



# Empirical evidence on the Global Minimum Tax: What is a critical mass and how large is the Substance-Based Income Exclusion?

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# **Empirical evidence on the Global Minimum Tax: What is a critical mass and how large is the Substance-Based Income Exclusion?**

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**Abstract:** This paper presents empirical evidence on the proposed Global Minimum Tax (GMT) of the OECD's Pillar 2. First, it addresses how many, and which, countries or country groups can be seen as constituting a "critical mass" for its successful implementation; given such a critical mass, remaining jurisdictions worldwide will have an incentive to implement the GMT as well. Second, it assesses the generosity of the substance-based income exclusion (SBIE), which is informative on the revenue collected under the GMT.

**JEL classification:** Multinational firms, minimum tax, substance-based income exclusion

**Keywords:** F23, H25, H26

## 1. Introduction

In a landmark deal in October 2021, almost 140 countries of the G20/OECD Inclusive Framework agreed to a two-pillar proposal for the fundamental reform of the international tax system (OECD/G20, 2021a). Pillar 1 seeks to re-allocate taxing rights for part of the profits of large multinational enterprises (MNEs) towards the market country. Pillar 2 introduces a global minimum tax (GMT) on corporate profits.

This paper aims to shed light on two important aspects of the GMT. The first concerns the incentive of countries to implement the GMT. This depends on some key features of the proposal, and in particular, the different ways in which the top-up tax can be collected by different countries in which an multinational enterprise (MNE) operates. It also depends on the extent to which MNEs have operations in countries which do introduce the GMT. Our results suggest that most in-scope MNEs operate in several large, developed countries. Given the detailed proposals of how the GMT would operate, this implies that a coordinated implementation of the GMT in a critical mass of even three or four such countries would create a significant incentive for other such countries to follow suit in implementing the GMT. That in turn, would create an incentive for most other countries also to implement the GMT. In particular, the recent commitment by the EU27 to introduce the GMT creates a significant incentive for other countries to follow (European Council, 2022).

The second concerns the revenue from the top-up tax that would be collected under the GMT. The GMT proposes to implement a top-up tax equal to a top-up rate multiplied by “excess profit”, defined broadly as financial profit less a “substance-based income exclusion” (SBIE). The SBIE is in turn defined as a proportion of the value of tangible assets and payroll costs. A key factor in the size of revenue collected is therefore the size of the SBIE relative to financial profit. The SBIE is also important in affecting the likelihood of competition between countries in the presence of the GMT. That is, profit from real activities, as opposed to profit shifted into a country, may generate a relatively large SBIE. In such cases, the top-up tax would be relatively small, and countries may therefore seek to continue to compete to attract such real activities.

Our findings suggest that a GMT implemented in Europe would result in total taxation of around 9% of financial profit of in-scope MNEs in the short run and around 12% in the longer run. We also document that behavioural responses by in-scope MNEs have the potential to substantially increase the share of profits covered by the SBIE.

The remainder of this article proceeds as follows. In the second section, we present methodology, data and results for determining the critical mass of countries. In the third section, we present methodology, data and results for share of profits covered by the SBIE. Section four briefly concludes.

## 2. Critical Mass of Countries

In this section, we address the question of what would constitute a critical mass of countries to implement the GMT. This depends on two factors: the design of the GMT, and the extent to which MNEs are active in a small number of key countries. Note that the countries that signed the agreement

have not so far committed to introduce it but only to accept the application of the rules by other countries (OECD/G20, 2021a).

## 2.1. Conceptual Framework

The GMT allows for the possibility that three types of country might implement the top-up tax. To consider this, let us consider a hypothetical MNE with a parent company and headquarter in a high-tax country A, real activities in other high-tax countries, B and C, and also a subsidiary in a low-tax country, D. Let us assume that the subsidiary in D faces an effective tax rate in D of less than 15%. This triggers a top-up tax of a percentage of “excess profit”, as defined in the Pillar 2 Model Rules.<sup>1</sup>

A key question for the incentive to implement the GMT is which countries might collect this top-up tax. There is a clear rule order. First, country D may introduce a Qualified Domestic Minimum Top-up Tax (QDMTT) equal to the top-up charge. If it does so, then no other countries levy any further tax. If country D does not levy a QDMTT, then country A may levy the top-up tax through an Income Inclusion Rule (IIR). If country A does not do so, then countries B and C may collect the top-up tax through an Undertaxed Payments Rule (UTPR). In practice the UTPR would operate by denying deductions for costs incurred by the MNE in those countries, and there are rules as to how the revenue would be shared between B and C.

To understand the incentives created by this structure, let us start with country A.<sup>2</sup> In the absence of any GMT, country A would be unlikely to implement unilaterally a tax along the lines of the IIR. Doing so would create a disincentive for MNEs to locate their parent companies in A. Those MNEs that nevertheless did so may face a competitive disadvantage compared to MNEs with parents located elsewhere and which were not subject to the IIR. The USA is the only country with a tax akin to the IIR (the GILTI), which reflects the size and market power of the USA.

How would country A’s incentives be changed if other countries adopted an IIR, but no countries adopted a UTPR or QDMTT? In this case, there would be no competitive disadvantage to implementing an IIR. However, there would be a competitive advantage from *not* implementing an IIR, since it would be become a relatively attractive location for parent companies.

The existence of the UTPR may remove this potential competitive advantage, however. In our example, if countries B and C implemented a UTPR, then – at least with respect to our hypothetical MNE - there would be no competitive advantage for A in *not* implementing an IIR. That is because the top-up tax would simply be collected by countries B and C instead. By *not* having an IIR, country A would be giving up tax revenue without creating any incentives for MNEs to locate their parent companies there.

The UTPR therefore plays a crucial role in creating an incentive for countries hosting parent companies to implement an IIR. But how crucial the role is, depends on the structure of MNEs, and whether other countries implement a UTPR. If most MNEs with parents in A are also present in B and C, and each has a UTPR, then there is a strong incentive for A to implement an IIR. If the MNEs are not present in B and C, then that incentive is much weaker. The empirical analysis below therefore focuses on this

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<sup>1</sup> (OECD/G20, 2021b).

<sup>2</sup> These issues are developed further in Devereux (2023).

issue: To what extent are MNEs with parents in large and developed countries also present in other large and developed countries?

Note in passing that if all countries implemented an IIR, then no revenue would be raised from a UTPR. The value to, say, country B of implementing a UTPR is to provide an incentive for other countries – notably A – to introduce an IIR, and thereby make it feasible for B also to have an IIR.

Finally, if A, B and C had all introduced an IIR and a UTPR, then there is a clear incentive for D to introduce a QDMTT. Again, if D did *not* introduce a QDMTT it would be giving up potential tax revenue, without any effect on incentives for MNEs to shift either real activity, or mobile profit, to D.

In sum, if a critical mass of large and developed countries each introduces an IIR and a UTPR, then that would create an incentive for other countries to follow suit. But it is an empirical question as to what would constitute such a critical mass. We now turn to that question.

## 2.2. Data & Methodology & Results

To study the critical mass of the GMT, we analyse parent and subsidiary location data of in-scope MNEs. In the ORBIS database (provided by Bureau von Dijk), we observe in 2018 11,334 firm groups that have consolidated revenues above the GMT revenue threshold of €750 million. These firms have aggregate turnover of €65 trillion and aggregate pre-tax profit of €5 trillion. For 5,878 of the firm groups, we have subsidiary location data. These firms have aggregate turnover of €35 trillion and aggregate pre-tax profits of €5 trillion.

Most of the firms for which we have subsidiary location data are MNE groups. In total we observe 4,842 MNEs. These have aggregate revenues of \$32 trillion and pre-tax profits of \$2.8 trillion pre-tax. By comparison, the OECD (2020) identified a total number of MNEs (including those not subject to the GMT) of almost 28,000 with aggregated revenues of \$51.5 trillion and pre-tax profits of \$4.1 billion.

In Table 1, we focus on G7 countries. The first column reports the total pre-tax profit of MNEs with a headquarter in each of the countries listed; for example, in 2018, the total worldwide profit of in-scope US-headquartered MNEs in our sample is €949 billion. Of course, only a fraction of this profit might be subject to the GMT. The second column reports the percentage of this total profit that can be attributed to MNEs that have no subsidiary in any of the other G7 country. Again, for example, only 4% of the total profit of in-scope US MNEs is earned by those MNEs that do not have any presence in other G7 countries. The next 7 columns examine what proportion of the total profit is attributable to MNEs that have a subsidiary in each other G7 country. For example, 91% of the total profit of in-scope US MNEs is attributable to those MNEs that have a subsidiary in Canada.

As already noted, the total profit figures in the first column do not represent profit that might be subject to the GMT. Nevertheless, the table is instructive. Most of the percentages in the right-hand part of the table exceed 80%. That indicates that MNEs headquartered in G7 countries are very likely to have operations in all other G7 countries. The second column indicates that (with the possible exception of Italian headquartered MNEs) almost all the profit of in-scope MNEs headquartered in G7 countries is attributable to those MNEs with subsidiaries in other G7 countries.

This has important implications for the use of the UTPR, and hence the IIR in these countries. Suppose that a G7 country – say the UK - decided not to implement an IIR, but that the other G7 countries all implemented a UTPR. Then (in the absence of a QDMTT in the source country) it seems very likely that the vast majority of profit that would otherwise be subject to a UK IIR would instead be subject to a UTPR in the other G7 countries. Indeed, even if the USA were the only country to implement a UTPR, the same would be true.

**Table 1: Total Profits of MNCs by G7 Headquarter and Subsidiary Country**

HQ country	Total profit before tax (€billion)	Percentage of profit of MNEs in HQ country without subsidiaries in any other G7 country	Percentage of profit of MNEs in HQ country with subsidiaries in each other G7 country						
			USA	Canada	Japan	Germany	France	UK	Italy
US	949	4		91	65	73	77	86	74
Canada	50	1	98		13	34	30	46	22
Japan	366	5	94	62		71	72	80	59
Germany	116	4	89	80	71		94	90	87
France	97	1	93	85	76	96		94	95
UK	223	3	94	88	73	84	85		70
Italy	43	11	76	57	27	75	75	82	

*Notes:* Table shows the total profits before tax and percentage profit of MNEs with subsidiary in each other G7 country by G7 headquarter country. *Source:* Authors' calculation based on Orbis database 2018, provided by Bureau von Dijk

Table 1 therefore provides strong evidence that an agreement between G7 countries – or even a subset of G7 countries – to introduce a UTPR would constitute a powerful incentive for those countries to also introduce an IIR.

To investigate this further, we assess whether the EU27 – which recently reached an agreement to introduce the GMT (see European Council, 2022) – would represent a critical mass for the implementation of the GMT worldwide. Table 2 reports the share of profits for the top 10 countries for MNE headquarters (excluding the EU27 countries) with operations in at least 1, 2, 3, 4 and 5 of the EU27 countries.

The bottom row of Table 2 indicates that of all in-scope MNEs 77% of their aggregate profit is attributable to MNEs that have subsidiaries in at least two of this group of countries. Assuming that all EU27 countries successfully implement a UTPR, this suggests that between them they would constitute a powerful incentive for other countries to introduce an IIR.

That incentive does vary across countries, however. The percentage is very high in G7 countries, but considerably lower in other countries. The EU27 countries would arguably create a critical mass

amongst for the USA, Japan, the UK and Switzerland but possibly not for important Asian and Australasian countries – for example, it is only 16% in China, 37% in Australia and 44% in Taiwan. However, if some other countries – notably the US, Japan and the UK – also followed suit by implementing a UTPR, then the incentive to introduce an IIR would be stronger also for those countries. Our calculations do, however, not suggest that the change to the incentive would be very strong: Even if the US, Japan and the UK in addition to the EU27 European countries implemented the GMT, only 39% (22%) of the profits of MNEs headquartered in China would belong to firms groups that have a subsidiary in at least two (three) of these countries.

**Table 2: Share of Profits of MNCs in Top 10 Headquarter Countries with Subsidiaries in Germany, France, Italy, Spain and/or the Netherlands**

Top 10 HQ country (excluding Germany, France, Italy, Spain and the Netherlands)	Total profit before tax (€ billion)	Percentage of profit of MNEs in HQ country with subsidiaries in at least <i>n</i> of the EU27 countries (%)				
		<i>n=1</i>	<i>n=2</i>	<i>n=3</i>	<i>n=4</i>	<i>n=5</i>
US	949	89	84	81	78	75
Japan	366	84	76	71	69	64
UK	223	99	97	94	87	86
China	137	33	16	14	11	10
South Korea	102	93	79	78	77	75
Australia	71	70	37	33	10	7
Taiwan	62	50	44	18	15	15
Switzerland	59	98	95	95	95	95
Cayman Islands	58	81	72	71	71	68
Hong Kong	57	17	12	11	4	4
Total (not just top 10)	2,835	84	77	73	69	66

*Notes:* Table shows total profits before tax of MNEs and the percentage of profit of MNEs with subsidiaries in at least 1,2,3,4, or 5 of the EU27 countries by headquarter country for the top 10 headquarter countries, excluding the EU27 countries.  
*Source:* Authors' calculation based on Orbis database 2018, provided by Bureau von Dijk

More broadly, given the importance of Europe and the USA as homes of MNE headquarters, if the EU27 countries create a strong incentive for the US, Japan and the UK to also introduce an IIR, then there would also be a strong incentive for low-tax countries to introduce a QDMTT. In short, the EU27 countries alone may well represent a critical mass that would induce a much broader implementation of the elements of the GMT proposal.

### 2.3. Summary

In this section, we have discussed the incentives from the perspective of individual countries to introduce the various elements of the GMT: the QDMTT, IIR and UTPR. A key issue is whether the UTPR will be implemented successfully in a small number of key countries. If it is, then that creates a strong incentive for other headquarter countries to implement an IIR, and in turn for low-tax countries to introduce a QDMTT.

The evidence presented indicates that the vast majority of the profit of in-scope MNEs is attributable to MNEs that have a presence in G7 countries. That suggests that the G7 – or probably a subset of the G7 – could represent a critical mass sufficient for the GMT to be implemented much more broadly. Indeed, the EU27 countries - that have recently reached an agreement to implement the GMT would very probably constitute a critical mass as well.

### **3. Substance-Based Income Exclusion**

In the second part of this paper, we turn to analysing the generosity of the Substance-Based Income Exclusion (SBIE). The SBIE is a formulaic carve-out. Initially it will be set to the sum of 10% of payroll and 8% of tangible assets (an average of the beginning and the end of the financial year). The percentages will decline gradually until the tenth year, after which they will be 5% of both payroll and tangible assets.

The size of the SBIE plays an important role for the GMT. The SBIE is deducted from total GloBE income to derive the measure of “excess profit”. This is the base for any top-up tax levied, whether it is applied in the form of a Qualified Domestic Minimum Top-up Tax (QDMTT), an Income Inclusion Rule (IIR), or an Under-Taxed Payments Rule (UTPR). A higher SBIE therefore reduces the top-up tax, and hence the overall effective tax rate ultimately levied. As Devereux et al. (2022) point out, the GMT puts a minimum floor on total tax paid of 15% of excess profits (at least in the absence of qualified refundable tax credits, QRTCs).

#### **3.1. Data and Methodology**

We assess the size of the SBIE using unconsolidated financial statements of foreign-owned EU subsidiaries of multinational enterprises (MNEs). We use data from the AMADEUS dataset, collected by Bureau von Dijk. We use data for 2019 on sales, pre-tax profits, wage costs, tangible assets and depreciation provisions. We use 2019 data to remove the impact of Covid-19 on corporate profits. Dropping foreign-owned firms with no data on depreciation provisions leaves us without any firms in Cyprus, Greece and Lithuania.

Our main measure of interest is the share of pre-tax profits covered by the SBIE. We therefore exclude firms with non-positive profits. We also consider other measures of expected profit, based on a return to equity, and we therefore also exclude firms with non-positive equity. Some elements of profit may be non-taxable – for example, dividends received. In our base case we address this issue by removing firms with a ratio of pre-tax profits to sales in the top 5% of the distribution (a ratio of around 34%). We report the robustness of our results to this below.

The GMT applies only to firms belonging to multinational enterprises (MNE) with aggregate revenue above €750 million. However, we do not observe complete ownership structures, nor aggregate revenue for the consolidated MNE. We therefore apply our analysis to all foreign-owned firms in the EU27 and the UK. Our sample consists of 43,564 firms. We also test the robustness of this approach

by also using only data on MNEs on which we have the necessary data to identify them as being in-scope for the GMT.

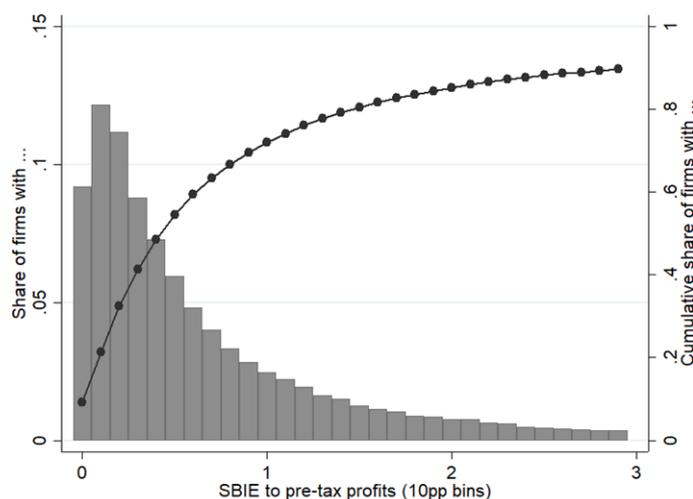
Table A1 in the Appendix compares the aggregate turnover of the firms in the raw data and our sample to country-level macroeconomic data from Eurostat. The sample coverage is good for most countries, and the sample restrictions have only a modest impact on the coverage. Since coverage is, however, less than 5% for Latvia and the Netherlands, we exclude these countries from the analysis. Thus, our analysis is based on foreign-owned firms in 23 European countries.

### 3.2. The size of the SBIE relative to pre-tax profit

Figure 1 shows the distribution and cumulative distribution of the ratio of SBIE to pre-tax profits for our sample. As described above, we use data from 2019, and apply the rules of the proposed GMT. We do not account for any behavioural change in response to the introduction of the GMT.

The figure indicates a significant heterogeneity among firms. The SBIE (based on the initial proportions of payroll and tangible assets) is below pre-tax profit for around 70% of firms; for the remaining 30% the SBIE exceeds pre-tax profit, sometimes by a wide margin.

**Figure 1: Distribution of SBIE to Pre-Tax Profits (1<sup>st</sup> year)**



*Notes:* The Figure shows the distribution, and cumulative distribution, of firms by the ratio of SBIE to pre-tax profits (using 10-percentage point bins). Firms with a ratio of SBIE to pre-tax profits in the top 10% of the distribution are not shown.  
*Source:* Authors' calculations based on Amadeus database, provided by Bureau von Dijk.

Since unused SBIE cannot be carried forward, in our base case summary statistics in Table 3 we cap the ratio of SBIE to pre-tax profit for each firm to 1, meaning the SBIE cannot exceed pre-tax profits. Based on this adjustment we calculate that in the first year that the GMT applies, the average ratio of SBIE to pre-tax profits is 57%, and the median ratio is 52%. These shares fall to 41% and 28% respectively after ten years due to the reduction in the percentages for the calculation of the SBIE. Based on an average ratio of SBIE to pre-tax profit of 57%, then on average, excess profit is approximately 43% of GloBE income, implying a minimum tax of 6.45% of GloBE income. This rises to 8.85% after 10 years.

Table 3 also shows the ratio of total SBIE relative to total pre-tax profit. The share of *total* pre-tax profit shielded is 37% in the first year and 23% after ten years.<sup>3</sup> Given that this ratio is below the share of profits covered by the SBIE for the average (and median) firms, this implies that firms with higher absolute profits have a higher ratio of profits to SBIE. In other words, the share of profits covered by the SBIE tends to fall with the absolute amount of profits. The minimum total tax on aggregated profits of all the firms included in our sample is 9.45% in the first year and 11.55% after ten years.

**Table 3: Ratio of SBIE to Pre-Tax Profits**

	<b>1<sup>st</sup> year</b>	<b>After 10 years</b>
<b>% Pre-tax profits shielded by SBIE</b>		
Average firm	57	41
Median firm	52	28
<b>% Total pre-tax profits shielded by SBIE</b>	37	23

*Notes:* The Table shows the share of pre-tax profits covered by the SBIE for the average and the median firm, and the share of total pre-tax profits covered by the SBIE. Results are reported for the 1<sup>st</sup> year the GMT applies and after 10 years.

*Source:* Authors' calculation based on Amadeus database, provided by Bureau von Dijk

### 3.2.1 Sensitivity analysis

We report two forms of sensitivity analysis.

First, the ratios reported in Table 3 are based on all foreign-owned firms in our sample due to the reasons set out above. When we instead use only a subsample of foreign-owned firms for which aggregate revenue data is available, and which we determine to be in-scope for the GMT, we calculate an average ratio of SBIE to pre-tax profits of 56% - almost identical to our base case.<sup>4</sup> This falls to 38% after 10 years.

Second, we also repeat this exercise dropping only the top 1% of firms in the distribution of the ratio of pre-tax profits to sales, instead of the top 5%. This has little impact on the average or median ratio. However, in this case the share of total profits shielded by the SBIE is lower: it is initially 28%, and falls to 18% after 10 years, substantially below the results reported in Table 3.<sup>5</sup> This reduction in the total ratio somewhat stronger in countries with a low statutory tax rate, and in Ireland and Luxembourg.

<sup>3</sup> These results are comparable to those of Barake et al. (2021) who use country level data to assess the impact of the substance based carve out on tax revenue collected under the GMT.

<sup>4</sup> The average ratio for out-of-scope firms is also 56% initially and 39% after 10 years. We find similar results for subsidiaries of domestic MNEs.

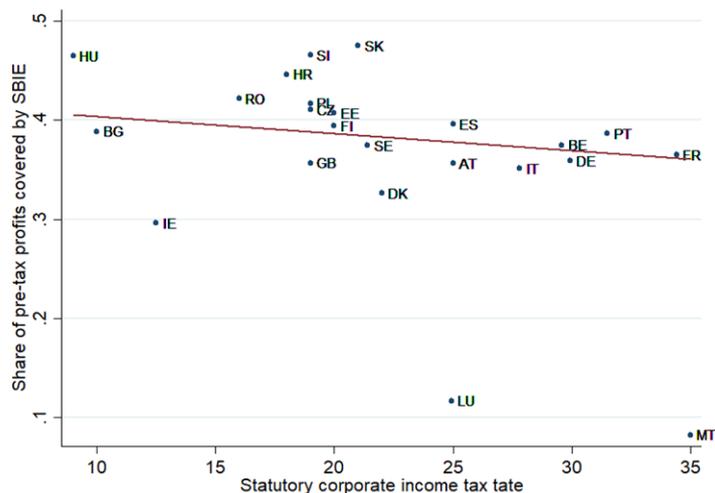
<sup>5</sup> The reduction in the share of total profits shielded is somewhat stronger in countries with a low statutory tax rate, and in Ireland and Luxembourg. Not dropping any firms in the distribution of the ratio of pre-tax profits to sales reduces the share of total profit shielded to 26% in the first year the GMT applies and to 17% after 10 years.

### 3.2.2 Results by Country

Given that our sample includes both low-tax and high-tax jurisdictions, the sample average may hide important heterogeneity across countries. We therefore also report results by country. In Figure 2, for each country we plot the share of total profit shielded by the SBIE against the statutory corporate income tax rate (this is for the first year; Figure A1 shows the position after 10 years).

Two results emerge: First, the share of total profits covered by the SBIE declines with the statutory tax rate, albeit only to a small degree. Second, Luxembourg, Malta - and to some extent also Ireland - are different; their share of total profits covered by the SBIE is substantially lower compared to those for the other EU countries. Given that these three countries are known for offering favourable tax conditions to MNEs, these results are in line with the hypothesis that MNEs book higher profits in low-tax jurisdictions and that statutory tax rates are only a weak predictor of the tax burden on company profits.

**Figure 2: Share of Pre-Tax Profits Covered by SBIE by Country (1st year)**



*Notes:* The Figure plots for each country the share of total profits covered by the SBIE in the first year the GMT applies against the statutory corporate tax rate.

*Source:* Authors' calculation based on Amadeus database, provided by Bureau von Dijk.

### 3.2.3 Ownership of Assets

We now return to an issue raised above; that some firms may have unused SBIE since their SBIE exceeds their pre-tax profit. This creates an incentive for firms with unused SBIE to mix with in-scope firms with SBIE that is insufficient to prevent a top-up charge. In principle this could be done by exchanging assets (and the associated income stream), or by merging firms. Here we ask: How much of the profits of foreign-owned firms that are not covered by the SBIE could be covered by using unused SBIE of other firms? In this case we consider merging firms. For example, a profitable domestic firm could be acquired by an in-scope MNE. The combined profit would then be subject to the GMT, and we examine how far that would reduce the top-up charge of the MNE. In considering other firms, we examine both profitable foreign-owned firms and profitable domestic firms located in the same

country?<sup>6</sup> The results for the first year of the GMT are shown in in Table 4. The first column indicates the share of aggregate profits of foreign-owned firms not shielded by the SBIE, expressed as a percentage of pre-tax profit of these firms. The next two columns show the unused SBIE of these two groups of other firms, also expressed as a percentage of the pre-tax profit of foreign-owned firms. The final column combines these two groups of other firms.

**Table 4: Aggregate Unused SBIE by Country (1st year of the GMT)**

	Aggregated profits of foreign owned firms <i>not shielded as a percentage of aggregate pre-tax profit of foreign owned firms</i>	Aggregate <i>unused</i> SBIE of ... as a percentage of aggregate pre-tax profit of foreign owned firms		
		Profitable foreign owned firms	Profitable domestic firms	Profitable foreign and domestic firms
Austria	64	4	15	19
Belgium	63	7	7	14
Bulgaria	61	4	3	7
Czech Republic	59	4	2	6
Croatia	55	3	5	8
Germany	64	8	9	17
Denmark	67	6	12	18
Estonia	59	4	12	16
Finland	61	6	22	28
France	64	4	6	10
Hungary	54	6	7	13
Ireland	70	4	6	10
Italy	65	5	14	19
Luxembourg	88	4	1	5
Malta	92	0	0	0
Poland	58	3	3	6
Portugal	61	6	5	11
Romania	58	4	4	8
Slovenia	53	5	7	13
Slovakia	53	6	2	8
Spain	60	7	9	16
Sweden	63	7	14	21
United Kingdom	64	6	9	15

*Notes:* Table shows the ratio of aggregate unused substance-based carve-out for profitable foreign owned firms and of profitable domestic firms to aggregate pre-tax profits of foreign owned firms by country. *Source:* Authors' calculation based on Amadeus database, provided by Bureau von Dijk

We find that the size of unused SBIE of other foreign-owned firms is relatively small relative to the total profit of foreign-owned firms. For example, in aggregate in Austria 64% of the profit of foreign-owned firms is *not* shielded by the SBIE. But if all of the surplus SBIE of other foreign-owned firms

<sup>6</sup> We focus only on profitable firms here since affected firms are unlikely to acquire unprofitable firms only because they have unused SBIE. We assume firms to be profitable if their return on equity is above 10%. In undertaking this exercise, we are not able to distinguish between in-scope of out-of-scope firms.

were allocated to those without surplus SBIE, this percentage would only be reduced by 4 percentage points to 60%. The size of the unused SBIE of domestic firms, in contrast, is more important as in the case of Austria the share of total profits not shielded is reduced by a further 15 percentage points by including the surplus SBIE of purely domestic firms. Across countries, a more efficient use of the SBIE could increase the share of total profits covered by the SBIE by around 15 percentage points or almost 40%. While this would benefit in-scope MNEs, it may well lead to economic inefficiencies in inducing acquisitions purely for tax purposes. These findings should be interpreted with some caution, since our sample of foreign-owned firms is not restricted to in-scope MNEs, and the coverage of domestic firms varies by country.

### 3.2.4 Heterogeneity by sector and source of finance

We now explore heterogeneity in the ratio of the SBIE to pre-tax profit. We analyse two factors which may affect the ratio: the use of intermediate materials and the use of debt finance.

First, we consider variation in the costs of materials. Some firms may produce intermediate materials themselves, using tangible assets and labour, while others buy such intermediate materials. The former group are likely to have a higher ratio of SBIE to pre-tax profit. We explore this variation in Table 5 by considering sectoral level differences. The Table reports the ratios of average material costs, average wage costs and average tangible assets, all to pre-tax profits. The ratios are not in percent as the share of SBIE to pre-tax profits: for example, a ratio of material to pre-tax profits of 40 means, for example, for each £1 profit there are on average £40 of material costs.

**Table 5: SBIE to Pre-Tax Profits by Industry (1st year the GMT applies)**

Average ... to pre-tax profits	SBIE in %	Material	Wages	Tangible assets
Agriculture	64	40	9	36
Mining and quarrying	62	15	11	19
Manufacturing	61	32	10	13
Electricity	54	63	4	22
Utilities	59	19	6	10
Construction	58	22	12	6
Retail	46	63	7	5
Transportation/Storage	68	21	16	12
Accommodation	78	10	11	25
Information	62	7	11	4
Financial Sector	49	7	9	10
Real Estate	68	10	8	47
Professional Activities	62	13	14	5
Other	68	12	19	10

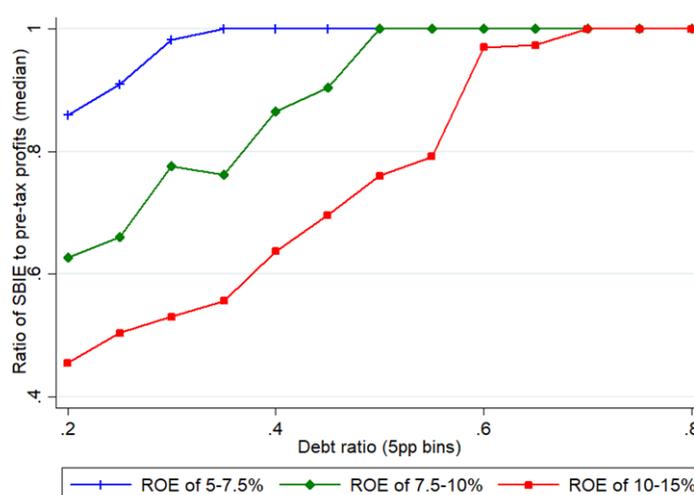
Notes: Table shows the average ratio of SBIE, material costs, wages and tangible assets to pre-tax profits by industry (NACE Rev 2 Codes).

Source: Authors' calculation based on Amadeus database, provided by Bureau von Dijk.

Table 5 indicates that the sectors with the lowest average ratio of SBIE to profits are retail (46%) and finance (49%). The low ratio for retail seems to be driven by the high importance of material inputs, with a very high ratio of material inputs to pre-tax profit. This is not true for finance, which seems instead to reflect very high average profitability. The sectors with the highest ratio of SBIE to pre-tax profits are accommodation (78%), transportation and storage (68%) and real estate (68%). These are all industries with a relatively low importance of material costs, and a high relevance of tangible assets (real estate and accommodation) or wages (transportation and storage).

Second, we analyse how the ratio of SBIE to pre-tax profit depends on the use of debt finance. Since pre-tax profit is after interest payments, greater use of debt will tend to reduce pre-tax profit and hence yield a higher ratio of SBIE to pre-tax profit. Figure 3 provides evidence on the relationship between debt financing and share of profits covered by the SBIE: It shows the median ratio of SBIE to profits of firms with a particular debt ratio (using 5-percentage point bins) and a particular rate of return on equity (ROE). As expected, the share of profits covered by the SBIE increases substantially with firms' debt ratio: The ratio is 60% for a firm with a return on equity of between 10% and 15% and a debt ratio of 40%, and 70% for an otherwise similar firm that has a debt ratio of 50%. The Figure also demonstrates that, for a given debt ratio, the ratio of SBIE to pre-tax profits rises as the ROE falls.

**Figure 3: SBIE to Pre-Tax Profits by Debt Ratio (1st year the GMT applies)**



*Notes:* Figure shows the median ratio of SBIE to pre-tax profits by debt ratio (5-percentage point bins) for companies with pre-tax profits over equity (ROE) between 5 and 7.5%, between 7.5 and 10%, and between 10 and 15%.

*Source:* Authors' calculation based on Amadeus database, provided by Bureau von Dijk

### 3.3. Summary

In this section, we have investigated various aspects of the size of the SBIE, measured as a proportion of pre-tax profit – effectively the share of profits shielded by the SBIE. This is important in determining the minimum tax burden on profits, and hence the revenue consequences, of the GMT.

We find that the share of total profits covered by the SBIE is just under 40% in the first year the GMT applies and 23% after 10 years. This implies a minimum tax burden on total profits of 9% and 12%

respectively. There is considerable heterogeneity in the share of profit covered by the SBIE. We explore two elements of the heterogeneity, depending on the same of use of material inputs and the use of debt finance.

We also investigate the scale of unused SBIE in each country, and consider how aggregate SBIE could be used more “efficiently” by MNEs to reduce their tax burden, if they acquire other firms with unused SBIE. We calculate that a more efficient use of the SBIE within a country could increase the share of profits covered by the SBIE by almost 40%.

## 4. Conclusion

The aim of this paper is to shed light on two central issues of the GMT: (i) the critical mass of countries required to implement the GMT for a worldwide roll-out and (ii) the generosity of the SBIE. We present evidence that the EU27 countries that have recently reached an agreement to implement the GMT most likely constitute a critical mass. In addition, we document that the share of total profits covered by the SBIE is around 40% in the first year the GMT applies and close to 20% after 10 years. Thus, this suggests that soon the minimum total tax on corporate profits around the Globe will be at 9% in the short run and around 12% in the medium term.

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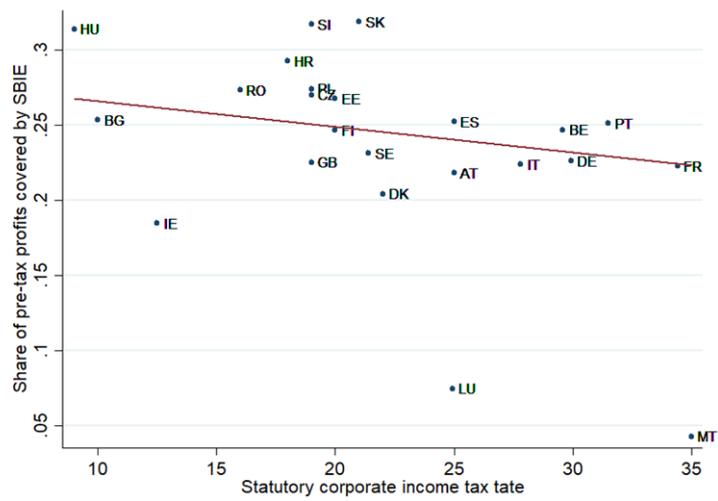
## Appendix

**Table A1: Sample Coverage**

Country	Operating revenue of <b>firms</b> in		Operating revenues of <b>foreign owned firms</b> in	
	raw data to operating revenues of all firms	sample	raw data to operating revenues of all foreign owned firms	sample
Austria (AT)	60%	47%	82%	66%
Belgium (BE)	75%	50%	122%	73%
Bulgaria (BG)	73%	60%	98%	78%
Czech Republic (CZ)	73%	61%	98%	81%
Germany (DE)	29%	19%	50%	34%
Denmark (DK)	21%	17%	33%	28%
Estonia (EE)	75%	63%	97%	82%
Spain (ES)	54%	39%	75%	55%
Finland (FI)	34%	25%	59%	45%
France (FR)	65%	40%	145%	93%
Croatia (HR)	63%	54%	83%	67%
Hungary (HU)	70%	54%	81%	57%
Ireland (IE)	59%	24%	71%	25%
Italy (IT)	50%	39%	86%	62%
Luxembourg (LU)	90%	28%	113%	40%
Latvia (LV)	3%	2%	3%	3%
Malta (MT)	11%	7%	32%	20%
Netherlands (NL)	4%	3%	4%	3%
Poland (PL)	55%	45%	67%	57%
Portugal (PT)	59%	48%	103%	85%
Romania (RO)	76%	61%	94%	75%
Sweden (SE)	31%	23%	46%	33%
Slovenia (SI)	65%	55%	84%	74%
Slovakia (SK)	62%	46%	87%	62%

*Notes:* Table shows the ratio of aggregated operating revenues of the firms (the foreign owned firms) included in the raw data and the sample to total operating revenues of all firms (all foreign owned firms) by country. Total operating revenues of all firms and foreign owned firms is provided by Eurostat. No data available for the UK.

**Figure A1: Share of Pre-Tax Profits Covered by SBIE by Country (after 10 years)**



*Notes:* Figure shows the share of total pre-tax profits covered by the SBIE after 10 years of the introduction of the GMT by countries' statutory corporate tax rate.

*Source:* Authors' calculation based on Amadeus database, provided by Bureau von Dijk