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Global Minimum Tax and the Proposed Green Tax Credit

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Valtion taloudellinen tutkimuskeskus
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Abstract

The Finnish Government proposed a green tax credit (GTC) to encourage industrial investments that support the transition to a climate-neutral economy. This study examines the potential negative effects of the global minimum tax (GMT) on the incentives for projects eligible for such tax credits. Although Finland's corporate tax rate exceeds the GMT threshold, generous tax incentives could lower a company's effective tax rate (ETR) below the minimum, potentially triggering GMT liability. Using the King-Fullerton framework, we model the interaction between GMT and GTC and find that GMT's overall impact on investment incentives is modest. However, the effect of the GMT on the tax incentives is more pronounced for companies with little other business activities in Finland, such as foreign multinational companies. This differential impact arises for two reasons: first, the GTC is targeted at specific new investments, minimizing its influence on the ETR of large industrial companies with other activity in Finland. Second, the GTC includes a 10% annual deduction ceiling, further limiting its effect on ETR and the risk of GMT liability.

Keywords: Corporate tax, Global minimum tax, Green investment, Business subsidies, Tax credit, Effective tax rate

JEL Classification: F23, H25, H32, H73

Tiivistelmä

Muistiossa tarkastellaan minimiveron vaikutuksia kannusteeseen investoida teollisiin investointikohteisiin, jotka olisivat oikeutettuja hallituksen vastikään ehdottamaan ilmastoneutraaliin talouteen tähtäävien investointien verohyvitykseen. Vaikka Suomen nykyinen yhteisöverokanta (20%) on minimiverokantaa (15%) korkeampi, voi avokätinen verotuki laskea konsernin efektiivisen veroasteen alle minimitason, mistä seuraisi velvoite maksaa minimiveroa. Mallinnamme minimiveron ja verohyvityksen yhteisvaikutusta King–Fullerton-kehikossa ja havaitsemme, että minimiveron vaikutus verohyvityksen luomiin kannustimiin ei ole kovin suuri. Vaikutuksen havaitaan lisäksi kohdistuvan ainoastaan konserneihin, joilla on niukasti muuta toimintaa Suomessa, kuten ulkomaisiin monikansallisiin konserneihin. Tämä eroavaisuus syntyy kahdesta verohyvityksen yksityiskohdasta. Investointituki on kohdennettu tarkasti rajattuihin uusiin investointeihin eikä se siksi alentane merkittävästi esimerkiksi suuren kotimaisen teollisen konsernin efektiivistä veroastetta Suomessa. Lisäksi vuosittain tehtävän verovähennyksen enimmäismäärä on rajattu 10 %:iin hyvityksen kokonaismäärästä. Tämä rajaus pienentää verotuen vaikutusta efektiiviseen veroasteeseen ja edelleen riskiä joutua maksamaan minimiveroa.

Asiasanat: Yritysverotus, minimivero, ilmastoinvestoinnit, yritystuki, verohyvitys, efektiivinen veroaste

JEL luokat: F23, H25, H32, H73

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1 Introduction

To support economic growth and accelerate the transition to a climate-neutral economy, the Finnish Government has launched a draft proposal on a temporary tax credit for large green industrial investments. The tax credit would be sizable, up to 20 per cent of the investment costs, and it would be granted to projects whose eligible costs amount to at least 50 MEUR. The maximum amount of aid would total 150 MEUR per corporate group. The proposal is intended to stimulate large industrial investments to boost economic growth, and to accelerate the transition to a clean, climate-neutral economy.[1]

State aid in the form of the proposed tax credit is enabled by the European Commission's Temporary Crisis and Transition Framework (TCTF) which makes time-limited and specific exceptions to state aid rules in order to allow Member States to support investments of strategic importance.[2] Previously, several EU Member States, including France, Italy and Germany, have introduced generous TCTF-qualifying tax incentives to accelerate the green transition.[3]

Two key aspects of the proposed subsidy, its generosity and the fact that the scheme is targeted at large industrial investments, raise questions of how the subsidy might interact with the legislation on Global Minimum Tax (GMT) which has been in force in Finland since 1 January 2024. The rules on GMT apply to domestic and multinational corporate groups with annual consolidated revenue of at least 750 MEUR. They give the countries where the company operates the right to levy top-up taxes if the effective tax rate (ETR)[4] of an MNE in a country falls below the agreed minimum level of 15 per cent.

The company's ETR is calculated broadly by dividing the taxes paid by the total net income in the country. Finland's current corporate income tax rate, 20 per cent, is well above the 15 per cent minimum. However, generous tax incentives in the form of tax allowances or tax credits may bring the ETR below the minimum and trigger the requirement to pay top-up tax to reach the 15 per cent floor.

According to the GMT rules, tax incentives under the so-called tax reduction treatment (TRT) are considered to reduce the company's taxes, thereby lowering its effective tax rate. However, the GMT rules include an alternative approach to treat a specific class of tax credits.[5] Under this Income treatment (IT) approach, tax credits are not treated as tax reductions but rather as taxable income,

[1] See the press release (16.9.2024) https://valtioneuvosto.fi/en/-/10623/bill-on-tax-credit-for-large-investments-aimed-at-building-a-climate-neutral-economy-sent-out-for-comments

[2] The State Aid Temporary Chrisis Framework, adopted on 23 March 2022, allowed Member States flexibility in their attempts to support the economy in the context of Russia's war against Ukraine. On 9 March 2023 the Commission launched the current TCTF to support sectors which are important for the transition to a net-zero economy. See https://competition-policy.ec.europa.eu/state-aid/temporary-crisis-and-transition-framework_en

[3] These measures have also been seen as a response to the US Investment Reduction Act which grants large subsidies to clean energy production and investment.

[4] We use the abbreviation 'ETR' to refer to the specific effective tax rate measure of GMT rules.

[5] See OECD (2022, 2023). Kari and Viertola (2024) consider the implications of TRT and IT for the incentive to invest.

similar to direct subsidies. ETR, in this case, is calculated by dividing the gross amount of taxes (before tax credits) by the sum of income and tax credits. Under IT, tax credits still reduce the effective tax rate but, in most cases, less than under TRT. The green tax credit proposal seems not to align with the conditions of the IT approach, and therefore would be subject to the harsher approach of TRT.

The goal of this paper is, first, to illustrate the conditions under which the proposed green tax credit (GTC) may trigger payments of top-up tax under the current GMT rules and, second, how this top-up tax liability affects the incentive to invest in qualifying green investments. The incentive to invest is measured using the effective average tax rate (EATR) as the method. This measure is calculated using the model introduced in Kari and Viertola (2024).

The analysis shows that the green tax credit is exceptionally generous. EATR on qualifying investment is low, close to zero or even negative. We further report that the tax credit may well bring the ETR below the 15 per cent threshold. However, the outcome essentially depends on the scale of activities of the overall corporate group in Finland. The risk of being liable to pay top-up tax is higher for groups with little or no other activities and the risk is much lower if the green investment project is just a small share of the group's overall activities in Finland.[6] The reason for this is that the ETR test, which aims to assess whether top-up tax liability is due, considers all activities of the corporate group in a country, not the ETR of a single subsidiary or a single project.

Our analysis of the scale of the impacts of GMT reveals that, in certain situations, the minimum tax may significantly reduce the incentives to invest in a GTC eligible project. We observe that the scale of the corporate group's activities in Finland affects not only the risk of becoming liable to pay top-up tax but also the size of the top-up tax liability and further the size of the impact of GMT on investment incentives. With a relatively moderate scale of other activities, the rate of the top-up tax is low which likely results in a small impact on incentives. However, we also find cases where the impact of GMT is considerable. The key aspect of those cases is that the green investment project eligible for GCT is the sole activity of the corporate group in Finland.

In the next section we introduce the proposed GTC scheme and the GMT rules of the treatment of tax incentives. In Section 3 we first provide calculations which illustrate the conditions under which the proposed GTC may lead to a top-up tax liability. In the second part we calculate the impacts on investment incentives. The final section summarizes and discusses. Appendix 1 describes the treatment of tax credits under GMT. Appendix 2 presents the model for calculating the impacts of GCT and GMT on investment incentives.

[6] This aspect has been recognized in VATT's comment on the draft proposal (VATT, 2024) as well as in Vehviläinen and Kartila (2024).

2. Introducing the tax rules

2.1 The proposed green tax credit

According to the draft proposal, the green tax credit would be available to companies that invest in projects that contribute to a climate-neutral economy, with eligible investment costs of at least 50 MEUR. The tax credit would be 20 per cent of the eligible investment costs but no more than 150 MEUR per corporate group.

The following investments would qualify for the tax credit (Ministry of Finance, 2024):

> investments in the production of renewable energy, including the production of renewable hydrogen and hydrogen fuels;
>
> investment in storage of electricity and heat;
>
> investments in decarbonization of industrial production processes and energy efficiency;
>
> investments in strategic sectors aiming at transitioning to a climate-neutral economy, such as production of equipment, key components and related critical raw materials essential to the transition to a climate-neutral economy.

The subsidy would be available if the application filed with Business Finland, an authority managing business subsidies, has been accepted by the end of 2025. The credit can be deducted the year the project is completed, but not earlier than 2028, and the credit should be fully exhausted within 20 years. According to the rules, only 10 per cent of the total amount can be deducted annually, which means that the credit will be deducted over a period of at least 10 years.

2.2 Treatment of tax incentives under GMT

The global minimum tax gives the right to levy top-up tax if ETR of an in-scope corporate group in a jurisdiction falls below the agreed minimum level of 15 per cent. The ETR is calculated by dividing the "adjusted covered taxes" by the "adjusted income". The adjusted income is based on the financial accounting income used to prepare consolidated financial statements with some adjustments. The covered taxes, on the other hand, include the taxes associated with the adjusted income, CIT being their main element.

In the following, we will illustrate how the firm's taxes are calculated in the presence of GMT. To simplify the exposition, we assume no other taxes are levied on corporate profits than CIT and GMT. We write the expression for the company's taxes, T^{Tot}, as follows:

$$T^{Tot} = \underbrace{(T^{CIT} - C)}_{CIT\ after\ tax\ credit} + \underbrace{[(t^{GMT} - t^{ETR})(P^{Adj} - S)]}_{GMT\ top\text{-}up\ tax}, \quad (1)$$

The first element is the CIT liability after tax credit and the second is the potential GMT top-up tax liability. T^{CIT} denotes CIT before tax credit, C is the tax credit, t^{GMT} is the rate of minimum tax,

$t^{ETR} = \frac{T^{Adj}}{P^{Adj}}$ denotes the effective tax rate on all activities of the corporate group in the country, where P^{Adj} is adjusted income and T^{Adj} is adjusted covered taxes. S denotes the substance-based income exclusion (SBIE) of the GMT system and it is determined as follows: $S = s(K + W)$, where s is the allowance rate, K is tangible assets and W is labor costs in the country. The allowance rate, s, is 5% after a transition period.[7]

GMT is levied if t^{ETR} is lower than the minimum tax rate, t^{GMT}. Therefore, in equation (1), the rate of top-up tax is non-negative, $t^{GMT} - t^{ETR} \geq 0$. Similarly, the tax base of top-up tax is required to satisfy: $P^{Adj} - S \geq 0$.

The GMT rules include two approaches to treat national tax incentives, which countries grant to firms in their tax systems. To illustrate the rules, we assume, as above in equation (1), that a country provides the subsidies in the form of an investment tax credit. Under GMT, the tax credit is either subject to tax reduction treatment, TRT, or income treatment, IT, depending on the details of the national tax credit rules. We denote the (standard measure of) accounting profit by P, and, as above, tax credit by C and CIT before credit by T^{CIT}. Using these notations, we illustrate the difference between TRT and IT under GMT in Table 1.

Table 1. Definitions of tax variables in GMT under the two different treatments of tax credits.

	Tax reduction treatment, TRT	Income treatment, IT
Adjusted taxes, T^{Adj}	$T^{CIT} - C$	T^{CIT}
Adjusted income, P^{Adj}	P	$P + C$
GMT ETR, t^{ETR}	$\frac{T^{CIT} - C}{P}$	$\frac{T^{CIT}}{P + C}$
GMT tax base	$P - S$	$P + C - S$

Hence the treatments differ in how tax credits are considered to affect the concepts of adjusted taxes and adjusted income. Under TRT they reduce taxes, while under IT they are added to income. This difference affects the calculation of the ETR and the tax base of the top-up tax. Through these variables, the difference ultimately affects the top-up tax liability (T^{GMT}).

Under GMT, IT is only applied to qualified refundable tax credits (QRTC) that satisfy certain strict conditions related to the refundability of the credit within a short time span of four years.[8] The TRT case, on the other hand, is applied to most other forms of tax incentives such as special allowances, reduced tax rates and tax credits that do not satisfy the requirements of QRTC. Since the Government's GTC proposal does not allow refundability, the green tax credit will be subject to the TRT type treatment under GMT.

Hence, the TRT approach is the relevant treatment for assessing the impact of GMT on incentives to invest in GTC-eligible projects. Since some countries have implemented their TCTF-qualifying tax credits in such a way that they are aligned with the conditions of the IT approach, we provide a slightly more detailed illustration of the two treatment types in Appendix 1.

[7] In more detail, see Kari and Viertola (2024).
[8] A detailed illustration of the rules can be found in OECD (2023).

From Appendix 1, we see that GMT tends not to eliminate the impacts of tax incentives entirely under either tax credit treatments. The highest share, observed in Table A1, eliminates 60 per cent of the benefits from the tax credit. The explanation is that the SBIE allowance mitigates the impacts of GMT. Second, under the IT approach tax credits have a much smaller effect on ETR compared to the TRT approach. This may have two distinct implications. First, even generous tax credits do not lower ETR below the threshold level. In this case no top-up tax liability is due. Second, even if the ETR were lower than the minimum tax threshold, the resulting top-up tax liability might be rather small. In summary, the impact of GMT on taxes and investment incentives are infinitesimal under IT treatment, while it is clearly higher under TRT.

3. Green tax credit and the incentive to invest under GMT

3.1 Introduction

This section considers whether and in what situations the GTC proposed by Finland's Government may trigger GMT top-up tax payments and how significant the effect might be on the incentive to invest in green projects.

Section 3.2 assesses the conditions under which a company becomes liable for paying top-up tax by considering the impact of GTC on the GMT effective tax rate (ETR). The proposed GTC scheme is assumed to be subject to Tax Reduction Treatment (TRT) since the scheme does not satisfy the rather strict conditions of Income Treatment (IT).

In Section 3.3 we consider the impacts of GTR on the incentive to invest using average effective tax rate, EATR, as the measure.

3.2 When will GTC trigger top-up tax?

A corporate group is liable to pay top-up tax in a country if the ETR on all its activities in the country falls below the agreed GMT minimum rate. We will assess this by analyzing the determination of ETR in the presence of GTC.

We consider a GTC scheme which allows the deduction of a share c of investment costs from CIT payments in fixed instalments over a period of n years. We assume that the company's activities are a multiple z of the activities produced by the green investment project. The rate of return on the new project p is assumed to equal the average return on all the activities of the company. To simplify, we normalize the investment cost of the new project to one. We assume that CIT at rate t^{CIT} is the only national tax on corporate profits and that there are no other allowances or credits affecting ETR than GTC. We can now write the ETR as follows:

(2) $$t^{ETR} = \frac{t^{CIT}P^F - C}{P^F} = t^{CIT} - \frac{\frac{c}{n}}{zp} = t^{CIT} - \frac{c}{znp} \ ,$$

where $P^F = zp$ denotes profit on all the activities of the company.

In equation (2), t^{CIT}, c and n are parameters of the tax system with given values. Therefore, the effective tax rate, t^{ETR}, primarily depends on the size factor, z, of the company (relative to the green investment project) and the rate of return on investment, p. Figure 1 illustrates this dependency of t^{ETR} on z and p.[9] The calculations are made using the parameter values corresponding to those of the GTC proposal: $c = 20$ per cent and $1/n = 10$ per cent. The calculations are presented for three values of p: 12%, 16% and 20%. The size factor, z, takes values from 1 to 10. The statutory CIT rate is $t^{CIT} = 20$ per cent.

Figure 1 shows that both aspects, the size of the company compared to the new investment project (z), and the profitability rate (p), are important determinants of the ETR. When the new investment project constitutes a major part of the activities of the company (small z), the GTC may induce the ETR to fall below the minimum tax threshold (15 per cent) and thus generate a top-up tax liability. Instead, if the green investment project constitutes just a small part of the total activities of the company (high z), the ETR is likely to stay above the minimum level of 15 per cent.

However, the outcome also depends on the profit rate, p. The lower the rate, the higher the risk of having an ETR lower than the threshold level and thus, being liable to pay top-up tax. At high profit rates, the risk of being liable to top-up tax is small. For example, at the highest profit rate, p = 20%, already the value z = 2 yields an ETR of 15 per cent implying that no top-up tax will be due. [10]

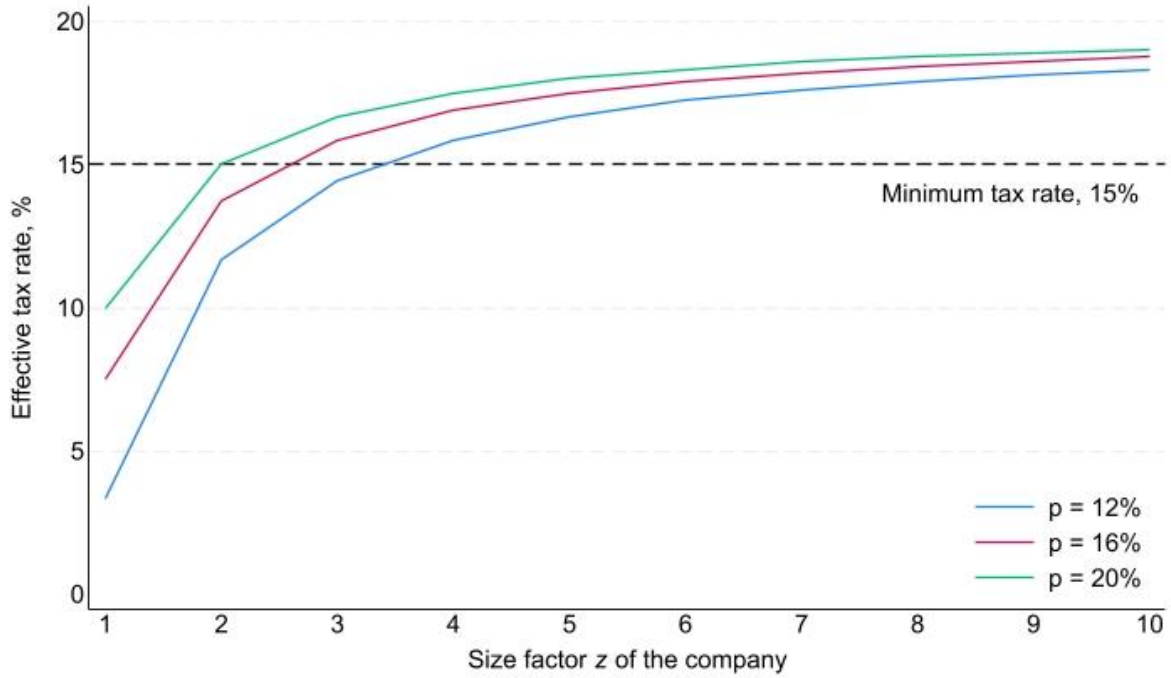
The calculations suggest that the risk of large Finnish industrial companies becoming liable for paying top-up tax because of GTC is negligible. Instead, the risk is substantial if e.g. a foreign MNE with little or no previous activities in Finland invests in green assets eligible for GTC.

We observed that despite the generousness of the GTC scheme, the risk of being liable for paying top-up tax is concentrated in a narrow class of companies with relatively small-scale activities in Finland. The reason for this outcome seems to derive from the aspect of GTC that the yearly deduction is limited to 10 per cent of the total amount of the tax credit. If this share was higher, e.g. 20 per cent, the risk of top-up tax would expand to companies with much more extensive activities in Finland. For an illustration, see Figure A2.1 and Figure A2.2 in Appendix 2.

[9] Table A2.1 in Appendix 2 presents the calculations in table format.

[10] The reverse relationship between the profit rate, p, and the ETR is easily understood by inspecting the formula for ETR in Eq. (2). The last term on the right-hand side, $\frac{c}{znp}$, gives the impact of tax credit. It implies that, with constant values of c, z and n, the higher the profit rate, p, the smaller the (negative) impact of credit on the ETR.

Figure 1. GMT effective tax rate at different values of the size, *z*, and the profit rate, *p*, of the company



The low annual deduction ceiling of 10 percent in the GTC proposal was justified as a measure to limit the annual tax revenue loss to a modest level. However, as is apparent from the analysis above, the ceiling also contributes to reducing the group of companies with a substantial risk of being liable for paying top-up tax.

3.3 Effect of GMT top-up tax on green investments

This section considers the effects of the GTC proposal on investment incentives by calculating the effective tax rate on a new investment project. As is familiar from the literature, the family of effective tax rate measures includes several slightly varying means to illustrate the impacts of tax rules on the profitability of a hypothetical investment project.[11] The cost of capital and the effective marginal tax rate (EMTR) illustrate how tax rules affect the minimum required rate of return on new investments. Their aim is to answer the question of how tax rules affect the scale of investment.

The effective average tax rate (EATR), on the other hand, calculates the taxes paid on the profits of an intramarginal project, i.e. an investment project that yields a return higher than the minimum rate of return. EATR can be a useful tool, particularly, when determining how taxes affect the location of an MNE's new production units. However, it is generally suited to studies where the aim is to compare how different tax systems affect the viability of a hypothetical investment project.

In the following analysis, we use EATR. We have chosen this measure partly because the proposed GTC is so generous that the two methods that deal with a marginal investment project, the cost of

[11] For the literature, see e.g. Sørensen (2004) and King and Fullerton (1984).

capital and EMTR, are difficult to interpret. The model framework we apply is described in Appendix 2.

Figure 2 presents calculations of EATR on an investment eligible for the proposed GTC.[12] The calculations are again made for three pre-tax rates of return (p), 12%, 16% and 20%. For each of the three cases, we consider two assumptions about the tax system, one of which includes both CIT and GMT and the other CIT only. The rate of GCT is $c = 20$ per cent and the credit is deducted from corporate taxes during the first 10 years after investment, $1/n = 10$ per cent. We use the following parameter values: the interest rate is $\rho = 7$ per cent, the rate of economic depreciation is $\delta = 12{,}25$ per cent, the inflation rate is $\pi = 0$, the CIT rate is $t^{CIT} = 20$ per cent, the rate of depreciation for taxation purposes is $\alpha = 25$ per cent,[13] and the rate of SBIE allowance $s = 5$ per cent. We further assume no debt financing and that p is the same for all activities of the company.

In general, we find that the EATR for eligible green investment is low, in several cases even negative.[14] For $p = 12\%$ and in the absence of GMT, the EATR is as low as -7.2 per cent. If the tax system includes GMT, EATR is clearly higher for small values of the size factor $(z \leq 3)$ but still negative. The highest value of EATR, -1.2 per cent, is found with $z = 1$. In this case, GMT raises EATR by 6 percentage points.

For $p = 16\%$ and no GMT, EATR is slightly negative (-0.4 per cent). Again, GMT raises it significantly for low values of z. For $p = 20$ per cent and no GMT, EATR is 3.7 per cent. In the case of $z = 1$, EATR rises by 3.5 percentage points to 7.2 per cent.

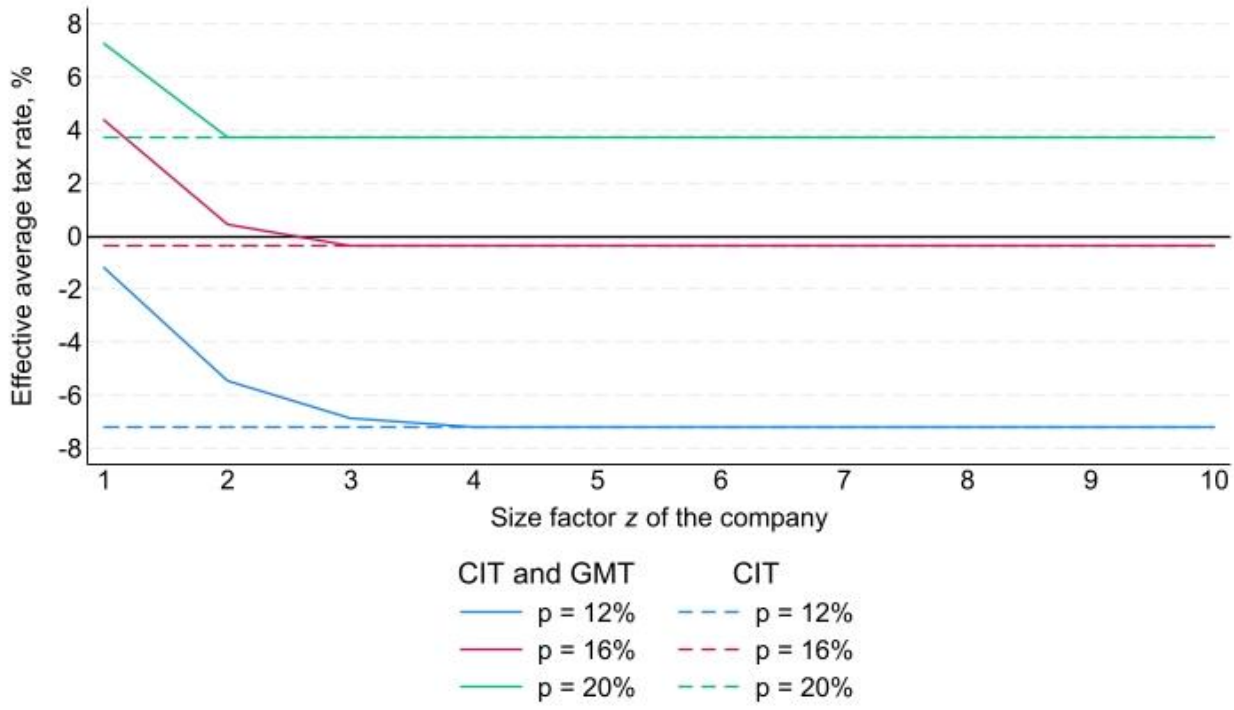
All these EATRs are low, and the impact of GMT is modest and is concentrated at low values of z, i.e. to a situation where the corporate group has little or no other activities in Finland.

[12] Table A2.1 in Appendix 2 gives the calculations in table format.

[13] We assume the investment involves machinery and equipment, which are depreciated at the rate of 25 per cent in Finland's tax system.

[14] For a benchmark, we calculate that without GTC the effective tax rate varies from 15.4 per cent to 17.2 per cent depending on the assumed rate of return, p. These values of EATR are lower than the statutory CIT rate (20 per cent) due to generous fiscal depreciation allowances.

Figure 2. EATR of eligible investment at different values of size, z, and profit rate, p, of the company



The impact of GMT on EATR varies between 3.5 – 6 percentage points in cases where the corporate group has no activities outside the green investment project, $z = 1$.[15] While the level of EATR is still low, GMT tends to raise the EATR significantly compared to cases where the company has more extensive activities in Finland, $z \geq 3$. The difference might be judged as non-trivial, particularly because the less favorably treated companies apparently include foreign MNEs investing in eligible green investment projects in Finland, possibly through a newly established subsidiary. This outcome seems contradictory to the original aims of the subsidy scheme,[16] and it might also conflict with the principle of free movement of capital in the EU.

[15] Table A2.2 in Appendix 2 presents the calculations in table format.

[16] According to the press release referred to in footnote 1, one of the aims of the planned scheme is to attract industrial investment to Finland.

4. Conclusions

We study impacts of global minimum tax rules (GMT) on the incentive to invest in projects eligible for green tax credit (GTC) proposed by the Finnish Government. A corporate group is liable for paying GMT top-up tax if its GMT effective tax rate (ETR) on its activities falls below the agreed minimum of 15 per cent. Finland's current corporate tax rate, 20 per cent, is well above the threshold rate. However, generous tax incentives such as the proposed tax credit may well bring the ETR below the minimum and trigger top-up tax liability.

One notable aspect of GMT is that ETR is measured considering all the activities of the company in the country. In contrast, GTC is targeted at narrowly defined green investment projects. This difference leads to the conclusion that GTC may only trigger GMT if the green investment project constitutes a large share of the company's activities in the country. We model this aspect in the King–Fullerton framework and calculate the effective average tax rate, EATR, for GTC-eligible green investments.

We observe that GTC is generous: it lowers the EATR substantially, from the level of 15-17 per cent to even negative values. GMT's impact is found to be modest; it raises the EATR by 6 per cent at most to a level close to 0 per cent, still reflecting a high incentive to invest. The companies that are mostly affected by GTC are a special group, where the company has no or little other activity than the green investment project. It is presumable that such companies are foreign multinational companies investing new funds in Finnish green projects. The fact that these very companies are in a less favorable position would appear to be an unintended side effect generated by the interaction between the rules of GMT and GTC, and might contradict both the aid scheme's original goals and possibly also the free movement of capital in the EU.

The explanation for the finding that GMT's impact is modest and focuses on a narrow group of companies is twofold. First, the green subsidy is strongly targeted and in the framework of the rules of GMT it does not easily lower the ETR of a company with extensive activities in Finland to sufficiently low levels to trigger top-up tax liability. Second, while the subsidy is generous, the 10 per cent ceiling for the annual deduction is likely to reduce such situations where the ETR is lower than the minimum rate.

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Appendix 1. Different treatments of tax incentives under GMT

This Appendix illustrates how the GMT top-up tax liability is calculated if the national tax system allows a company to deduct investment tax credits. The key goal is to compare the tax reduction treatment (TRT) and income treatment (IT) approaches to treating tax credits. We assume profit is 100, the amount of tax credit deducted from CIT liability is 15 and the amount of the SBIE allowance is 40. We present the calculations for two corporate income tax rates: 20 per cent, which corresponds to Finland's current CIT rate, and a hypothetical lower rate of 15 per cent. The latter case reveals some interesting aspects of the IT approach.

The first two columns of Table A1 illustrate the calculation of top-up tax on the assumption that the CIT rate is 20 per cent. In both cases, CIT before tax credit is 20 and 5 after deducting the credit (of 15). Column 1 assumes that tax credits are treated according to the TRT approach. The GMT ETR is 5 per cent, i.e. clearly below the minimum level of 15 per cent. Therefore, the firm pays top-up tax at the rate of 10 per cent on the top-up tax base of 60, resulting in a top-up tax liability of 6. GMT does not eliminate all the tax benefits provided by the tax credit. Only 40 per cent of the credit is eliminated (see the bottom row), which is explained by the SBIE deduction. Column 2 illustrates the IT case. Now, the ETR is 17.4 per cent clearly above the threshold rate and therefore no top-up tax is levied.

Column 3 and column 4 illustrate the case where the CIT rate is 15 per cent. Now, the tax credit eliminates the CIT liability entirely. Under TRT type treatment (column 3) the ETR is 0 per cent and the rate of top-up tax 15 per cent resulting to a top-up tax liability of 9. This implies that 60 per cent of the tax credit is eliminated by the top up tax.

Column 4 illustrates the IT case. Now ETR is 13 per cent, slightly below the threshold level of 15 per cent. The rate of top-up tax is 2 per cent and the top-up tax liability is 1.5, implying that 10 per cent of the tax credit is eliminated.

The calculations highlight several important aspects of the impacts of GMT. First, GMT does not eliminate the impacts of tax incentives entirely. The highest share eliminated in the example is 60 per cent. The explanation for this is the SBIE allowance; it mitigates the impacts of GMT. Second, under the IT approach tax credits have a much smaller effect on ETR than under TRT. This has two distinct implications. First, even generous tax credits do not necessarily lower ETR below the minimum level, in which case no top-up tax liability ensues (column 2). Second, even if the minimum tax threshold is crossed, the resulting tax liability can be rather small (column 4).

Table A1.1 Top-up tax under TRT and IT approaches. Tax credit 15, CIT rate 20% or 15%.

	Corporate tax rate 20%		Corporate tax rate 15%	
	(1) Tax Reduction Treatment, TRT	(2) Income Treatment, IT	(3) Tax Reduction Treatment, TRT	(4) Income Treatment, IT
Profit (P)	100	100	100	100
Corporate tax liability (T^{CIT})	20	20	15	15
Tax credit (C)	15	15	15	15
CIT net of credit $(T^{CIT} - C)$	5	5	0	0
GMT ETR (t^{ETR})	5%	17.4%	0%	13.0%
Top-up tax rate $(t^{GMT} - t^{ETR})$	10%	0	15%	2%
SBIE allowance (S)	40	-	40	40
Top-up tax base	60	-	60	75
Top-up tax liability (T^{GMT})	6	0	9	1.5
Total taxes, T^{Tot}	11	5	9	1.5
Tax increase due to GMT - of profit - of tax credit	 6% 40%	 0% 0%	 9% 60%	 1.5% 10 %

Appendix 2. EATR method and calculations

A2.1 The model

The effective average tax rate, EATR, on an intra-marginal investment project is obtained by dividing the project's present value of taxes (PVT) by the present value of the project's pre-tax profit (PVP).

The starting point for deriving PVT is the following expression for total taxes under GMT:[17]

(A1) $$T^{Tot} = (t^{CIT}P - C) + [(t^{GMT} - t^{ETR})(P - S)]$$

where $t^{ETR} = \frac{t^{CIT}P^F - C}{P^F} = t^{CIT} - \frac{C}{P^F}$. Here P^F refers to the profit on all activities of the corporate group, while P in (A1) is the intra-marginal project's profit. Using the definition for t^{ETR} we can rewrite T^{Tot} as follows:

(A1') $$T^{Tot} = \left(t^{GMT} + \frac{C}{P^F}\right)P - \left(\left(t^{GMT} + \frac{C}{P^F}\right) - t^{ETR}\right)S - C,$$

where $t^{GMT} + \frac{C}{P^F}$ can be interpreted as the marginal tax rate on profit. In what follows, we denote it by t^{MTR}.

The next step is to bring this tax formula into the standard framework of King and Fullerton (1984). The model considers a one-unit investment that depreciates exponentially at rate δ and yields a pre-tax rate of return of R. Pre-tax profit at time t is written as $Re^{-(\delta-\pi)t}$, where π denotes the rate of inflation.

The firm pays corporate tax on gross profit (R) reduced by fiscal depreciation at rate α. The amount of depreciation at time t is $\alpha e^{-\alpha t}$. At time $t = 0$, the project's taxes are reduced by an investment tax credit, which is calculated as the share c of the acquisition cost of the investment.

To bring T^{Tot} in (A2') into the model, we define profit as $P = Re^{-(\delta-\pi)t} - \alpha e^{-\alpha t}$, the SBIE deduction as $S = se^{-\alpha t}$, and tax credit as $C = \int_0^n \frac{c}{n} e^{-\rho t} dt$, where c is the rate of tax credit and n is the period over which the credit can be deducted from taxes (number of years).

The present value of the investment project's taxes (over the project's life cycle) can be written as:

(A2) $$PVT = \int_0^\infty \left[t^{MTR}(Re^{-(\delta-\pi)t} - \alpha e^{-\alpha t}) + (t^{MTR} - t^{CIT})se^{-\alpha t}\right]e^{-\rho t}dt - \int_0^n \frac{c}{n} e^{-\rho t} dt,$$

Where $R = \tilde{p} + \delta$. $\tilde{p}$ is the above-normal pre-tax rate of return on the investment.

Solving (A2) gives

(A3) $$PVT = \frac{t^{MTR}(\tilde{p}+\delta)}{\rho+\delta-\pi} - \frac{(t^{MTR} - t^{CIT})s}{\rho+\alpha} - \frac{t^{MTR}\alpha}{\rho+\alpha} - \frac{c}{n}\frac{1}{\rho}(1 - e^{\rho n}).$$

[17] The variables are defined in Section 3.2.

The pre-tax value of the project, i.e. the present value of pre-tax profit, is:

(A4) $$PVP = \frac{\tilde{p}}{\rho+\delta-\pi}.$$

EATR can now be calculated by substituting PVT and PVP into the following equation:

(A5) $$EATR = \frac{PVT}{PVP}.$$

A2.2 Additional Tables and Figures

Table A2.1 GMT effective tax rate at different values of the size z and the profit rate p of the company

z	p=12%	p=16%	p=20%
1	3.33	7.50	10.00
2	11.67	13.75	15.00
3	14.44	15.83	16.67
4	15.83	16.88	17.50
5	16.67	17.50	18.00
6	17.22	17.92	18.33
7	17.62	18.21	18.57
8	17.92	18.44	18.75
9	18.15	18.61	18.89
10	18.33	18.75	19.00

Table A2.2. EATR of eligible investment at different values of size z and profit rate p of the company

z	p=12% CIT & GMT	p=12% CIT	p=16% CIT & GMT	p=16% CIT	p=20% CIT & GMT	p=20% CIT
1	-1.15	-7.18	4.40	-0.39	7.24	3.69
2	-5.46	-7.18	0.41	-0.39	3.69	3.69
3	-6.90	-7.18	-0.39	-0.39	3.69	3.69
4	-7.18	-7.18	-0.39	-0.39	3.69	3.69
5	-7.18	-7.18	-0.39	-0.39	3.69	3.69
6	-7.18	-7.18	-0.39	-0.39	3.69	3.69
7	-7.18	-7.18	-0.39	-0.39	3.69	3.69
8	-7.18	-7.18	-0.39	-0.39	3.69	3.69
9	-7.18	-7.18	-0.39	-0.39	3.69	3.69
10	-7.18	-7.18	-0.39	-0.39	3.69	3.69

Figure A2.1 GMT effective tax rate at two different values of the deduction ceiling, 10% and 20%

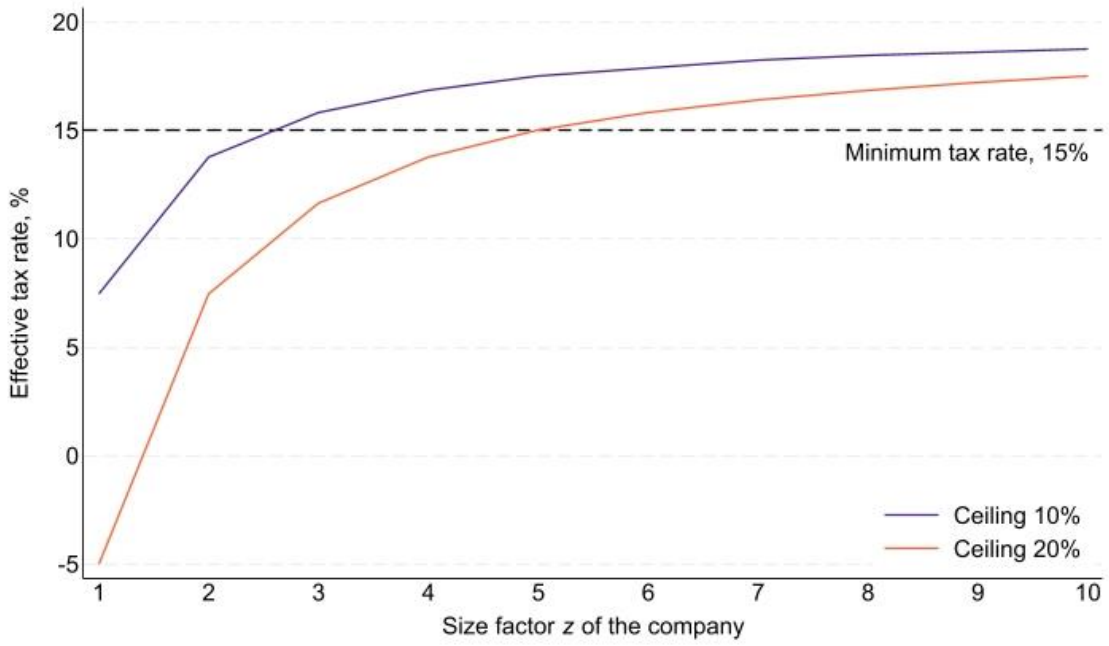

Figure A2.2 EATR at two different values of the deduction ceiling, 10% and 20%