union),[1] and tabulations of the country-by-country reports of multinational firms (published by the OECD).[2] These new data allow us to better know the location of multinational profits (in particular, how much are booked in tax havens globally) and to estimate the effective tax rates to which these profits are subject. We illustrate and validate our methodology by applying it to a new dataset of firm-level data we assembled covering all the public country-by-country reports of European multinationals (all large European banks, two smaller ones, plus 16 non-bank multinationals).

The starting point of our analysis is the notion of "tax deficit." The tax deficit is the difference between what a company currently pays in taxes and what it would have to pay if it was subject to a minimum tax rate in each country where it operates. As the definition makes clear, the tax deficit depends on a reference minimum tax rate. In our main results, we consider a reference minimum tax rate of 25%, a relatively modest tax rate in an international and especially historical perspective.[3] From there, we compute the revenues of a minimum tax in three scenarios: a full coordination scenario, an imperfect coordination scenario, and a unilateral scenario.

In the full coordination scenario, each country would collect the tax deficit of its own multinationals. For instance, if a German multinational company has an effective tax rate of 10% on the profits it records in Singapore, then Germany would impose an additional tax of 15% on these profits to arrive at an effective rate of 25%. More generally, Germany would collect extra taxes so that its multinationals pay at least 25%

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[1] See Tørsløv et al. (2018) for an analysis of these data.
[2] See OECD (2020) for simulations of a minimum tax using these country-by-country tabulations.
[3] Between 1985 and 2020, the global average statutory corporate tax rate fell from 49 percent to 23 percent.

in taxes on the profits they book in each country. Other nations would proceed similarly. We find that such a 25% minimum tax would increase corporate income tax revenues in the European Union by about €170 billion in 2021, an increase of about 50% relative to current tax collections.

In the imperfect coordination scenario, only EU countries apply a 25% minimum tax, while non-EU countries do not change their tax policies. In this scenario, each EU country would collect the tax deficit of its own multinationals (as in our first scenario), plus a portion of the tax deficit of multinationals incorporated outside of the European Union, based on the destination of sales. For instance, if a British company makes 20% of its sales in Germany, then Germany would collect 20% of the tax deficit of this company (in addition to collecting the full tax deficit of German multinationals). In this scenario, the European Union would increase its corporate tax revenues by about €200 billion per year. Out of this total, €170 billion would come from collecting the tax deficit of EU multinationals; an additional €30 billion would come from collecting a portion of the tax deficit of non-EU multinationals.

Last, in the unilateral scenario, a single country acts as a "first mover" and decides to collect the tax deficit of multinational companies. Specifically, this first mover would collect the full tax deficit of its own multinationals, plus a portion (based on the destination of sales) of the tax deficit of all foreign multinationals—always using a 25% minimum tax rate as a reference for the computation of each firm's tax deficit. We find that a first mover in the European Union would increase its corporate tax revenues by close to 70% relative to its current corporate tax collection.

For each scenario we also simulate how revenues would change if the reference minimum tax rate was lower or higher than 25%. A scenario of full international coordination on a low minimum rate of 15% would generate only €50 billion in the European Union, around a quarter of what could be achieve with a 25% minimum tax rate.

We illustrate and validate our methodology based on macroeconomic data by applying it to microeconomic data, namely the country-by-country reports disclosed by all large

European banks and 16 large non-bank multinationals. We find that European banks would have to pay 41% more in taxes if they were subject to a 25% country-by-country minimum tax. This estimate is in line with our finding that EU multinationals as a whole (all sectors combined) would have to pay around 50% more in taxes, thus suggesting that this number is indeed the correct order of magnitude. Companies such as Shell, Iberdrola, and Allianz—who voluntarily disclose their country-by-country profits and taxes—would also have to pay 35%-50% more in taxes if they were subject to a 25% minimum tax.

Beyond these quantitative findings, our analysis reveals a number of important insights. First, for the European Union as a whole, there is a much higher revenue potential from increasing taxes on EU companies than from taxing non-EU companies. If it wants to generate significant resources, for instance to pay for the cost of the Covid-19 pandemic, it is thus essential that the European Union polices its own multinationals.

To be sure, the European Union could collect additional tax revenues from American (and more broadly extra-European) multinationals, a number of which have a large tax deficit. But because non-EU multinationals generally make the majority of their sales outside of the European Union, the revenue potential of collecting a fraction (based on sales) of their tax deficit, although significant, is lower than the revenue potential of collecting 100% of the tax deficit of EU multinationals. Moreover, if other countries started to police their own multinationals (for instance, if the United States applied a high minimum tax to its multinationals), then the tax deficit of non-EU companies would fall, further reducing what could be collected by the European Union.

Second, our analysis illustrates that although international coordination is always preferable, a unilateral move of a single EU member state (or a group of member states) could play a transformative role. A first mover willing to apply a high minimum tax would de facto collect some of the revenue that other countries (including other EU member states) choose not to collect. This would encourage other EU countries to start increasing the tax rate applied to their own multinationals, as not doing so would mean leaving tax revenues on the table for the first movers to grab. Thus, unilateral

adoption by an EU member state (or a group of states) of an ambitious minimum tax (say of 25% or more) could pave the way for a race to the top with corporate taxation, eventually leading to an agreement on a high minimum tax, within the European Union and then globally.

Third, our analysis suggests that refusing international coordination is not a sustainable position. According to a widely held view, a high global minimum tax is utopian, because a single country can always block such an agreement. This view, however, is incorrect. To be sure, a number of tax havens derive large benefits from offering low tax rates—by attracting activity and a large amount of paper profits—and thus have incentives to refuse joining a global agreement. But this does not stand in the way of an effective international agreement, because other countries can always choose to collect the taxes that tax havens choose not to collect. For example, the United States, Germany, or France can always decide to tax the profits recorded by their multinationals in Ireland at a minimum rate of 25%, thus making the Irish tax rate of 12.5% irrelevant (in the same way as the United States, Germany, or France tax individuals on their worldwide income, including income subject to no or low taxes abroad). This shows that offering low corporate tax rates is a fundamentally unstable development strategy, one that only works as long as other countries chose to accept tax competition—and stops to work as soon as they refuse it.

Our study adds to a body of work that estimates the revenue potential of various international corporate tax reforms. Our work is most closely related to Clausing et al. (2021) who estimate the tax deficit of U.S. multinationals and how much additional revenue could be collected by the United States with a 21% minimum tax (see also Saez and Zucman, 2019, chapter 6). Our study is also closely related to the impact assessment of the OECD (2020) and of the work of Devereux et al. (2020), among other recent estimates of the revenue potential of minimum taxation.

Relative to this body of work, we make a number of contributions. First, at the microeconomic level, we analyze the public country-by-country reports of European firms (banks and non-bank) using a new dataset that we hand-collected. This allows us to compute the tax deficit of each of these firms, thus illustrating and validating our

estimation of the tax deficit of EU multinationals as a whole. Second, at the macroeconomic level, we consider a broader range of rates and scenarios than in earlier work. Crucially, we consider imperfect coordination scenarios in which the European Union (or individual EU member states) would collect a portion of the tax deficit of foreign multinationals, based on apportioning the tax deficit of these foreign firms proportionally to where sales are made.

This report is accompanied by an interactive simulation website, https://tax-deficit-simulator.herokuapp.com. This new tool allows policy makers, journalists, members of civil society, and all citizens in each EU country to assess the revenue potential from minimum taxation on both domestic and foreign firms. Users can select various scenarios (e.g., international coordination or unilateral action), and a full range of minimum tax rates from 10% to 50%. All the data and computer code are available online, making our estimates fully reproducible.

We plan to regularly update our findings, as improved and more comprehensive macroeconomic data sources become available, refined estimation techniques are designed, and more companies publicly disclose their country-by-country reports. Our estimates should be seen as preliminary and subject to revision. We thank readers in advance for their comments and suggestions.

2 Collecting Corporate Tax Deficits: Principles

2.1   Tax Deficit

A key notion used in this work is the notion of tax deficit. The tax deficit is the difference between what a company currently pays in taxes and what it would have to pay if it was subject to a minimum tax rate in each country where it operates. A number of remarks are in order about this definition.

First, the computation of the tax deficit requires us to choose a reference minimum tax rate. In this study, the benchmark minimum rate we consider is 25%—a relatively

modest rate in an international and historical perspective. On our interactive website, users can select minimum tax rates ranging from 10% to 50% and assess how different rates would affect revenues for each EU member state. For a country individually, a natural minimum rate to consider is the statutory corporate tax rate. Other relevant rates include 21%—the minimum tax rate that President Biden, during his campaign, proposed to apply to US multinationals—and 15%—the rate that the U.S. administration in May 2021 viewed as a floor for an international agreement.

The tax deficit captures all the ways in which a firm is able to avoid taxes. To the extent that a multinational company sees its profits taxed at an effective rate of less than 25% in at least one of the countries where it operates, then this company has a tax deficit. This is the case no matter the reason why the effective rate is less than 25%—whether this is because the country has a low statutory rate, because the firm benefits from tax exemptions (e.g., operates in a tax-free zone), because of tax evasion, etc. From that perspective, the tax deficit is the broadest possible measure of tax avoidance.

Tax authorities in each EU country can compute the tax deficit of virtually all the world's multinationals. As a result of the Base Erosion and Profit Shifting process launched by the OECD in 2015, multinational companies must produce country-by-country reports, which disaggregate their global turnover, profits, taxes, and a number of other indicators on a country basis. These reports are generally not public, but they are transmitted to tax authorities. Moreover, there is an international exchange of country-by-country reports between tax authorities, meaning that the report of a company like Apple is available to the German tax authority (and vice versa, the report of a company like Volkswagen is available to the US tax authority). European banks must also publicly disclose their country-by-country reports and a number of non-bank multinationals have also chosen to voluntarily do so.

Having defined the tax deficit of each firm, we consider three ways for EU countries to collect it: a full coordination scenario, an incomplete coordination scenario, and a unilateral "first-mover" scenario.

2.2 Coordinated Minimum Tax

First, we consider an international agreement on a minimum tax of the type currently discussed by the OECD, favored by a number of European Union countries, and by the United States. In this scenario, each EU country would collect the full tax deficit of its own multinationals. For instance, if the minimum tax rate is 25% and a German company has an effective tax rate of 10% on the profits it records in Singapore, then Germany would impose an additional tax of 15% on these profits to arrive at an effective rate of 25%. More generally, Germany would collect extra taxes so that its multinationals pay at least 25% in taxes on the profits they book in each country, thus fully erasing their tax deficit. Other nations would proceed similarly.

A number of points about this scenario must be noted. First, the minimum tax we simulate is collected on a country-by-country basis. This is in contrast to the minimum tax introduced in the United States in 2018 at a rate of 10.5%, known as GILTI (for Global Intangible Low-Tax Income), which applies not to the country-by-country profits of US multinationals but to their foreign profits combined. A country-by-country minimum prevents multinationals from averaging their low-taxed income in tax havens with higher-taxed income in other countries.

Second, in the scenario we consider, all profits are subject to the minimum tax, with no exception or exemption. This, again, is in contrast to the minimum tax introduced in the United States in 2018, which only applies to the foreign earnings of US multinationals in excess of a rate of return of 10 percent on capital. A problem with this exemption is that it exacerbates incentives for firms to move capital to low-tax places, since increased capital investment in tax havens lowers the amount of minimum tax due. Moreover, this kind of carveout can easily destroy a large fraction of the tax revenues that can be generated with a minimum tax (e.g., Clausing et al., 2021).

Third, the minimum tax we consider applies to both foreign and domestic profits. This means that if a company today enjoys a less than 25% effective rate in its home country (due, e.g., to tax breaks such as tax credits), it would be required to pay more

taxes. There is no particular reason for taxing domestic profits less than foreign profits.

Fourth, we assume that the minimum would be based on economic profit as defined and reported in the data we use—country by country reports and foreign affiliates statistics—and not based on taxable profit as defined in the tax law.[4] Economic profit typically differs from taxable profit for a number of reasons: tax depreciation can be more generous than economic depreciation, interest deductions can be limited in the tax law (while all interest is deducted to obtain economic profit), loss carryforwards or carrybacks are often allowed in the tax law (while only current year profit is recorded in the economic base), etc. Applying the minimum tax to economic profit makes it impossible for firms to avoid the minimum tax by exploiting provisions of the tax laws that reduce the tax base.

Fifth, we simulate the revenue effects of a coordinated minimum tax in the short term (one yar). For a medium-run or long-run analysis, a number of behavioral responses would deserve to be modelled. To start with, tax havens would be likely to increase their tax rates. Indeed, with a country-by-country minimum tax, any income booked in tax havens immediately generates an offsetting tax liability in the parent's country. If sufficiently many parent countries applied a substantial minimum tax, tax havens couldn't attract activity or profits anymore by offering low rates. They would thus be encouraged to raise their own tax rates—as not doing so would mean leaving tax revenues on the table for the parent countries to collect.

Because most of the profits booked by EU multinationals in tax havens are booked in EU tax havens today, the fact that tax havens would likely increase their statutory tax rates does not significantly affect total EU tax revenues in the medium or long-run. It simply affects which EU country would get those revenues. Everything else equal there would be, relative to our simulation, more revenues in the current EU havens if those havens increased their tax rates, and less revenues in the current EU high-tax

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[4] Economic profits reported in the country-by-country reports of multinationals are computed following harmonized guidelines produced by the OECD; economic profits reported in foreign affiliates statistics are computed following harmonized guidelines produced by Eurostat.

countries. However, this would be (at least partly) offset by a second type of behavioral response, namely that multinationals would relocate their profits and capital away from today's tax havens and towards today's high-tax countries.

In this report, we do not attempt to model the long-run location of profits and capital if there was a coordinated minimum tax. Instead, we assume that parent countries would collect the minimum tax, which is likely to be accurate in the short-term, and not unreasonable in the medium and long run.

2.3   EU Minimum Tax

In our second scenario, we simulate an incomplete international agreement in which only EU countries apply a minimum tax, while non-EU countries do not change their tax policies. In this scenario, each EU country would collect the tax deficit of its own multinationals (as in the full coordination scenario), plus a portion of the tax deficit of multinationals incorporated outside of the European Union. This portion would be based on the geography of sales to final customers. For instance, if a company incorporated in the United Kingdom makes 20% of its final (i.e., non-intragroup) sales in Germany, then Germany would collect 20% of the tax deficit of this company (if it has any).

Collecting a minimum tax on non-EU multinationals serves two purposes. First, it would level the playing field by ensuring that firms that pay too little in taxes relative to the norm in force in the European Union (i.e., have a tax deficit) pay more in taxes, in proportion to how much they benefit from accessing the EU market—as proxied by the fraction of their global sales made in the European Union. Second, this mechanism would reduce the incentives for EU firms to reincorporate outside of the European Union, which some firms might otherwise be tempted to do to avoid an EU-wide minimum tax. In the extreme case in which a company that does all its sales in the European Union chose to relocate to, say, the United Kingdom, then 100% of its tax deficit would be taxed in the European Union, just as if it was incorporated in the EU. Collecting the tax deficit of non-EU multinationals would thus alleviate tax competition for headquarters.

A few remarks about this scenario are in order. First, EU tax authorities have the information necessary to implement a minimum tax on non-EU multinationals. Thanks to the automatic exchange of country-by-country reports, Germany, for example, has access to the country-by-country reports of British multinationals, which contain a breakdown of their non-intragroup sales. The sales information in these reports can be cross-checked against VAT filings.

Second, although collecting the tax deficit of non-EU multinationals would deserve a detailed legal analysis that falls outside of the scope of this report, such a solution does not evidently violate any international treaty. The minimum tax applied to non-EU multinationals would come in addition to any regular corporate tax owed in the European Union according to existing rules and treaties. Its base would be new—namely, the tax deficit, computed relative to the EU-agreed minimum tax rate, and applied to economic profit as recorded in country-by-country reports. Conceptually, this minimum tax can be thought of as a blend of the OECD "Pillar 1" (relocating part of taxable profits to destination countries) and "Pillar 2" (minimum taxation). It is thus in line with the current evolution of international corporate taxation.

2.4   Unilateral Minimum Tax

In our third scenario, we estimate how much revenue each EU country could collect unilaterally, assuming all other countries keep their current tax policy unchanged. This corresponds to a "first-mover" scenario, in which one country alone decides to collect the tax deficit of multinational companies. This first-mover would collect the full tax deficit of its own multinationals, plus a portion (based on the destination of sales) of the tax deficit of all foreign multinationals, both in and outside of the European Union.

For instance, if this first-mover is Germany, then Germany would collect 100% of the tax deficit of German multinationals, plus a portion of the tax deficit (if there is one) of French, UK, US, etc. multinationals. This portion would be equal to the fraction of the global sales these multinationals make in Germany. As in the case of the tax on non-EU multinationals described in the imperfect coordination scenario above, this tax on

foreign multinationals would come in addition to any corporate income tax owed under existing rules. It would be easy to collect thanks to the availability of country-by-country reports in the tax authorities of each EU member state.

A number of remarks about this scenario are worth noting. First, there is an advantage to being the first mover. The first mover collects taxes not only on its own multinationals, but also on all other multinationals that have a non-zero tax deficit and have access to its market. It thus acts as a de facto "tax collector of last resort," collecting part of the taxes that other countries chose not to collect.

The more countries join the club of the first movers, the less revenue there is to collect by each of these countries. To see this, imagine for instance that Germany is initially the only country collecting a minimum tax. As such, it would collect some of the tax deficit of French multinationals. Now assume that France imitates Germany. France would start collecting 100% of the tax deficit of its own multinationals, plus a portion of the tax deficit of all foreign multinationals. French multinationals wouldn't have any tax deficit anymore. Thus, there would be nothing to collect by Germany on French multinationals anymore.

A unilateral collection of the tax deficit would encourage other countries to proceed similarly. In the preceding example, France would be encouraged to imitate Germany, since not doing so would mean letting Germany collect revenues that France could easily collect itself. Thus a "first-mover" scenario is not an equilibrium scenario. It would likely lead to an equilibrium with a significant number of countries joining the club of first movers, potentially all the way up to an EU-wide or global minimum tax. In our simulations, we do not attempt to simulate the distribution of corporate tax revenues in such an equilibrium—we focus on the revenues collected by the first mover in the short-term, keeping the tax policy of all other countries fixed.

3 Data and Methodology

To conduct our simulations, we rely on two types of macroeconomic statistics: tabulations of country-by-country reports, and foreign affiliates statistics used in Tørsløv, Wier and Zucman (2018). We describe these data in turn and explain how we combined them. We also illustrate and validate our approach using a micro-dataset that we assembled, which includes all the firm-level publicly available country-by-country reports of EU multinationals (all European banks plus 16 non-bank multinationals)

3.1 Macroeconomic data

OECD country-by-country data. The first data source used in this study is the tabulations of multinational corporations' country-by-country reports published by the OECD in July 2020. These tabulations are for the year 2016, the first year that OECD multinationals had to compile and transmit country-by-country reports. Among other indicators, this dataset provides information on the profits booked and taxes paid in the domestic and foreign jurisdictions of multinational corporations headquartered in 27 OECD countries.

The availability of country-by-country data marks an important milestone in the analysis of globalization. These data are currently the only systematic source on the taxes effectively paid by multinational companies in each of the country where they operate (foreign affiliates statistics, discussed below, capture many of the same information as country-by-country reports, such as profits and turnover, but do not systematically include corporate taxes paid). Country-by-country statistics, however, are still in their infancy and suffer from a number of limitations.

First, in 2016 country-by-country reporting was not mandatory in all countries. This led to significant gaps in coverage. While 137 countries participate in the Inclusive Framework of the OECD on Base Erosion and Profit Shifting, only 58 gathered country-by-country data for their own multinationals in 2016. Of these, only 27 nations shared

their results with the OECD, of which 12 are EU member states. Notable gaps include Germany, the United Kingdom and Spain, which did not report any country-by-country statistics. We address this issue by complementing the OECD data with the estimates of the amount of profit booked in tax havens by each parent country of Tørsløv, Wier and Zucman (2018); see below.

Second, in a number of countries that reported data to the OECD, reporting was not mandatory and thus total profits, taxes, and other aggregate statistics are too low. This, most importantly, is the case for the United States (see, e.g., Clausing et al., 2021).[5]

Third, due to insufficiently detailed guidelines in the first years of reporting, some profits are double counted (Horst and Curatolo, 2020). Profits assigned to "stateless entities" (particularly large in the case of US multinationals) are often also counted elsewhere (either under US domestic profits, or in a non-US jurisdiction). We conservatively address this issue by dropping profits in stateless entities entirely. Moreover, intra-company dividend also sometimes led to double counting. When a multinational from country A owns an affiliate in country B that owns an affiliate in country C, dividends paid by C to B are not counted as part of B's revenue, but they are sometimes counted as part of B's profit. There is no way to systematically address this issue at this stage.

Fourth, for cases with only few multinationals having subsidiaries in a foreign jurisdiction, reporting countries aggregated data of foreign jurisdictions to ensure taxpayer confidentiality. For example, the Isle of Man, Jersey and Guernsey can be pooled in the partner jurisdiction "other Europe."

Tørsløv, Wier and Zucman (2018) data. The second data source used in this study is the estimates of the profits booked in tax havens by parent country of Tørsløv, Wier and Zucman (2018). These estimates are obtained by combining foreign affiliates

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[5] This can be seen by comparing the 2016 US country-by-country data to the 2017 data published by the IRS. Between 2017 and 2016, profits booked by US multinationals in Switzerland rise from -$6 billion to $49 billion; profits in Jersey from $0 to $12 billion; profits in Singapore from $29 billion to $55 billion, etc. Profits in non-haven countries also rise, e.g., from $18 billion to $32 billion in Canada.

statistics (from which Tørsløv et al. infer the amount of profits booked in tax havens globally) and direct investment statistics on an ultimate ownership basis (from which Tørsløv et al. infer the countries of the parent companies that book profits in tax havens).[6] The original Tørsløv, Wier and Zucman (2018) data are for the year 2015; an update to 2016 is available at http://missingprofits.world (Tørsløv, Wier and Zucman, 2019). For consistency with the OECD country-by-country data, we use the 2016 estimates of Tørsløv et al.

An advantage of this dataset is that it is more comprehensive that the OECD country-by-country statistics, since it includes multinationals from all countries, while the OECD statistics only cover 27 parent countries. For example, the Tørsløv, Wier and Zucman (2019) database includes estimates of the amount of profits booked by UK, German, and Spanish multinational in tax havens in 2016—information which is unavailable in the OECD country-by-country statistics since these countries did not report country-by-country data in 2016.

One limitation of the Tørsløv et al. database is that it does not identify profits in non-havens at the bilateral level by partner country. For example, the database includes estimates of the profits booked by German multinationals in tax havens, but no estimate of the profits booked by German multinationals in France. Moreover, foreign affiliate statistics generally do not include information on taxes paid (the main exception being the foreign affiliate statistics of the United States), making it difficult to estimate effective corporate tax rates.

The Tørsløv et al. database and OECD country-by-country data are generally consistent. In both datasets about 40% of identified multinational profits (i.e., profits booked by multinationals outside of the country where they are headquartered) are booked in tax havens.[7] Specifically, tax havens in total have $395 billion in profit in the

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[6] In spirit, foreign affiliates statistics contain similar information as country-by-country reports. More precisely, these statistics record (among other indicators) the wages and profits of foreign firms, defined as firms more than 50% owned by foreign shareholders (in practice, affiliates of multinational companies). For EU countries, foreign affiliates statistics are disseminated by Eurostat; the OECD also disseminates foreign affiliate statistics for OECD countries and a number of non-OECD countries. See Tørsløv et al. (2018) for a detailed discussion of these data.

[7] See list of tax havens in Appendix F.

OECD statistics, which is 40% of the amount of allocated multinational profits in these data ($992 billion), a number very close to the one in Tørsløv et al. (2018), 36% in 2016. In absolute terms, there are more profits (both in havens and overall) in the Tørsløv et al. data than in the OECD country-by-country statistics. This is due both to the larger country coverage in Tørsløv et al. (as only 27 country reported country-by-country statistics to the OECD) and the more exhaustive reporting within a number of countries (such as the United States). There are some differences at the individual country level between the Tørsløv et al. data and the OECD country-by-country statistics, due to differences in coverage and estimation methods. We refer to Appendix G of Tørsløv et al. (2018) for detailed comparison and reconciliation between these two data sources.[8]

Methodology to estimate tax deficits. We describe here the main steps of our estimation procedure; complete details, robustness tests, and supplementary results are discussed in Appendices A (full coordination), B (unilateral case) and C (imperfect coordination).

To estimate the tax deficit, three ingredients are required: (i) a reference minimum tax rate, (ii) estimates of profits booked in each pair of parent country A and subsidiary country B, (iii) estimates of effective tax rates in each of these pairs. The reference minimum tax rate we use in our benchmark computations is 25%; we also provide results with rates ranging from 15% to 30%. Given data limitations, we focus on estimating tax deficits for 36 parent countries: all EU countries for which data is available (23 EU countries) plus 13 non-EU countries that report country-by-country statistics to the OECD. To estimate tax deficits of these 36 countries, we combine the OECD and Tørsløv data as follows.

- Profits booked in tax havens by parent companies that report country-by-country data to the OECD: we take the maximum of the tax deficit computed in the OECD data (using the observed effective tax rate in the OECD data) and the tax deficit computed in the Tørsløv et al. data (assuming haven profits were

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taxed at an effective tax rate of 10%, a rate in line with the one observed in country-by-country statistics in 2016). This is motivated by the fact that reporting of country-by-country statistics was not mandatory and incomplete in 2016.

- Profits booked in tax havens by parent companies that do not report country-by-country data: the tax deficit is estimated using the the Tørsløv et al. data, assuming haven profits were taxed at an effective tax rate of 10%.

- Profits booked in non-haven countries by parent companies that report country-by-country data: the tax deficit is estimated using the OECD data (profits and effective tax rates) with no correction.

- Profits booked in non-havens by parent companies that do not report country-by-country data: these tax deficits are imputed based on the ratio of non-haven to haven tax deficits for the countries that report country-by-country data to the OECD; see Appendix A for complete details.

Two remarks are in order. First, foreign affiliates statistics (that underpin the Tørsløv et al. database) and even more so country-by-country statistics are still in their infancy and have known issues. For these reasons, we see our computations as providing orders of magnitude rather than perfectly accurate estimates. We plan to regularly update our findings as improved and more comprehensive macroeconomic data become available, refined estimation techniques are designed, and more companies publicly disclose their country-by-country reports.

In addition, the orders of magnitude we obtain should be seen as conservative lower bounds, due to a number of identified sources of downward bias. First, the effective tax rates we use are based on 2016 data. It is possible that effective tax rates may have declined from 2016 to 2021, leading to higher tax deficit than we report. Second, tabulated data by construction deliver downward-biased estimates of tax deficits, because of heterogeneity in effective tax rates within each country-pair. For example, imagine that half of French multinationals have an effective tax rate of 30% (euro-

weighted) in Italy and the other have an effective tax rate of 20% in that country. The average effective tax rate reported in tabulated statistics for French multinationals in Italy is 25% and thus the estimated tax deficit (relative to a 25% minimum tax rate) is 0. In reality the true tax deficit is positive, since the multinationals with a less than 25% effective tax rate have a tax deficit.[9]

The only way to remove this bias is to use firm-level data to estimate tax deficits. To assess the reliability of our methodology, we therefore applied it to all the micro data available to us, which we now describe.

3.2 Firm-level data

Data. A number of multinationals publicly provide their country-by-country reports, detailing profits and taxes paid on a country-by-country basis. This includes European banks, which must by law disclose this information publicly, and a number of non-bank multinationals in other sectors, which chose to voluntarily do so.

The country-by-country reporting for banks started in 2015 following the Article 89 of the CRD IV Directive 2013/36/EU. Banks with a consolidated turnover above 750 million euros and that operate in the European Union are required to publicly disclose the activity of all their affiliates (subsidiaries and branches) regarding the allocation of their income, profit and taxes. We hand-collected all of these reports for the year 2019 from the banks' annual reports or from a separate report filed by banks under capital requirements or country-by-country reporting. Our sample includes 38 European banks, most of which large systemic banks except for two smaller banks.[10]

In addition, a number of non-bank multinationals voluntarily publish country-by-country reports of their profits and tax payments. We collect data for 16 multinationals for the

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[9] Another potential source of bias with tabulated data comes from loss-making companies, which tend to bias effective tax rates upward. We address this issue by computing effective tax rates for profit-making companies only (which is possible in the OECD data).

[10] AIB group (Ireland) and Belfius (Belgium). For the full list if banks see Appendix D.

year 2019 from various sectors (oil, mining, telecommunication, insurance, financial services, etc.). In 8 cases (BP, Eni, Repsol, Rio Tinto, Shell, Iberdrola, Telefonica, Anglo-American), the report published is the same as the on submitted to tax authorities. In the other cases, it's a simplified version.

An illustrative example. We illustrate the principle of collecting the tax deficit of multinationals using the example of Shell, an oil company incorporated in the Netherlands.

In 2019, according to its public country-by-country report, Shell reported $2.3 billion in profit in Singapore, where it paid $50 million in tax, an effective tax rate of 2%. Relative to a reference minimum tax rate of 25%, Shell thus had a tax deficit of 23 points (25 minus 2) in Singapore. Collecting this tax deficit would have generated 0.23 x $2.3 billion = $530 million in tax revenue in the Netherlands. Other countries where Shell had a large tax deficit included Bermuda, Canada, Switzerland, and the United Arab Emirates.

Shell also reported $1 billion in profit in Malaysia, where it paid $415 million in tax—an effective tax rate of 41.5%, well in excess of 25%. Thus, Shell did not have a tax deficit in Malaysia. Other countries where Shell paid a significant amount of tax and had a high effective tax rate included Kazakhstan, Nigeria, Norway, and Oman

Overall, if Shell had been subject to a minimum tax rate of 25% in each country where it operates, it would have paid $2.4 billion more in taxes, an increase of 36.5%% relative to the taxes it paid globally in 2019.

4   Results

4.1   Macroeconomic Results: Full Cooperation Case

We start by presenting the revenue effects of our first scenario: an international agreement on a minimum tax of the type currently discussed by the OECD, favored by a number of European Union countries, and by the United States. In this scenario, each

parent country would collect taxes on its multinationals to ensure that they pay at least 25% in each of the country where they operate.

Table 1 shows the projected increase in corporate income tax revenues in 23 EU countries[11] and a number of non-EU countries (including the United States, Australia, Canada, Japan, India, and Mexico) in 2021. We express revenues in billion euros, and as a percent of projected corporate tax revenues in 2021 (absent a change in the tax law) and as a percent of current health spending.[12]

Table 1: Revenues of a 25% coordinated minimum tax in 2021

Parent Country	Additional tax revenue (bn €)	As a % of health expenditure	As a % of corporate income tax revenue
Austria	7.0	16.6%	73.3%
Belgium	19.0	37.9%	114.8%
Bulgaria	.	.	.
Cyprus	0.9	64.9%	77.5%
Czech Republic	1.1	7.5%	14.3%
Germany	29.1	7.3%	41.5%
Denmark	3.5	10.6%	40.9%
Estonia	0.4	23.2%	88.7%
Spain	12.4	11.0%	43.6%
Finland	4.7	20.4%	86.9%
France	26.1	9.0%	50.9%
Greece	1.6	9.9%	32.9%
Croatia	.	.	.
Hungary	1.9	20.5%	62.6%
Ireland	14.0	61.2%	167.9%
Italy	11.1	6.6%	27.3%
Lithuania	.	.	.
Luxembourg	7.9	243.4%	282.3%
Latvia	0.5	25.9%	95.2%
Malta	0.3	28.8%	40.9%
Netherlands	9.3	11.3%	34.7%
Poland	11.0	34.9%	123.9%
Portugal	0.6	2.9%	9.0%
Romania	.	.	.
Sweden	5.3	9.2%	36.5%
Slovenia	0.1	1.6%	8.4%
Slovakia	0.0	0.7%	1.3%
EU total	**167.7**	**12.1%**	**52.3%**

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[11] Due to data limitations, we are unable to report estimates for four EU countries: Bulgaria, Croatia, Lithuania, and Romania.

[12] 2021 ratios are based on estimated revenues from a minimum tax in 2016, scaled by 2016 corporate tax revenues (or 2016 health spending). We assume these ratios are constant between 2016 and 2021.

Australia	11.7	9.8%	19.2%
Brazil	7.4	4.4%	12.7%
Canada	34.7	20.2%	64.3%
Chile	1.2	5.6%	11.3%
China	30.2	5.3%	6.8%
Indonesia	0.9	3.2%	
India	1.4	1.7%	1.9%
Japan	28.7	5.2%	15.4%
Korea	6.2	5.9%	12.0%
Mexico	1.3	2.1%	3.4%
Norway	0.4	1.0%	2.6%
United States	165.4	5.1%	43.9%
South Africa	3.0	12.3%	18.2%

For the European Union as a whole, we find that the revenue potential from minimum taxation is large. With a minimum tax at a rate of 25% applied to the profits of European multinationals, the European Union would increase its current corporate tax revenues by about €170 billion in 2021—from the €340 billion projected to be collected in 2021 under current law to about €510 billion. The extra revenues from minimum taxation represent the equivalent of about 50% of the corporate tax revenues currently collected, or about 12% of total current health spending in the European Union. These extra revenues would increase total EU corporate tax receipts from 2.4% of the European Union's GDP to 3.6% of EU GDP. To generate new revenues in a fair and sustainable manner, a 25% minimum tax is thus a powerful—yet realistic—instrument.

A number of additional results are worth noting. First, there is heterogeneity in the revenues generated by the minimum tax. A number of countries would stand to benefit particularly significantly from this policy. This includes Eastern European countries (e.g., Estonia, Hungary, Latvia, and Poland) and EU tax havens.

Many Eastern European countries currently have low effective tax rates on the profits of their domestic firms. Since the 25% minimum tax we simulate would also apply to the profits booked locally by headquartered firms, it would boost tax collection on domestic profits. In these countries, a 25% minimum tax essentially would mean doubling tax payments made by domestic firms.

The case of countries like Cyprus, Ireland, Luxembourg also deserves to be noted. Table 1 suggests that EU tax havens would stand to benefit a lot from a 25% minimum tax. However, this result relies on the assumption that these countries would keep the headquarters they have attracted so far in part by offering low corporate tax rates. In reality, with an international agreement on a minimum tax, headquarters might move to currently high-tax countries, which means that tax havens would likely benefit less than what we report in Table 1 (and other countries would benefit more). To the extent that headquarters located in EU havens would move to EU non-havens, this would not affect the extra revenues collected by the European Union as a whole (€170 billion in 2021).

Figure 1: Additional Revenues of a 25% coordinated minimum tax in 2021 (% of current corporate income tax revenue)

Total tax deficit as a % of corporate income tax revenue

Domestic tax deficit as a % of corporate income tax revenue **Foreign tax deficit as a % of corporate income tax revenue**
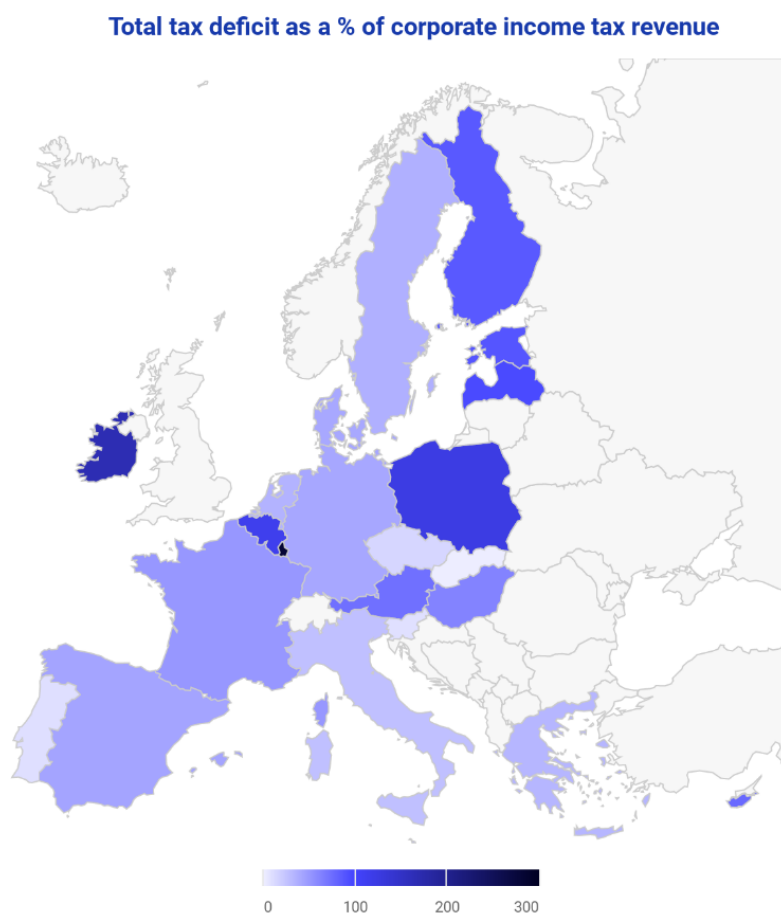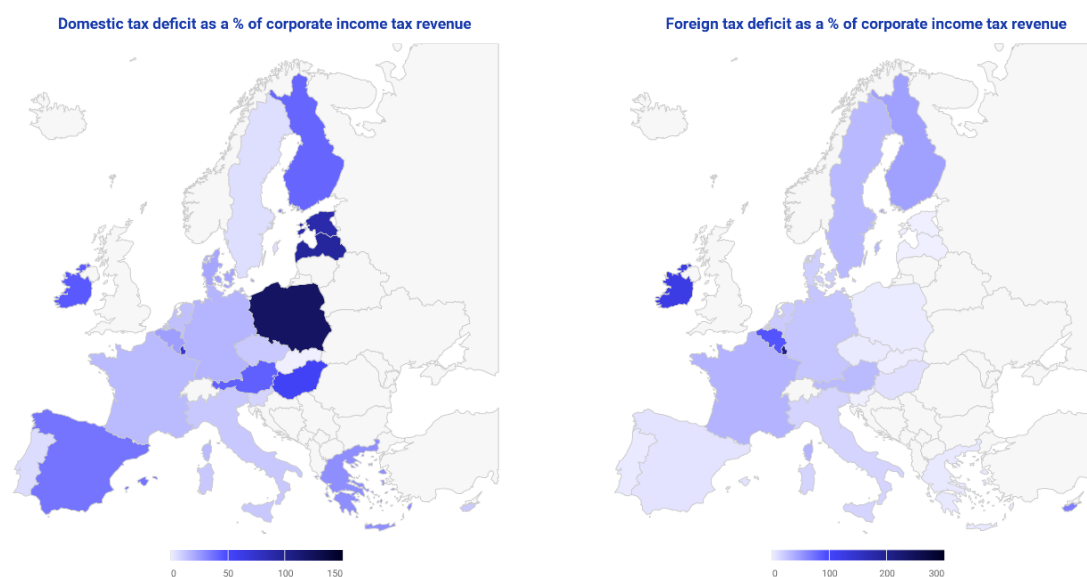
Notes: the top panel shows the additional tax revenues that would be collected by European countries if each of them applied a 25% minimum tax on the country-by-country profits of their multinationals; the results are expressed as a fraction of currently collected corporate income tax revenues. The bottom panel, left shows the revenues that would be collected on the profits booked by domestic multinationals domestically, and the bottom panel, right shows the revenues that would be collected on the profits booked by domestic multinationals abroad.

In the largest EU countries, according to our estimates, corporate tax revenues would generally increase by 30% to 50%: 42% in Germany (an increase of €29 billion per year), 51% in France (€26 billion), 44% in Spain (€12 billion) and close to 30% in Italy (€11 billion).

We also provide estimates for a number of non-EU countries. Unsurprisingly, corporate tax revenues would increase the most in countries where multinationals tend to be incorporated, most notably the United States (with an increase of €165 billion, about as much as for the European Union as a whole). By contrast, the revenue effects of an international agreement on a minimum tax would be more muted for developing countries since these countries tend to host relatively few headquarters. Note however that developing countries would indirectly benefit from a high minimum tax, as this policy would make it easier for them to increase taxation on corporate profits (including on the profits of subsidiaries of foreign multinationals) without risking capital flight. We do not attempt to estimate these indirect effects in this report.

Figure 1 illustrates the source of the additional revenues that would be collected by EU countries. As the top panel shows, all EU member countries would significantly benefit from a 25% minimum tax—with particularly large increases in currently low-tax countries (e.g., Eastern European countries). As the bottom left panel shows, the bulk of the additional tax revenues from minimum taxation in currently low-tax countries (e.g., Poland) would stem from an increased taxation of the profits booked by domestic firms locally (e.g., profits booked by Polish firms in Poland). Vice versa, as shown by the bottom right panel, in currently relatively high-tax countries (e.g., France), a large fraction of the additional revenues from minimum taxation would come from an increased taxation of profits booked abroad (e.g., profits booked by French multinationals in Luxembourg).

In Table 2, we assess how varying the minimum tax rate would affect tax revenues. Revenues significantly depend on the commonly agreed minimum tax rate. With a 21% minimum rate, the European Union would collect about €100 billion in 2021 (as opposed to €170 billion with a 25% minimum tax rate). Moving from 21% to 15% would reduce the revenue potential by a factor of two to about €50 billion.

Table 2: Revenues of a minimum tax in 2021 for different minimum tax rates

Parent Country	Tax deficit in bn EUR (2021) for a minimum tax rate of….			
	15%	21%	25%	30%
Austria	3.0	5.4	7.0	8.9
Belgium	10.5	15.6	19.0	23.3
Bulgaria	.	.	.	.
Cyprus	0.3	0.4	0.9	1.7
Czech Republic	0.1	0.3	1.1	2.1
Germany	5.7	6.6	29.1	69.0
Denmark	0.7	2.3	3.5	4.9
Estonia	0.1	0.3	0.4	0.5
Spain	0.7	5.3	12.4	21.2
Finland	1.7	3.5	4.7	6.2
France	4.3	16.0	26.1	39.2
Greece	0.1	0.6	1.6	2.9
Croatia	.	.	.	.
Hungary	0.6	1.3	1.9	2.6
Ireland	7.2	11.3	14.0	17.3
Italy	2.7	7.6	11.1	15.7
Lithuania	.	.	.	.
Luxembourg	4.1	6.3	7.9	9.9
Latvia	0.1	0.3	0.5	0.6
Malta	0.1	0.2	0.3	0.5
Netherlands	0.9	4.9	9.3	14.9
Poland	3.7	8.0	11.0	14.8
Portugal	0.1	0.1	0.6	1.9
Romania	.	.	.	.
Sweden	1.5	1.7	5.3	10.8
Slovenia	0.0	0.0	0.1	0.1
Slovakia	0.0	0.0	0.0	0.4
EU total	**48.3**	**97.9**	**167.7**	**269.5**
Australia	2.3	7.9	11.7	16.6
Brazil	0.9	3.4	7.4	12.3
Canada	16.0	27.2	34.7	44.2
Chile	0.2	0.8	1.2	1.8
China	4.5	12.0	30.2	53.1
Indonesia	0.1	0.3	0.9	1.8
India	0.5	1.1	1.4	2.2
Japan	6.0	14.4	28.7	61.4
Korea	0.0	1.5	6.2	12.7
Mexico	0.5	0.9	1.3	3.1
Norway	0.1	0.2	0.4	0.7
United States	40.7	104.4	165.4	245.4
South Africa	0.6	2.0	3.0	4.3

A scenario of international coordination on a low minimum rate of 15% would generate only €50 billion in the European Union, around a quarter of what could be achieved with a 25% minimum tax rate. Thus, the choice of the minimum tax rate matters greatly, and an agreement on a low minimum tax is unlikely to significantly increase tax revenues in the European Union in the short-term (though it may pave the way for a higher minimum tax rate in the future).

We emphasize that revenues from our various scenarios (and particularly from the 15% scenario) are likely to be a lower bound. This is due to the fact, already noted in section 3.1 above, that tabulated data by construction deliver downward-biased estimates of tax deficits, because of heterogeneity in effective tax rates within each country-pair. To the extent that certain countries offer tax rates ranging from 10% to 20% to foreign multinationals, the average rate may be 15% (thus generating no tax collection in our simulations), despite the fact that there would be actual additional tax collections on all the firms with an effective tax rate below 15%.

4.2   Macroeconomic Results: Imperfect or No Coordination

We now turn to the two other scenarios we consider: an incomplete international agreement in which only EU countries apply a minimum tax (while non-EU countries do not change their tax policies); and a unilateral "first-mover" scenario. In both cases, a portion of the tax deficits of multinationals headquartered in countries refusing international coordination would be collected by the European Union. For instance, if a British company makes 20% of its sales in Germany, then Germany would collect 20% of the tax deficit of this company (if it has any). Moreover, in the unilateral scenario, Germany (if it is the first mover) would also collect its share of the tax deficit of all other EU multinationals, in addition to its share of the tax deficit of non-EU multinationals.

In the case of an agreement among EU countries only, we find that using a rate of 25% to compute the tax deficit of each multinational, the European Union would increase its corporate tax revenues by about €200 billion; see detailed results in Appendix C.

Out of this total, €170 billion would come from collecting the tax deficit of EU multinationals; an additional €30 billion would come from collecting a portion of the tax deficit of non-EU multinationals. For the European Union, there is thus a much higher revenue potential from increasing taxes on EU companies than from taxing non-EU companies. The conclusion is clear: to improve the fairness of its tax system and generate new government revenues (e.g., to pay for the cost of Covid-19), it is essential that the European Union polices its own multinationals.

In the unilateral scenario in which a country collects its share of the tax deficit of all the world's multinationals (based on a reference rate of 25%), we find that a first mover in the European Union would increase its corporate tax revenues by close to 70% on average relative to its current corporate tax collection (see Table 3). A number of remarks about this result are worth noting. First, the revenue gains from being the first mover are sizable. This means that the incentives for unilaterally collecting the tax deficit of multinationals are high. In turn, this suggests that should an international agreement on a substantial minimum tax fail to materialize, it is possible that one country (or a coalition of countries) may decide to unilaterally adopt a high minimum tax.

Second, a unilateral move of a single EU member state (or a group of member states) could play a transformative role. It would give incentive to other EU countries to also collect the tax deficit of multinationals—as not doing so would mean leaving tax revenues on the table for the first movers to grab. This could pave the way for an agreement on a high minimum tax, within the European Union and then globally.

Third, as shown by Table 3, first-mover countries could increase revenues by collecting a portion of the tax deficit of foreign multinationals (proportionally to where these multinationals make their sales). However, revenues from taxing US multinationals must not be over-estimated: first, because these firms typically make the bulk of their sales outside of the European Union (primarily in the United States), so that based on the destination of sales, only a relatively small fraction of the tax deficit of US multinationals would end up being collected by the European Union. Second, because

the United States may well soon itself collect the bulk of the tax deficit of its own multinationals, leaving relatively little tax deficit to collect by other countries.

Table 3: Revenues of a minimum tax of 25% in 2021 for a first mover

| Country | Revenue (€ billion) collected from… | | | | % of current corporate tax revenue |
	Head-quartered firms	US firms	Other foreign firms	Total	
Austria	7.0	0.2	0.7	7.8	82.3%
Belgium	19.0	0.8	0.8	20.6	124.5%
Cyprus	0.9	0.0	0.1	1.0	85.6%
Czech Republic	1.1	0.1	0.2	1.4	19.3%
Germany	29.1	2.6	6.0	37.7	53.7%
Denmark	3.5	0.1	0.2	3.8	45.3%
Estonia	0.4	0.0	0.0	0.4	96.9%
Spain	12.4	0.7	3.6	16.7	58.7%
Finland	4.7	0.1	0.3	5.1	94.2%
France	26.1	1.5	3.7	31.3	60.9%
Greece	1.6	0.1	0.1	1.8	35.9%
Hungary	1.9	0.1	0.3	2.3	75.9%
Ireland	14.0	2.5	0.4	16.9	202.6%
Italy	11.1	1.1	2.1	14.4	35.1%
Luxembourg	7.9	0.2	0.7	8.8	315.0%
Latvia	0.5	0.0	0.0	0.5	98.3%
Malta	0.3	0.0	0.0	0.3	40.9%
Netherlands	9.3	1.4	2.7	13.4	50.1%
Poland	11.0	0.3	1.1	12.4	139.2%
Portugal	0.6	0.1	0.5	1.2	18.3%
Sweden	5.3	0.2	0.8	6.3	43.7%
Slovenia	0.1	0.0	0.0	0.1	14.3%
Slovakia	0.0	0.1	0.1	0.2	7.5%
Unallocated	.	0.0	9.9	9.9	.
EU average	**.**	**.**	**.**	**.**	**66.8%**
Australia	11.7	1.2	1.9	14.8	24.3%
Brazil	7.4	1.1	2.3	10.8	18.6%
Canada	34.7	3.9	1.7	40.3	74.6%
Chile	1.2	0.4	1.1	2.7	25.4%
China	30.2	2.6	20.5	53.3	12.0%
Indonesia	0.9	0.1	1.8	2.8	.
India	1.4	0.6	0.8	2.9	3.9%
Japan	28.7	2.7	1.2	32.6	17.5%
Korea	6.2	0.6	0.2	7.0	13.4%
Mexico	1.3	1.6	2.1	5.1	13.2%
Norway	0.4	0.2	0.4	1.0	6.2%
United States	165.4	0.0	44.5	209.8	55.7%
South Africa	3.0	0.3	0.5	3.9	23.5%

4.3   Firm-Level Results

Finally, we present our analysis of the firm-level micro-data: European banks and non-bank multinationals that chose to provide their country-by-country reports. Table 4 shows the tax deficit (relative to a reference minimum tax rate of 25%) of these firms. We find that the tax deficit of EU banks reached €12 billion in 2019, the equivalent of about 41% of the taxes they paid that year. In other words, European banks would have to pay 41% more in taxes if they were subject to a 25% country-by-country minimum tax.

This estimate is in line with our finding that EU multinationals as a whole (all sectors combined) would have to pay around 50% more in taxes, thus suggesting that this number is indeed the correct order of magnitude.

Companies such as Shell, Iberdrola, and Allianz—who voluntarily disclose their country-by-country profits and taxes—would also have to pay 35%-50% more in taxes if they were subject to a 25% minimum tax. For our sample of non-bank multinationals, the tax deficit is lower on average—21%. This is due to a number of reasons. First, the largest non-bank multinational in our sample (in terms of taxes paid), Equinor, is a public Norwegian company with a virtually zero tax deficit. Second, multinationals that voluntarily chose to disclose their country-by-country reports are a selected sample. It is likely that the most aggressive tax avoiders chose not to disclose their reports. The average tax deficit of the sample of voluntary disclosers can thus be seen as a lower bound for the tax deficit of EU multinationals.

Table 4: The tax deficit of EU banks and a sample of non-bank multinationals (relative to a reference rate of 25%) in 2021 million euros.

Non-banks	Parent country	Tax deficit (€ million)	Taxes paid (€ million)	Tax deficit, % of taxes paid
AXA	France	275.5	1,180.4	23.3%
Allianz	Germany	893.9	2,514.1	35.6%
Anglo-American	United Kingdom	480.9	1,833.5	26.2%
BP	United Kingdom	484.9	4,246.6	11.4%
BT Group	United Kingdom	21.4	82.8	25.9%
ENI	Italy	171.5	4,821.0	3.6%
Enel	Italy	356.3	1,944.4	18.3%
Equinor	Norway	285.1	7,818.3	3.6%
Grupo ACS	Spain	235.1	61.5	382.1%
Iberdrola	Spain	488.3	818.4	59.7%
Legal&General	United Kingdom	170.7	626.9	27.2%
Prudential	USA	578.2	242.9	238.0%
Repsol	Spain	126.8	967.5	13.1%
Rio Tinto	United Kingdom	429.9	3,997.5	10.8%
Shell	Netherlands	2,436.9	6,670.5	36.5%
Telefonica	Spain	425.2	582.5	73.0%
Total Non-Banks		**7,860.7**	**38,408.9**	**20.5%**
Banks				
AIB	Ireland	73.6	57.0	129.0%
Abn Amro	Netherlands	76.7	653.8	11.7%
BBVA	Spain	205.7	1,840.3	11.2%
BNP Paribas	France	534.9	2,621.4	20.4%
BPCE	France	107.0	1,788.4	6.0%
Banco Sabadell	Spain	80.6	177.4	45.4%
Banco Santander	Spain	687.9	3,278.3	21.0%
Bankia BFA	Spain	0.2	217.3	0.1%
Barclays	United Kingdom	916.9	-73.1	.
Bayern LB	Germany	255.4	81.5	313.4%
Belfius	Belgium	0.0	255.1	0.0%
Commerzbank	Germany	37.2	415.5	9.0%
Crédit Agricole	France	220.3	467.5	47.1%
Crédit Mutuel	France	407.6	1,726.2	23.6%
DZ Bank	Germany	219.8	854.5	25.7%
Danske Bank	Denmark	85.9	-159.2	
Deutsche Bank	Germany	82.9	644.7	12.9%
ERSTE	Austria	164.5	476.6	34.5%
HSBC	United Kingdom	4,246.7	1,712.4	248.0%
Handelsbanken	Sweden	17.2	581.4	3.0%
Helaba	Germany	95.2	75.4	126.4%
ING	Netherlands	61.6	1,992.0	3.1%
Intesa Sanpaolo	Italy	672.4	1,648.9	40.8%
KBC Bank	Belgium	154.5	508.2	30.4%
LBBW	Germany	27.5	183.3	15.0%

Lloyds Banking Group	**United Kingdom**	37.4	1,468.5	2.5%
Monte dei Paschi	**Italy**	0.1	-0.1	
Nationwide	**United Kingdom**	0.0	292.5	0.0%
Nord LB	**Germany**	1.8	31.6	5.6%
Nordea	**Finland**	67.7	581.5	11.6%
Nykredit Realkredit	**Denmark**	116.2	182.8	63.5%
RBS	**United Kingdom**	903.5	322.7	280.0%
Rabobank	**Netherlands**	46.1	829.0	5.6%
SEB Bank	**Sweden**	161.9	453.7	35.7%
Société Générale	**France**	480.5	979.7	49.0%
Standard Chartered	**United Kingdom**	478.1	1,073.6	44.5%
Swedbank	**Sweden**	134.1	453.2	29.6%
Unicredit	**Italy**	312.5	917.6	34.1%
Total Banks		**12,172.0**	**29,611.2**	**41.1%**

5 Conclusion

The revenue potential of a coordinated minimum tax in the European Union is large. A 25% minimum tax imposed on the country-by-country profits of multinationals headquartered in the European Union would increase EU corporate income tax revenues by about €170 billion in 2021—the equivalent of more than 50% of the amount of corporate tax revenue currently collected in the European Union and 12% of total EU health spending. Collecting a portion of the tax deficit of non-EU multinationals would increase this sum to close to €200 billion.

It is important to note that a collection of the tax deficit of multinational companies is a realistic policy development in the short term. Contrary to a widely held view, to be effective a minimum tax does not require an agreement of all the world's countries. To be sure, a number of countries have an interest in applying low rates and refusing to join an international agreement. But that is not an obstacle to other individual countries raising the effective taxation of corporate profits here and now.

Concretely, because the vast majority of multinationals are headquartered in large economies, lawmakers in Rome, Berlin, Paris, and Washington D.C. can whistle the end of the game by collecting the tax deficit of their own multinationals—offsetting the low taxes paid in tax havens by higher taxes owed at home. The spiral of international tax

competition can be stopped even if tax havens do not increase their tax rates, and the European Union could be the world leader in this process.

We encourage readers to consult our interactive website, https://tax-deficit-simulator.herokuapp.com, to assess the revenue potential from minimum taxation on both domestic and foreign firms. Users can select the various scenarios discussed in this report (e.g., international coordination or unilateral action), and a full range of minimum tax rates from 10% to 50%. All the data and computer code are available online, making our estimates fully reproducible. We plan to regularly update our findings, as improved and more comprehensive macroeconomic data sources become available, refined estimation techniques are designed, and more companies publicly disclose their country-by-country reports.

Appendix

Appendix A. Cooperative scenario computations: data, methodology, and supplementary results

Dataset: In our benchmark calculation, we estimate how much countries can gain in corporate income tax revenue by collecting the tax deficit, that is the difference between what their multinational enterprises pay in corporate income tax in foreign jurisdictions and the parent country itself and what they would have to pay under a minimum tax of 25% applied in each jurisdiction (domestic and foreign). For these estimations, we use an integrated dataset of the OECD's country-by-country reporting (CbCR) data, and Tørsløv, Wier, Zucman (TWZ, 2019) to cover 23 EU countries and 13 further OECD countries. The OECD's (2020) CbCR data details multinationals' booked profits and taxes paid in the headquarter country as well as foreign jurisdictions including tax havens and non-havens on a country-by-country basis for 27 OECD countries for the year 2016. However, in several cases, partner jurisdictions are aggregated to a broader region, for example Other Europe, or Other Asia. This blurs the distinction between non-haven and tax haven partner jurisdictions, we use throughout the report. We assume that those aggregated jurisdictions are primarily non-havens. The dataset by TWZ (2019) is based on foreign affiliates statistics (FATS) and direct investment statistics on an ultimate ownership basis. This dataset covers a greater number of countries than the OECD's CbCR data. However, its main limitation is that it only covers booked profits in tax-haven countries. For all estimations, we only use the positive-profits sample in both datasets.

Method: Due to different coverage and structure of the two datasets, we follow different methodologies. For the OECD's CbCR data, we first calculate effective tax rates (ETRs) by dividing income tax paid (on cash basis) by profit before income tax for each parent country in each foreign jurisdiction. For missing values, we use statutory tax rates from KPMG's corporate tax rates table (2021). We winsorize the effective tax rates at the 6th and 94th percentile and arrive at a range between 0% and 51.3%. In our benchmark estimate, we calculate the difference of the resulting

effective tax rates to a 25% minimum rate. The difference between the effective tax rate and the minimum tax rate is then multiplied by booked profits in each jurisdiction (equation A1). Thus, the tax deficit of parent country p is the sum of tax deficits in each jurisdiction j (foreign and domestic) where its multinationals book profits:

$$Tax\ deficit_p = \sum_{j}^{J}\left(25\% - ETR_j\right)Booked\ profits_{pj} \qquad \text{(A1)}$$

Due to the lower degree of detail in the dataset by TWZ (2019), we apply a simplified methodology. First, the dataset only covers foreign tax haven partner jurisdiction. We assume that these jurisdictions exhibit a uniform effective tax rate of 10%. We use the sum of positive profits booked by each parent country in all tax havens for the year 2016 and compute the tax deficit in line with equation A1. Second, we impute the tax deficit in non-haven jurisdictions by estimating the ratio of tax deficits in non-havens to tax havens for the EU non-haven parent countries in the CbCR data. We assume a 20% effective tax rate in non-havens and a 10% ETR in tax havens:

$$Imputation\ Factor = \frac{(25\% - 20\%)\ Profits\ booked\ in\ non\ havens}{(25\% - 10\%)\ Profits\ booked\ in\ tax\ havens} \qquad \text{(A2)}$$

For a 15% tax rate, this imputation would result in no tax deficit to be collected in non-haven jurisdictions. We know that this is an underestimation. Thus, we correct the imputation for the 15% minimum rate by computing the ratio of the tax deficit that can be collected in non-havens for a 15% and a 25% rate for the OECD's CbCR data. The resulting ratio is about 0.337 and is multiplied by the tax deficit of each parent country at a 25% minimum rate to arrive at the corrected 15%-rate tax deficit. The difference between the corrected and non-corrected tax deficit for a 15% minimum tax rate amounts to €5.5 billion among EU countries. For the tax deficit that countries can collect from headquartered multinationals operating within the parent country is based on profits of local firms and their effective tax rates provided in Tørsløv, Wier, Zucman (2018, Appendix Tables, Table A6). We correct the implausibly low ETR for Germany by the average ETR of Germany as partner jurisdiction in the OECD's CbCR data (22.75%). The tax deficit is again calculated as laid out in equation A1.

Dataset Integration: We combine both datasets to arrive at our final sample of 23 EU countries and 13 further OECD countries. For countries which have information in both datasets, we use the OECD's CbCR data as benchmark. Only for tax havens and due to the incomplete coverage of countries and booked profits especially for tax-haven jurisdictions, we use the higher tax deficit estimate of the two datasets for further computations.

Currency conversion and extrapolation to 2021: The original data is provided in 2016 current USD. We convert our results first to 2016 EUR using the European Central Bank's (2021) 2016 average market exchange rate. Second, since the latest CbCR data is available for the year 2016, we extrapolate our findings to the year 2021. We assume that multinationals' profits have grown proportional to global nominal GDP. For this second step, we use data of the World Economic Outlook (WEO, April 2021). We convert GDP given in current USD into GDP in current EUR. The USD/EUR market exchange rate was about 1.11 USD/EUR in 2016 and 1.20 USD/EUR in 2021. Global GDP in current EUR has grown in this five-year period by 13.3%.

Share of corporate income tax (CIT) revenue and health expenditure: To put the additional revenue gained from collecting the tax deficit in perspective, we present it as share of current corporate income tax revenue and health expenditure of each country. We use information on corporate income tax revenue from TWZ (2019) which is based on the OECD's revenue statistics. CIT revenue comprises the broad concept of "Taxes on income, profits and capital gains of corporates". Alternatively, we tried using revenue statistics by the European Commission's Taxation and Customs Union (Feb 2021), which are based on National Accounts data. However, in National Accounts data central bank profits can be part of corporate taxes paid, such that CIT revenues can be too high. Health expenditure is taken primarily from EUROSTAT (2021a). For the non-EU countries, we use health expenditure as share of current GDP provided by the World Health Organization (WHO, 2021). For all shares, 2016 tax deficits were compared with 2016 CIT revenue and health expenditure in current EUR. For the EU-wide shares, we divided the tax deficit of the 23 EU countries in our sample by the sum of national CIT revenue and health expenditure of those 23 EU countries.

Further Results: Table A1 shows the tax deficit generated by a 25% minimum tax from multinationals operations in the parent country (domestic), MNEs' subsidiaries in foreign non-haven and tax-haven jurisdiction respectively.

In table A2, we show the additional tax revenue from collecting the tax deficit for a 15%, 21%, and 30% minimum tax rate. While in table 2 of the main text, we present the tax revenue in 2021 euros, in table A2, we present additional tax revenue as a share of corporate income tax revenue and health expenditure.

Table A1: Tax deficit of a 25% global minimum tax in bn EUR, 2021.

Parent Country	Tax deficit of 25% min. tax in billion 2021 EUR			
	Domestic	Non-havens	Tax Havens	Only foreign aggregate data*
Austria	4.0	.	.	2.9
Belgium	4.0	2.4	12.6	.
Bulgaria	.	.	.	.
Cyprus	0.1	0.5	0.3	.
Czech Republic	0.8	0.1	0.1	.
Germany	12.0	11.2	5.9	.
Denmark	1.8	1.0	0.6	.
Estonia	0.4	0.0	0.0	.
Spain	10.4	1.3	0.7	.
Finland	2.2	.	.	2.5
France	8.1	7.3	10.7	.
Greece	1.4	0.1	0.1	.
Croatia	.	.	.	.
Hungary	1.7	0.2	0.1	
Ireland	3.7	.	.	10.3
Italy	4.8	5.1	1.3	
Lithuania	.	.	.	.
Luxembourg	2.0	4.2	1.6	.
Latvia	0.5	0.0	0.0	.
Malta	0.2	0.1	0.0	.
Netherlands	3.8	.	.	5.6
Poland	10.8	0.2	0.1	.
Portugal	0.4	0.1	0.1	.
Romania	.	.	.	.
Sweden	0.7	3.0	1.6	.
Slovenia	0.1	.	.	0.0
Slovakia	0.0	0.0	0.0	.
EU total	**73.8**	**36.9**	**35.7**	**21.3**
Australia	7.6	3.4	0.7	.
Brazil	5.2	1.1	1.1	.
Canada	19.3	12.7	2.8	.
Chile	1.1	0.1	0.0	.
China	20.6	1.0	8.6	.
Indonesia	0.9	0.1	0.0	.
India	0.0	0.7	0.8	.
Japan	7.2	18.3	3.2	.
Korea	5.5	.	.	0.7
Mexico	0.0	0.6	0.7	
Norway	0.2	.	.	0.2
United States	77.2	26.5	61.7	.
South Africa	1.7	0.5	0.8	.

* Several parent countries do not report country-specific data, but information aggregated at the continent level. For those, we cannot distinguish between tax havens and non-havens.

Table A2: Tax deficit of a minimum tax of 15%, 21%, 25%, and 30% as share of corporate income tax revenue and health expenditure (2016 numbers).

Parent Country	Tax deficit as % of CIT revenue				Tax deficit as % of health expenditure			
	15%	21%	25%	30%	15%	21%	25%	30%
Austria	31.7%	56.7%	73.3%	94.2%	7.2%	12.8%	16.6%	21.3%
Belgium	63.6%	94.0%	114.8%	141.0%	21.0%	31.0%	37.9%	46.6%
Bulgaria	.	.	.	.	.	.	.	.
Cyprus	22.3%	31.2%	77.5%	135.3%	18.6%	26.1%	64.9%	113.4%
Czech Republic	1.0%	3.4%	14.3%	27.9%	0.5%	1.8%	7.5%	14.6%
Germany	8.2%	9.4%	41.5%	98.4%	1.4%	1.6%	7.3%	17.3%
Denmark	8.6%	27.5%	40.9%	58.1%	2.2%	7.1%	10.6%	15.1%
Estonia	22.8%	62.4%	88.7%	121.7%	6.0%	16.3%	23.2%	31.8%
Spain	2.4%	18.8%	43.6%	74.6%	0.6%	4.7%	11.0%	18.8%
Finland	31.3%	64.6%	86.9%	114.7%	7.3%	15.2%	20.4%	27.0%
France	8.3%	31.1%	50.9%	76.4%	1.5%	5.5%	9.0%	13.5%
Greece	1.4%	12.3%	32.9%	58.7%	0.4%	3.7%	9.9%	17.7%
Croatia	.	.	.	.	.	.	.	.
Hungary	19.3%	42.5%	62.6%	87.7%	6.3%	14.0%	20.5%	28.8%
Ireland	86.9%	135.5%	167.9%	208.3%	31.7%	49.4%	61.2%	76.0%
Italy	6.6%	18.6%	27.3%	38.3%	1.6%	4.5%	6.6%	9.3%
Lithuania	.	.	.	.	.	.	.	.
Luxembourg	146.8%	226.8%	282.3%	356.8%	126.6%	195.5%	243.4%	307.6%
Latvia	30.4%	69.3%	95.2%	127.5%	8.3%	18.9%	25.9%	34.7%
Malta	17.5%	25.0%	40.9%	60.7%	12.3%	17.6%	28.8%	42.7%
Netherlands	3.5%	18.1%	34.7%	55.5%	1.2%	5.9%	11.3%	18.1%
Poland	41.3%	89.9%	123.9%	166.3%	11.6%	25.4%	34.9%	46.9%
Portugal	1.1%	1.2%	9.0%	29.3%	0.4%	0.4%	2.9%	9.4%
Romania	.	.	.	.	.	.	.	.
Sweden	10.6%	12.1%	36.5%	74.9%	2.7%	3.1%	9.2%	18.8%
Slovenia	2.5%	6.0%	8.4%	11.6%	0.5%	1.1%	1.6%	2.2%
Slovakia	0.5%	0.5%	1.3%	12.1%	0.2%	0.3%	0.7%	6.0%
EU total	15.1%	30.5%	52.3%	84.0%	3.5%	7.0%	12.1%	19.4%
Australia	3.8%	12.9%	19.2%	27.2%	1.9%	6.6%	9.8%	13.9%
Brazil	1.6%	5.9%	12.7%	21.2%	0.6%	2.0%	4.4%	7.3%
Canada	29.6%	50.3%	64.3%	81.8%	9.3%	15.8%	20.2%	25.7%
Chile	1.9%	7.3%	11.3%	16.4%	1.0%	3.6%	5.6%	8.1%
China	1.0%	2.7%	6.8%	11.9%	0.8%	2.1%	5.3%	9.3%
Indonesia	.	.	.	.	0.2%	1.0%	3.2%	6.0%
India	0.7%	1.4%	1.9%	3.0%	0.7%	1.3%	1.7%	2.7%
Japan	3.2%	7.7%	15.4%	33.0%	1.1%	2.6%	5.2%	11.1%
Korea	0.0%	2.9%	12.0%	24.6%	0.0%	1.4%	5.9%	12.0%
Mexico	1.2%	2.5%	3.4%	7.9%	0.7%	1.5%	2.1%	4.9%
Norway	0.4%	1.3%	2.6%	4.3%	0.2%	0.5%	1.0%	1.6%
United States	10.8%	27.7%	43.9%	65.2%	1.2%	3.2%	5.1%	7.5%
South Africa	3.4%	12.2%	18.2%	25.7%	2.3%	8.3%	12.3%	17.4%

Table A3: Tax deficit for alternative computations of effective tax rates (OECD CbCR countries only).

Parent Country	Tax deficit in bn 2021 EUR, Benchmark				Tax deficit in bn 2021 EUR, Average ETRs within partner				Tax deficit in bn 2021 EUR, Statutory rate minus 5%points			
	15%	21%	25%	30%	15%	21%	25%	30%	15%	21%	25%	30%
Austria	3.0	5.4	7.0	8.9	2.8	5.1	6.7	8.7	0.0	0.9	2.4	4.4
Belgium	10.5	15.6	19.0	23.3	6.9	12.3	16.3	21.2	0.1	1.1	3.6	7.3
Denmark*	0.7	2.3	3.5	4.9	0.4	1.9	3.0	4.5	0.2	1.4	2.5	3.9
Finland	1.7	3.5	4.7	6.2	1.5	3.3	4.5	6.0	0.0	1.2	2.4	3.9
France*	4.3	16.0	26.1	39.2	4.7	16.5	27.4	41.4	3.6	10.6	16.9	27.8
Ireland	7.2	11.3	14.0	17.3	6.4	10.5	13.2	16.5	1.3	3.5	6.2	9.5
Italy°	2.7	7.6	11.1	15.7	1.4	4.5	8.1	12.6	0.3	1.4	2.6	6.3
Luxembourg	4.1	6.3	7.9	9.9	2.4	4.3	5.9	7.9	0.2	1.0	1.8	3.6
Netherlands	0.9	4.9	9.3	14.9	2.7	6.6	11.1	16.6	0.0	2.2	6.7	12.3
Slovenia	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1
Australia	2.3	7.9	11.7	16.6	1.0	5.6	9.5	14.4	0.2	1.0	1.8	6.5
Brazil*	0.9	3.4	7.4	12.3	0.3	2.6	6.6	11.5	0.4	1.0	1.5	3.0
Canada*	16.0	27.2	34.7	44.2	11.3	22.0	29.6	39.1	0.9	3.4	9.3	17.7
Chile°	0.2	0.8	1.2	1.8	0.2	0.7	1.1	1.6	0.0	0.2	0.6	1.1
China°	4.5	12.0	30.2	53.1	4.1	15.3	33.6	56.5	2.6	10.0	28.5	51.7
Indonesia	0.1	0.3	0.9	1.8	0.0	0.0	0.7	1.5	0.0	0.2	0.8	1.7
India*	0.5	1.1	1.4	2.2	0.6	1.2	1.7	2.7	0.3	0.8	1.2	2.1
Japan*	6.0	14.4	28.7	61.4	3.7	11.7	26.5	59.3	1.1	8.2	16.5	43.9
Korea	0.0	1.5	6.2	12.7	0.0	1.2	5.9	12.4	0.0	2.5	7.7	14.2
Mexico*	0.5	0.9	1.3	3.1	0.4	0.9	1.4	2.4	0.2	0.6	1.1	3.0
Norway	0.1	0.2	0.4	0.7	0.1	0.1	0.2	0.3	0.0	0.1	0.3	0.5
United States°	40.7	104.4	165.4	245.4	43.8	105.9	169.4	250.3	17.8	45.1	67.2	99.5
South Africa*	0.6	2.0	3.0	4.3	0.3	1.7	2.7	4.0	0.3	0.7	1.3	2.6

* The tax deficit of tax havens is taken from TWZ(2019). ° The tax deficit of tax havens is calculated from TWZ(2019) for the last case of statutory rate minus 5%points only.

Appendix B: Unilateral scenario: data, methodology, and supplementary results

Dataset: For the unilateral scenario we estimate how much a country can gain in corporate income tax revenue by additionally collecting a share of the tax deficit from other countries' multinationals. This share is based on the percentage of sales of foreign multinationals in the country. For these estimations, we use the OECD CbCR data. The detailed country-by-country data make it possible to calculate the percentage of sales for each parent in each partner country. There are 27 reporting parent countries in the data. Of these 27 parent countries, 14 report detailed country-by-country data. There are three parent countries that report continental level data (Norway, Sweden and Austria). Four parent countries only report a total for all partner jurisdictions (Netherlands, Finland, Ireland, and South Korea).

Method: The unrelated party revenues of parent p in partner jurisdiction j are used to calculate the percentage of sales of each parent in partner countries:

$$\% \text{ sales }_{p,j} = \frac{unrelated\ party\ revenue_{p,j}}{\sum_{j}^{J} unrelated\ party\ revenue_{p,j}} \tag{B1}$$

The percentage of sales will then be used by the partner country to claim a share of the tax deficit of the parent as in equation B2. For instance, consider the US as the parent country p of multinationals and France as the partner country j. In that case, France can collect a share of the tax deficit of the US based on the percentage of sales US-American multinationals make in France:

$$\text{Sales based tax deficit }_{j} = \sum_{p}^{P} \% \text{ sales}_{p,j}\ Tax\ deficit_{p} \tag{B2}$$

The tax deficit of parent country p used for these calculations is taken from the multilateral tax deficit estimations (table 1).

Since important trade partners of the EU countries, such as Germany, the UK, Switzerland, and Spain, are not yet reporting CbCR data to the OECD, our dataset lacks information of the sales shares of these countries. This means concretely that we cannot estimate the sales-based tax deficit France could collect from German multinationals because we do not have information of the sales German multinationals realize in France. To account for this caveat, we scale the non-US sales-based tax deficit for each partner country by a factor of two (except for Germany by a factor of 1.5). The uprate factors are based on the observation that the EU countries missing in the OECD data made up around 50% of intra-EU exports in 2016 (EUROSTAT 2021c).

Currency Conversion and Extrapolation to 2021: We directly build on our results in 2021 bn EUR from the cooperation scenario explained in Appendix A with results presented in table 1.

Share in current corporate income tax revenue: The shares in CIT revenue and health expenditure are based on 2016 data (for the tax deficit and CIT revenue and health expenditure) detailed in Appendix A. We compute the share in current corporate tax revenue by dividing the hypothetical sum of the unilateral tax deficit within the EU (189 bn 2016 EUR) by the sum of corporate income tax revenue (283 bn 2016 EUR).

Appendix C. Imperfect coordination scenario: data, methodology, and supplementary results

In a second scenario, we model the revenue effects of a minimum tax agreed upon within the EU-27. The EU-27 countries collect the tax deficit of its headquartered MNEs and, additionally, the tax deficit of foreign, non-EU MNEs based on the sales share the non-EU MNEs realize in the EU countries. This scenario is an intermediary between the multilateral or cooperation scenario and the unilateral scenario, where only one country collects the tax deficit. The estimation of the cooperation-based tax deficit of headquartered MNEs is explained in Appendix A. The calculation of additional tax deficit based on the sales share of foreign MNEs, is laid out in Appendix B. The fact that 27 countries are collecting the tax deficit of their MNEs results in a reduced collection of the tax deficit from foreign MNEs, since countries can only collect the tax deficit on the sales share of non-EU multinationals.

Apart from the sales shares based on country-by-country information about unrelated party revenue, we also include the sales shares of the tax deficit of countries that report sales in "Europe" as well as "other Europe" on an aggregate basis. However, we restrict the parent countries to those which report only few EU countries on a country-by-country basis (Australia, Brazil, China, France, Singapore, Canada). The tax deficit from sales in those aggregated jurisdiction makes up €2.3bn of €27.5bn.

Since the OECD's CbCR data suffers from the absence of several non-EU economies with significant trade relations with the EU such as the United Kingdom, Turkey, Russia, and Switzerland, we implement an upward correction for the sales-based tax deficit similar to the one implemented in the unilateral scenario. For this task, we consult EUROSTAT's (2021b) import statistics from non-EU partners. The non-EU countries with sufficiently detailed sales data represented in the OECD's CbCR statistics[13] constituted about 50.5% of all imports into the EU from non-EU countries in 2016. Thus, we uprate the resulting tax deficit from our calculation by a factor of two for all parent

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[13] The non-EU countries represented in the OECD's CbCR data are the following: Australia, Canada, Chile, Mexico, Norway, Bermuda, Brazil, China, Japan, South Korea, USA, Indonesia, India, Singapore, South Africa. Norway and South Korea do not have sufficiently detailed information on their sales in partner jurisdiction and must be left out for the sales apportionment as well.

countries except for the sales tax deficit attributed to the jurisdictions "Other Europe" and "Europe" which are based on aggregate information.

Table C1: Tax deficit in 2021 bn EUR of an EU cooperation case among the EU-27.

| Parent country | Tax deficit in € billion collected from… | | | % of | |
	Head-quartered firms	Non-EU MNEs*	Total tax deficit	National health expenditure	National CIT revenue
Austria	7.0	0.6	7.6	16.6%	73.3%
Belgium	19.0	2.0	20.9	37.9%	114.8%
Cyprus	0.9	0.1	1.0	64.9%	77.5%
Czech Republic	1.1	0.3	1.4	7.5%	14.3%
Germany	29.1	5.7	34.8	7.3%	41.5%
Denmark	3.5	0.3	3.8	10.6%	40.9%
Estonia	0.4	0.0	0.4	23.2%	88.7%
Spain	12.4	1.6	14.0	11.0%	43.6%
Finland	4.7	0.2	4.9	20.4%	86.9%
France	26.1	3.5	29.6	9.0%	50.9%
Greece	1.6	0.1	1.7	9.9%	32.9%
Hungary	1.9	0.3	2.2	20.5%	62.6%
Ireland	14.0	5.1	19.1	61.2%	167.9%
Italy	11.1	2.3	13.5	6.6%	27.3%
Luxembourg	7.9	0.5	8.3	243.4%	282.3%
Latvia	0.5	0.0	0.5	25.9%	95.2%
Malta	0.3	0.0	0.3	28.8%	40.9%
Netherlands	9.3	3.3	12.6	11.3%	34.7%
Poland	11.0	0.7	11.7	34.9%	123.9%
Portugal	0.6	0.2	0.8	2.9%	9.0%
Sweden	5.3	0.5	5.8	9.2%	36.5%
Slovenia	0.1	0.0	0.1	1.6%	8.4%
Slovakia	0.0	0.1	0.2	0.7%	1.3%
Unallocated	.	2.3	2.3	.	.
EU total	167.7	29.8	197.5	13.1%	56.8%

* We uprate the tax deficit collected from non-EU multinationals based on sales by a factor of two to account for underrepresentation of important trade partners of the parent countries.

Appendix D: Firm-level computations: data, methodology, and supplementary results

Data: The firm-level estimations are based on newly collected country-by-country reports of multinationals (banks and non-banks). The bank CbCR data in our sample covers 38 European banks headquartered in 12 different European countries from which 36 are large systemic banks. The data are hand collected from the banks' annual reports and from CbCR reports published on each bank's website. The CbCR data on banks in our sample cover the year 2019 and include the list of banks in Table D.1.

The non-bank multinationals CbCR data in our sample covers 16 firms that are all headquartered in European countries except for one US-based multinational. Similarly, to the banks, the reports were hand collected from each company's annual report or from a country-by-country report on the company website. The CbCR data on MNEs in our sample cover the year 2019 and includes the list of companies in Table D.1.

The micro-level CbCR data sample gives information on profits and taxes paid by each MNE or bank in each country where the firm has activity. By using this data, we calculate the tax deficit that can be collected by the parent country of the firm. The individual companies' tax deficit implies that each parent country would collect extra revenues from the profits in partner countries based on a minimum tax.

Method: Each parent country would collect their headquartered firms' tax deficit based on the difference between the minimum tax rate and the effective tax rate the firm faces in the partner jurisdiction j (equation D1). This includes the tax deficit in the headquarter country. Four different minimum tax rates were taken into consideration for the estimations: 15%, 21%, 25% and 30%. Our benchmark scenario assumes a 25% minimum tax rate. The tax deficit of firm f is thus calculated as follows:

$$\text{Tax deficit}_f = \sum_j^J \left(25\% - ETR_j\right) Booked\ profits_j \tag{D1}$$

The sample is restricted to positive profits. The effective tax rate is computed as the taxes paid divided by the profits before tax for each multinational in each partner

country. For the bank sub-sample, we replace the ETR by the 6-year-average ETR if the taxes paid are negative or if the taxes paid are missing for the year 2019. We winsorize the banks' ETRs at the 5th and 95th percentile and arrive at a range between 0% and 50%. For the non-bank MNEs, we do not have access to data other than 2019 and the ETR is set to zero if the taxes paid are negative in this year. We winsorize the non-bank multinationals' ETRs at the 5th and 95th percentile and arrive at a range between 0% and 80%. Some ratios cannot be computed because of negative taxes in the year of our study and are thus left blank in table 4 and table D3.

For the sample of banks and non-bank multinationals, the tax deficit estimations are presented in millions current euros for the year 2021. The original data is extracted from CbC reports of firms of the year 2019. To align with the other results in the report, we uprate 2019 numbers proportional to nominal GDP growth. Nominal GDP grew by about 1.8% from 2019 to 2021.

Share of taxes paid: We also present the tax deficit of banks and MNEs as a share of taxes paid by each multinational based on 2019 numbers (see table D.2.). The results are presented for our benchmark scenario with the minimum tax rate of 25% in table 4. Estimations with four different tax rates can be found in table D.2. for the rates 15%, 21%, 25% and 30%. Additional tax deficit results for the individual banks and MNEs are presented in Table D.3. as a percentage of taxes paid by each bank or MNE.

Table D.1. List of Banks and MNEs in sample

Company	Parent country	Industry	No. of partner countries
BP	United Kingdom	Oil and gas	85
ENI	Italy	Oil and gas	72
Repsol	Spain	Oil and gas	45
Rio Tinto	United Kingdom	Oil and gas	53
Shell	Netherlands	Oil and gas	85
Enel	Italy	Oil and gas	15
Equinor	Norway	Oil and gas	20
Anglo-American	United Kingdom	Mining	48
Iberdrola	Spain	Electric utility	29
Telefonica	Spain	Telecommunications	18
BT Group	United Kingdom	Telecommunications	14
Grupo ACS	Spain	Engineering	24
Allianz	Germany	Insurance	21
AXA	France	Insurance	13
Prudential	United States	Financial services	12
Legal&General	United Kingdom	Financial services	5
ERSTE	Austria	Bank	8
Belfius	Belgium	Bank	3
KBC	Belgium	Bank	19
Danske	Denmark	Bank	16
Nykredit Realkredit	Denmark	Bank	2
Nordea	Finland	Bank	20
BNP Paribas	France	Bank	69
BPCE	France	Bank	64
Credit Agricole	France	Bank	47
Credit Mutuel	France	Bank	23
Societe Generale	France	Bank	80
Bayern LB	Germany	Bank	5
Commerzbank	Germany	Bank	12
Deutsche Bank	Germany	Bank	51
DZ Bank	Germany	Bank	19
Helaba	Germany	Bank	9

LBBW	Germany	Bank	10
Nord LB	Germany	Bank	6
AIB	Ireland	Bank	3
Intesa Sanpaolo	Italy	Bank	31
Monte dei Paschi	Italy	Bank	15
Uunicredit	Italy	Bank	35
ABN Amro	Netherlands	Bank	15
ING	Netherlands	Bank	40
Rabobank	Netherlands	Bank	40
Banco de Sabadell	Spain	Bank	5
Bankia BFA	Spain	Bank	2
BBVA	Spain	Bank	32
Santander	Spain	Bank	34
Handelsbanken	Sweden	Bank	16
SEB Bank	Sweden	Bank	19
Swedbank	Sweden	Bank	7
Barclays	United Kingdom	Bank	30
HSBC	United Kingdom	Bank	62
Lloyds	United Kingdom	Bank	9
Nationwide	United Kingdom	Bank	2
RBS	United Kingdom	Bank	28
Standard Chartered	United Kingdom	Bank	57

Table D.2. Firm-level tax deficit (in millions of euros, 2021)

	Parent Country	15%	21%	25%	30%
Non-banks					
AXA	**France**	121.3	195.7	275.5	435.4
Allianz	**Germany**	286.1	600.5	893.9	1,350.1
Anglo-American	**United Kingdom**	279.0	400.2	480.9	717.4
BP	**United Kingdom**	193.1	352.2	484.9	661.0
BT Group	**United Kingdom**	8.0	14.3	21.4	33.7
ENI	**Italy**	63.2	110.2	171.5	250.3
Enel	**Italy**	57.3	198.6	356.3	629.1
Equinor	**Norway**	157.7	234.1	285.1	349.6
Grupo ACS	**Spain**	124.5	190.6	235.1	293.1
Iberdrola	**Spain**	169.0	315.8	488.3	703.9
Legal&General	**United Kingdom**	102.4	143.3	170.7	204.8
Prudential	**USA**	280.1	447.9	578.2	741.2
Repsol	**Spain**	34.0	65.0	126.8	205.7
Rio Tinto	**United Kingdom**	230.9	350.3	429.9	530.6
Shell	**Netherlands**	1,150.6	1,913.9	2,436.9	3,095.4
Telefonica	**Spain**	192.1	327.2	425.2	547.7
Total non-banks		**3,449.3**	**5,859.7**	**7,860.7**	**10,749.0**
Tax deficit as % of taxes paid		**9.0%**	**15.3%**	**20.5%**	**28.0%**
Banks					
AIB	**Ireland**	21.3	52.7	73.6	99.7
Abn Amro	**Netherlands**	3.9	9.6	76.7	209.3
BBVA	**Spain**	34.1	92.7	205.7	461.2
BNP Paribas	**France**	127.8	329.0	534.9	905.6
BPCE	**France**	19.8	61.9	107.0	202.7
Banco Sabadell	**Spain**	16.1	54.3	80.6	117.4
Banco Santander	**Spain**	257.2	493.4	687.9	1,264.9
Bankia BFA	**Spain**	0.0	0.1	0.2	13.6
Barclays	**United Kingdom**	400.4	696.9	916.9	1,194.0
Bayern LB	**Germany**	121.0	201.6	255.4	322.5
Belfius	**Belgium**	0.0	0.0	0.0	26.8
Commerzbank	**Germany**	7.6	25.0	37.2	95.7
Crédit Agricole	**France**	46.4	142.8	220.3	434.1
Crédit Mutuel	**France**	8.5	104.0	407.6	788.7
DZ Bank	**Germany**	13.3	58.2	219.8	433.5
Danske Bank	**Denmark**	0.4	29.9	85.9	178.3
Deutsche Bank	**Germany**	10.6	47.8	82.9	189.0
ERSTE	**Austria**	21.1	90.2	164.5	267.0
HSBC	**United Kingdom**	2,400.6	3,484.6	4,246.7	5,222.3
Handelsbanken	**Sweden**	0.0	5.0	17.2	56.4
Helaba	**Germany**	39.3	72.2	95.2	124.0
ING	**Netherlands**	3.4	25.3	61.6	148.4
Intesa Sanpaolo	**Italy**	40.1	319.7	672.4	1,129.0
KBC Bank	**Belgium**	7.7	91.4	154.5	270.7
LBBW	**Germany**	10.2	20.2	27.5	37.1

Lloyds Banking Group	**United Kingdom**	20.4	29.9	37.4	185.0
Monte dei Paschi	**Italy**	0.0	0.0	0.1	0.1
Nationwide	**United Kingdom**	0.0	0.0	0.0	0.0
Nord LB	**Germany**	0.0	0.0	1.8	6.4
Nordea	**Finland**	18.2	47.9	67.7	114.4
Nykredit Realkredit	**Denmark**	0.0	68.3	116.2	175.9
RBS	**United Kingdom**	421.9	710.4	903.5	1,145.1
Rabobank	**Netherlands**	16.0	32.2	46.1	158.1
SEB Bank	**Sweden**	14.5	77.2	161.9	274.1
Société Générale	**France**	140.0	318.9	480.5	692.6
Standard Chartered	**United Kingdom**	186.6	356.6	478.1	651.9
Swedbank	**Sweden**	0.0	41.1	134.1	251.6
Unicredit	**Italy**	91.2	204.0	312.5	448.6
Total banks		**4,519.8**	**8,394.9**	**12,172.0**	**18,295.9**
Tax deficit as % of taxes paid		**15.3%**	**28.4%**	**41.1%**	**61.8%**

Table D.3. Firm-level tax deficit as a percentage of taxes paid

	Parent country	15%	21%	25%	30%
Non-bank					
AXA	France	10.3%	16.6%	23.3%	36.9%
Allianz	Germany	11.4%	23.9%	35.6%	53.7%
Anglo-American	United Kingdom	15.2%	21.8%	26.2%	39.1%
BP	United Kingdom	4.5%	8.3%	11.4%	15.6%
BT Group	United Kingdom	9.7%	17.3%	25.9%	40.8%
ENI	Italy	1.3%	2.3%	3.6%	5.2%
Enel	Italy	2.9%	10.2%	18.3%	32.4%
Equinor	Norway	2.0%	3.0%	3.6%	4.5%
Grupo ACS	Spain	202.3%	309.7%	382.1%	476.4%
Iberdrola	Spain	20.7%	38.6%	59.7%	86.0%
Legal&General	United Kingdom	16.3%	22.9%	27.2%	32.7%
Prudential	USA	115.3%	184.4%	238.0%	305.1%
Repsol	Spain	3.5%	6.7%	13.1%	21.3%
Rio Tinto	United Kingdom	5.8%	8.8%	10.8%	13.3%
Shell	Netherlands	17.2%	28.7%	36.5%	46.4%
Telefonica	Spain	33.0%	56.2%	73.0%	94.0%
Average non-banks		**9.0%**	**15.3%**	**20.5%**	**28.0%**
Banks					
AIB	Ireland	37.4%	92.4%	129.0%	174.8%
Abn Amro	Netherlands	0.6%	1.5%	11.7%	32.0%
BBVA	Spain	1.9%	5.0%	11.2%	25.1%
BNP Paribas	France	4.9%	12.5%	20.4%	34.5%
BPCE	France	1.1%	3.5%	6.0%	11.3%
Banco Sabadell	Spain	9.1%	30.6%	45.4%	66.2%
Banco Santander	Spain	7.8%	15.0%	21.0%	38.6%
Bankia BFA	Spain	0.0%	0.1%	0.1%	6.2%
Barclays	United Kingdom	.	.	.	.
Bayern LB	Germany	148.6%	247.5%	313.4%	395.9%
Belfius	Belgium	0.0%	0.0%	0.0%	10.5%
Commerzbank	Germany	1.8%	6.0%	9.0%	23.0%
Crédit Agricole	France	9.9%	30.6%	47.1%	92.9%
Crédit Mutuel	France	0.5%	6.0%	23.6%	45.7%
DZ Bank	Germany	1.6%	6.8%	25.7%	50.7%
Danske Bank	Denmark	.	.	.	.
Deutsche Bank	Germany	1.7%	7.4%	12.9%	29.3%
ERSTE	Austria	4.4%	18.9%	34.5%	56.0%
HSBC	United Kingdom	140.2%	203.5%	248.0%	305.0%
Handelsbanken	Sweden	0.0%	0.9%	3.0%	9.7%
Helaba	Germany	52.1%	95.8%	126.4%	164.6%
ING	Netherlands	0.2%	1.3%	3.1%	7.5%
Intesa Sanpaolo	Italy	2.4%	19.4%	40.8%	68.5%
KBC Bank	Belgium	1.5%	18.0%	30.4%	53.3%
LBBW	Germany	5.6%	11.0%	15.0%	20.2%
Lloyds Banking Group	United Kingdom	1.4%	2.0%	2.5%	12.6%
Monte dei Paschi	Italy	.	.	.	.

Nationwide	United Kingdom	0.0%	0.0%	0.0%	0.0%
Nord LB	Germany	0.0%	0.0%	5.6%	20.3%
Nordea	Finland	3.1%	8.2%	11.6%	19.7%
Nykredit Realkredit	Denmark	0.0%	37.4%	63.5%	96.3%
RBS	United Kingdom	130.7%	220.1%	280.0%	354.8%
Rabobank	Netherlands	1.9%	3.9%	5.6%	19.1%
SEB Bank	Sweden	3.2%	17.0%	35.7%	60.4%
Société Générale	France	14.3%	32.5%	49.0%	70.7%
Standard Chartered	United Kingdom	17.4%	33.2%	44.5%	60.7%
Swedbank	Sweden	0.0%	9.1%	29.6%	55.5%
Unicredit	Italy	9.9%	22.2%	34.1%	48.9%
Average banks		**15.3%**	**28.4%**	**41.1%**	**61.8%**

Appendix E: Methodological notes on website simulations

The online simulator, which can be accessed following this link, allows users to investigate the different scenarios of this report, examine the impact of the minimum tax rate and estimate what their home country would gain from collecting its tax deficit.

The following scenarios are covered on the platform: 1) a multilateral agreement on a global minimum effective tax rate, 2) a partial cooperation agreement involving EU member states, 3) the unilateral implementation of the tax deficit collection, and 4) the tax deficit of nine multinationals headquartered in various European countries.

Each of these scenarios is available on a specific page that allows to simulate corporate tax revenue gains from any minimum effective tax rate between 10% and 50%. For instance, the "Multilateral implementation scenario" tab provides an estimate of the tax deficit that EU member states and other large headquarter countries could collect from their own multinationals. On another page, the user can choose which headquarter country would unilaterally implement the tax deficit collection and observe from which jurisdictions additional revenues would be collected. All outputs can be downloaded as ".csv" tables.

Computations are run in Python and follow the methodology presented so far. The first three scenarios are based on the same combination of aggregated data by the OECD (2021) and Tørsløv, Wier and Zucman (2019, 2020). The fourth scenario relies on data

collected from firms' annual reports or tax transparency publications. As a simplification, however, exchange rates and multipliers used to extrapolate results from 2016 to 2021 bn EUR are not re-computed but directly implemented from the output of the benchmark computations.

Macroeconomic estimates rely on the data files described in Appendix A. In the OECD's aggregated country-by-country reports, the few missing "Income Tax Paid (on Cash Basis)" values for Canada-headquartered multinationals have been manually imputed, using the same statutory rates as in our central estimates. The domestic tax deficit of countries that do not provide a country-by-country report is estimated based on an intermediary output of our benchmark computations, itself drawn from Tørsløv, Wier and Zucman (2019, 2020).

Firm-level computations are based on the same data as the estimates provided in this report. A ".csv" file has been extracted from the database for each firm that can be investigated with the online simulator. The latter thereby covers: BNP Paribas (headquartered in France), SEB Bank (Sweden), ENI (Italy), Danske Bank (Denmark), Deutsche Bank (Germany), Erste Bank (Austria), Repsol (Spain), BP (United Kingdom) and Shell (Netherlands).

Besides the online simulator, the code running the computations has been conceived as a Python package, making it easy to reproduce our results. The logic for macro-computations has been encapsulated in a Python class, "TaxDeficitCalculator", defined in the "calculator.py" file. From there, several class methods allow to run the same computations as we do for the three scenarios. Similarly, the computational logic for firm-level estimates is established in a dedicated class, CompanyCalculator, defined in the "firm_level.py" file. The whole code and data files, as well as guidance on how to install and use this package, will shortly be made available in an online repository.

Appendix F: List of tax havens considered in this report

The list of tax havens we consider is the same as in Tørsløv et al. (2018):

OECD tax havens: Belgium, Ireland, Luxembourg, Netherlands, Switzerland.

Non-OECD tax havens: Andorra, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Belize, Bermuda, Bonaire, British Virgin Islands, Cayman Islands, Curacao, Cyprus, Jersey, Grenada, Guernsey, Gibraltar, Hong Kong, Isle of man, Lebanon, Liechtenstein, Macau, Malta, Marshall Islands, Monaco, Sint Maarten, Mauritius, Seychelles, Singapore, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Turks and Caicos, Panama, Puerto Rico

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The EU Tax Observatory is an independent research center that conducts and disseminate innovative studies on taxation and stimulates exchanges between the scientific community, civil society, and policy makers. It is hosted at the Paris School of Economics. The EU Tax Observatory receives funding from the European Union under grant TAXUD/2020/DE/326. This report does not reflect the views of the European Commission.

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