



Dipartimento
delle Finanze

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**DF WP n.24
September 2026**

Working

Paper

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DF Working Papers, 2017

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ISSN electronic edition 2610-8887

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MNEs behavioural responses to the introduction of the Global Minimum Tax: a tax payments analysis

Massimo Bucci* and Paolo Acciari*

Keywords: Global Minimum Tax; Pillar Two; Qualified Domestic Minimum Top-Up Tax (QDMTT); Multinational Enterprises; Corporate Tax Payments; Tax Compliance; Reputational Costs; Synthetic Difference-in-Differences.

JEL Classification:

H25 (Business Taxes and Subsidies)

H26 (Tax Evasion and Avoidance)

F23 (Multinational Firms; International Business)

C23 (Panel Data Models)

F38 (International Financial Policy; International Taxation)

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Abstract

This study examines the initial ex-post behavioural and fiscal effects of the introduction of the Global Minimum Tax (GMT), focusing on the Qualified Domestic Minimum Top-Up Tax in a high-tax jurisdiction. We use a panel micro-dataset of 2,300 MNE subgroups located in Italy, covering fiscal years 2018–2024, and apply the Synthetic Difference-in-Differences methodology. Although all subgroups in our dataset are potentially affected by the reform, as they belong to multinational groups with global revenues exceeding 750 million euros, the treated subgroups are identified as those with an effective tax rate below 15% in at least two pre-reform years (10% of the sample analysed). Results indicate that, following the reform's announcement and implementation, treated subgroups significantly increased their CIT payments compared with their synthetic counterfactual. In our preferred specification, the effect is particularly pronounced in the holding and financial sectors, where CIT payments of the treated are approximately five times the counterfactual level, while in other sectors treated subgroups' payments doubled. These findings suggest that the reform might have prompted spontaneous compliance among multinationals by aligning CIT effective tax rates with the new minimum, generating positive fiscal outcomes even before the first scheduled payments of the domestic minimum tax. This result is compatible with MNEs' willingness to prevent reputational risks as part of their Corporate Social Responsibility commitments.

Sintesi

Il presente studio esamina i primi effetti comportamentali e fiscali ex post dell'introduzione dell'imposta minima globale (GMT), concentrandosi sull'imposta minima nazionale in una giurisdizione ad alta imposizione. Viene utilizzato un dataset di tipo panel, microeconomico, relativo a 2.300 sottogruppi di imprese multinazionali con sede in Italia, che copre gli esercizi fiscali dal 2018 al 2024, applicando la Synthetic Difference-in-Differences. Sebbene tutti i sottogruppi nel nostro dataset siano potenzialmente interessati dalla riforma, in quanto appartenenti a gruppi multinazionali con ricavi globali superiori a 750 milioni di euro, i sottogruppi trattati sono identificati come quelli con un'aliquota fiscale effettiva inferiore al 15% in almeno due anni precedenti alla riforma (pari al 10% del campione analizzato). I risultati indicano che, a seguito dell'annuncio e dell'attuazione della riforma, i sottogruppi trattati hanno aumentato significativamente i propri versamenti di imposte societarie rispetto ai loro omologhi non trattati. Nella nostra specifica preferita, l'effetto è particolarmente pronunciato nei settori delle holding e finanziario, dove i pagamenti di imposte societarie dei sottogruppi trattati sono quintuplicati rispetto a quelli non trattati, mentre negli altri settori i pagamenti dei sottogruppi trattati sono raddoppiati. Questi risultati suggeriscono che la riforma possa aver stimolato un adempimento spontaneo tra le multinazionali allineando le aliquote fiscali effettive dell'imposta sul reddito delle società al nuovo minimo, generando risultati fiscali positivi anche in anticipo rispetto ai primi pagamenti previsti dell'imposta minima nazionale. Questo risultato è compatibile con la volontà delle multinazionali di prevenire rischi reputazionali nell'ambito dei loro impegni di Responsabilità Sociale d'Impresa.

1. Introduction

The international agreement on the introduction of a Global Minimum Tax marks a milestone in the international tax agenda. Following the OECD Inclusive Framework/G20 high-level statement in October 2021, the OECD finalised the legislative model of the new rules, the Global Anti-Base Erosion (GloBE) rules aiming at introducing an internationally coordinated tax system for large multinational enterprise (MNE) groups. The GloBE rules set a minimum level of effective taxation at 15% on jurisdiction-level profits based on a common determination of relevant covered taxes and qualifying taxable income.

The European Union introduced the new Global Minimum Taxation (GMT) architecture through the Council Directive (EU) 2022/2523 of 14th December 2022 by imposing an obligation for Member States to implement the new standard into the national tax legislation by the end of 2023. Italy transposed the GloBE rules timely in 2023 through the legislative decree No. 209 of 27th December 2023. The Global Minimum Tax regulation entered into force from the tax year 2024.

The primary rule of the new minimum taxation is the Income Inclusion Rule, which ensures that all subgroups of a MNE all around the globe are taxed at an Effective Tax Rate (ETR) of at least 15%, by eventually applying a top-up tax in the jurisdiction of the headquarter. The effectiveness of this primary rule is reinforced by the Undertaxed Profit Rule, the secondary rule, which is applied by third countries if the headquarter jurisdiction does not apply the Income Inclusion Rule.

In this context, another crucial rule is the Qualified Domestic Minimum Top-up Tax (QDMTT). If implemented by a jurisdiction, this rule applies a domestic top-up tax to all subgroups located in that jurisdiction having an ETR lower than 15%, ensuring that no top-up taxes would be applied in other jurisdictions implementing primary or secondary rules. QDMTT is important not only in jurisdictions with no or low Corporate Income Tax, but also in high tax rate jurisdictions, as the existence of some tax incentives and other provisions usually determines that some subgroups have an ETR lower than 15%: indeed, studies found that high tax jurisdictions account for a substantial share of global profits taxed below 15% (additional details in the literature review section).

In transposing the EU directive, Italy introduced a QDMTT targeted to all entities in Italy belonging to subgroups of both domestic and foreign MNEs. In the relevant year, QDMTT is due by all subgroups reporting an ETR in Italy below the minimum threshold of 15%.

On 5 January 2026, the OECD Inclusive Framework approved the Side-by-Side Package, an item of administrative guidance under the GMT framework, which includes a safe harbour applicable to MNE Groups headquartered in jurisdictions recognised by the Inclusive Framework as having an eligible tax regime with similar policy objectives. At the time of writing, the United States is the only eligible jurisdiction. The Side-by-Side (SbS) Safe Harbour exempts such MNE Groups from the application of the IIR and UTPR in other jurisdictions. Moreover, it includes provisions to improve the treatment of substance-based tax incentives, on the idea that well-designed investment incentives linked to substantive economic activity should not be penalized within the GMT framework.

However, as indicated by the OECD, the Side-by-Side system leaves the QDMTT unaffected, which is the focus of this paper.

Given the historic reform of the international corporate income taxation for multinational enterprises, this work explores the hypothesis that some multinational groups might have modified their behaviours, declaring higher CIT to avoid the obligation to pay the QDMTT. MNEs may consider it appropriate to adjust their fiscal strategies in response to the GMT, opting to pay higher corporate income tax (IRES and IRAP¹ in Italy) instead of the QDMTT by foregoing certain tax benefits. From a tax and reputational standpoint, companies may opt to avoid taking advantage of tax incentives that would lower their effective tax rate below the 15% minimum rate. Consequently, they may choose to increase their ordinary CIT (IRES and IRAP) payments to remain above this threshold, resulting in a spontaneous adjustment. Testing this hypothesis is the main research question of this paper.

Our work aims to evaluate the effects of the policy changes using panel data, i.e., using repeated observations of units across time, in a setting where some units are exposed to the policy and others are not. To the best of our knowledge, this is the first paper analysing ex post behavioural effects of the introduction of GMT, and QDMTT in particular, using microdata.

This paper is structured as follows: in section 2 we discuss a literature review, functional to our work, divided by sub-items for ease of reading: a) on the potential role of reputational costs of engaging in tax avoidance; b) on the issue of low tax profits in high tax jurisdictions and the behavioural effects of MNEs responding to the introduction of the Pillar Two minimum tax; c) on anticipated effects of tax policy changes; d) on Synthetic Difference-in-Differences, the methodology we have identified to measure those effects. In section 3 we describe the data used, in section 4 we explain the institutional context and how the data relate to it, in section 5 we introduce the methodological approach used, section 6 contains the main results of the analysis. Finally, in section 7, we conclude with final considerations and potential next steps for further work on this topic.

2. Literature review

a. Reputational costs of tax avoidance and Corporate Social Responsibility

In recent years, growing public and academic attention to corporate tax avoidance has become intertwined with the debate on corporate social responsibility (CSR). According to Carroll's (1991) pyramid, CSR encompasses economic, legal, ethical, and philanthropic responsibilities. Although tax avoidance is not an illegal practice, it is often perceived as socially irresponsible, especially when companies exploit regulatory loopholes to reduce their tax burden and do not "pay a fair share". This has led to questions about the reputational costs that companies

¹ Please note that IRAP, the Regional Tax on Productive Activities, has a taxable base broader than IRES, which is the typical Corporate Income Tax. In particular interests expenses are part of the IRAP tax base, as well as part of payroll associated with non-permanent employees. For this reason IRAP payments, which are part of our analysis, might be higher than zero for a group even in case IRES of the same group is zero.

may incur, namely the negative consequences in terms of image, market value, relationships with stakeholders, and financial performance. Corporate reputation is an intangible asset reflecting stakeholders' perceptions—customers, employees, investors, regulators, and the media—of a company's conduct. The literature distinguishes two approaches that companies may adopt to react to reputational risks of tax avoidance: “intrinsic” approaches, whereby companies refrain from tax avoidance for ethical reasons, and “instrumental” approaches, in case companies adopt CSR behaviours to mitigate reputational risks and maximise shareholder value (Lanis & Richardson, 2015; Hoi et al., 2013).

The public discussion around the OECD BEPS project and the Two-Pillar Solution and the consequential implementation of the Global Minimum Taxation increased the public scrutiny on international tax avoidance and profit shifting, potentially increasing the perception of reputational risks of MNEs. Reputational risk related to tax avoidance arises when fiscal behaviour is perceived as inconsistent with social expectations, especially in the presence of media campaigns, activism, or mandatory disclosures. A broad survey by Graham et al. (2014) of nearly 600 tax executives shows that 69% consider reputation an important factor in deciding not to adopt aggressive tax planning strategies. Reputational concerns are particularly strong among listed, large, profitable companies and in the retail sector. Companies with high public exposure—consumer brands and firms with significant media coverage—are more sensitive to reputational risks and tend to avoid aggressive practices. Event studies, such as those by Hanlon & Slemrod (2009) and Gallemore et al. (2014), indicate that public revelations of tax shelter practices produce a short-term negative reaction in share prices. However, this effect dissipates quickly and does not translate into lasting impacts on sales, managerial turnover, advertising expenses, or presence in reputation rankings such as Fortune's “Most Admired Companies.” Dhaliwal et al. (2021) find that during periods of intense public scrutiny (e.g., Occupy Wall Street), companies with more aggressive tax strategies experience greater negative media coverage and a reduction in market value. Nevertheless, these effects are temporary and linked to moments of particular social scrutiny.

Typically, companies may respond to reputational risk by increasing transparency, improving tax disclosure, or adopting “compensatory” CSR practices (such as donations or social campaigns) to balance negative perceptions (Krieg et al., 2021). In some cases, companies prefer to “obscure” tax information (e.g., by reducing the readability of financial statement notes) rather than change their fiscal conduct. The reputational impact of tax avoidance varies across countries and sectors. In countries with strong social pressure, independent media, and high social trust, reputational risk is greater.

The relationship between CSR and tax avoidance is complex and often ambivalent: some companies use CSR to “cover” aggressive tax practices, while others reduce avoidance for reasons of value coherence (Krieg et al., 2021). Reputational costs are difficult to measure directly; indirect proxies are often used (such as changes in effective tax rate, turnover, rankings, sales). Empirical evidence supports the notion that reputational costs are real and measurable. Austin and Wilson (2017) examine firms with valuable consumer brands and find that those with higher reputational capital tend to engage in less tax avoidance. Their study shows a positive association between brand reputation and effective tax rates, suggesting that firms with more to lose reputationally are more cautious in their tax strategies. Similarly, Lee et al. (2021) use employee reviews from Glassdoor to demonstrate that tax

avoidance news negatively affects employee perceptions of both managers and firms. These findings indicate that reputational damage from tax avoidance can extend beyond external stakeholders to internal ones, potentially impacting employee morale and retention.

In a recent article, Tuinsma et al. (2025) include MNEs' different preferences for CSR in their analysis, finding that the introduction of confidential Country-by-Country Reporting (CbCR), by increasing transparency, improved the tax compliance of moderately tax-aggressive multinationals. They also argue that public CbCR might be needed to prompt compliance among highly aggressive multinationals.

The growing relevance of tax as a component of corporate social responsibility is reflected in initiatives such as the *B Team Responsible Tax Principles*², endorsed by a number of multinational enterprises. The Principles promote the view that taxation should be considered an integral part of responsible business conduct and encourage companies to adopt transparent tax practices, align their tax behaviour with the location of economic value creation, and respect both the letter and the spirit of tax legislation. As such, they represent one of the most prominent private-sector frameworks linking corporate tax practices to broader ESG (Environmental Social and Governance) and sustainability objectives.

b. OECD Pillar Two impact assessment and low tax profits in high tax jurisdictions

Since the launch of the Base Erosion and Profit Shifting (BEPS) project, the OECD Inclusive Framework on BEPS and the G20 contributed with substantial efforts in addressing the negative consequences of the tax avoidance of MNEs and exploring the quantitative magnitude of corporate low-taxed profits. While the location of low-taxed profits in investment hubs, commonly referred to as “tax havens”, is a longstanding and widely discussed issue, less evidence is available on the possible presence of low-taxed profits also in high-tax jurisdictions. Recent work by the OECD sheds light on this possibility and provide quantitative evidence on the amount of low-taxed profits in high-tax countries (jurisdiction having an average ETR greater than 15%). Hugger et al. (2025) elaborate a comprehensive, data-driven assessment of the global distribution of low-taxed profits and the expected impact of the Global Minimum Tax. Their methodological approach, which applies a distributional analysis on aggregated CbCR data complemented by other sources, reveals that low-taxed profits are not confined to traditional tax havens but are also located in high-tax jurisdictions. The occurrence of low-taxed profits in high-tax jurisdictions is attributed to several factors such as tax incentives (e.g., patent boxes, R&D credits, tax holidays and preferential regimes) in place in many high-tax jurisdictions that substantially reduce the ETR for qualifying firms or activities. OECD (2022) describes how Pillar Two affects tax incentives and how to preserve the effectiveness of properly designed tax incentives in a post-Pillar Two environment. Also, differences between financial and tax accounting, since the use of accounting profits as the denominator of the ETR for GMT purposes can create discrepancies between fiscal and accounting values. Moreover, data aggregation may mask firm-level strategies that exploit specific provisions, leading to pockets of low-taxed profit within otherwise high-tax jurisdictions. Hugger et al. (2025) find that more than half (53.2%) of global profits taxed below 15% are located

² Further information on this initiative can be found at the link: <https://www.bteam.org/our-thinking/news/responsible-tax>

in high-tax jurisdictions and that high-tax jurisdictions also account for over 10% of profits taxed at an ETR below 5%.

High statutory tax rate of corporate income tax, reaching 27.8% combining both IRES and IRAP, makes Italy a high tax country. Nevertheless, it may not be completely excluded that pockets of low-taxed profits still persist. MNEs can artificially optimise their fiscal burden through a keen use of available tax incentives and business function restructuring. For this reason, the introduction of QDMTT is expected to generate additional tax revenues³. Along with additional revenues from domestic low-taxed profits, the GMT is expected to increase further the revenues via a structural reduction of profit shifting to low-taxed jurisdictions. The reduction of effective tax rates differentials from a widespread GMT implementation might substantially reduce the incentive to book profits away from the source countries where they have been produced. However, the quantitative estimation of this stream of revenues is complex because of the heterogeneity of MNEs' responses and the uncertainty on the effective degree of implementation of the jurisdictions around the world. It is plausible to expect an increase of CIT tax revenues either from an increase of ordinary CIT payments instead of QDMTT payments or from some initial behavioural reactions by MNEs to less advantageous profit shifting incentives.

c. Anticipated effects of tax policy changes

If it is possible that multinational enterprises (MNEs) respond to the introduction of GMT, an important question is determining when these reactions first occur. Tax policy literature on tax shocks and reforms reveals the possibility that announced tax policy changes can induce anticipated behavioural effects and bring about considerable real effects even before the entry into force of the relevant reforms. Anticipated tax reforms can have significant effects on investment choices, but also on the allocation of profit and income, often preceding the actual implementation of policy. For example, Auerbach and Hines (1987) investigate how expectations of future tax changes influence the timing of investment decisions by firms. They develop a theoretical macroeconomic model for short and long run effects of tax reforms on investments and firms' market value, taking into account different investor expectations. The authors find that anticipated tax changes can have significant intertemporal effects on investment, with firms accelerating or delaying investment in response to expected changes in tax policy. Mertens and Ravn (2010) provide a rigorous analysis of the macroeconomic effects of anticipated and unanticipated tax policy shocks, testing a DSGE model with post-World War II time series. Their empirical findings reveal that unanticipated tax cuts have persistent expansionary effects on output, investment, consumption, and hours worked, while anticipated tax cuts induce a contraction in economic activity prior to implementation, followed by a positive effect upon enactment similar to what happens in case of unanticipated tax changes.

In the international tax field, De Simone et al. (2017) explore how U.S. multinational enterprises respond to the anticipation of future reductions in repatriation taxes. They focus on the period following the approval of the

³ In Italy, the implementing legislation projected additional revenues between 300 and 500 million euros, an amount in line with similar ex-ante budget estimates of other comparable European countries (e.g. France and United Kingdom).

American Jobs Creation Act (AJCA) in 2004, which allowed a generous deduction for cash flow dividends received from controlled foreign companies, and subsequent legislative discussions about a second repatriation tax holiday. The authors develop a model to estimate firms' likelihood of benefiting from such a policy. They find that MNEs with high expected gains from a new repatriation tax reduction began accumulating significant excess cash holdings overseas as soon as credible legislative proposals emerged, even though the policy was uncertain and not yet enacted. Regarding the repatriation of offshore wealth, O'Reilly et al. (2019) rely on bank deposit data to analyse the impact of the increasing tax transparency following the international commitment and agreements to implement common standards for the exchange of information on financial assets between jurisdictions, including international financial centres (IFCs). They find a statistically significant reduction of IFC's financial assets from non-IFCs countries since the first signatures of agreements on the exchange of information on request between non-IFCs jurisdictions and IFCs, even before the commencement of the actual automatic exchange of information.

In a recent work, Gómez-Cram and Olbert (2023) use high-frequency stock market data to assess the investors' responses to news about the GMT introduction on the stock market price of MNEs exposed to the new taxation. Also, they test the impact of the agreement on the public finances of countries particularly affected by the reform, such as international financial hubs, by measuring the variations of the Credit Default Swaps (CDS) spreads on sovereign debts. The authors find that firms with high exposure to low-tax jurisdictions and aggressive international tax planning experienced significant negative stock returns after the announcements on the Two-Pillar Solution agreement in 2021, while at the country level CDS spreads increased for jurisdictions likely to lose tax base under the new rules, particularly small low-tax countries.

All the above mentioned literature indicates evidence of behavioural responses of several economic agents (companies, investors, countries) to significant tax policy changes, highlighting the likelihood of anticipated reactions. For these reasons, we can expect that the announcement of the implementation of the ground-breaking reform of the Pillar Two Global Minimum Tax has brought MNEs to reconsider their overall tax strategies to minimise potential negative consequences from the final adoption of the reform.

d. SDID methodology

As explained in the introduction, our work aims to evaluate the effects of policy changes using panel data, i.e., using repeated observations of units across time, in a setting where some units are exposed to the policy and others are not. We apply the recent Synthetic Difference-in-Differences (SDID) methodology introduced by Arkhangelsky et al. (2021), which combines attractive features of both Difference-in-Differences (DID) methodology and synthetic control (SC) methodology. In particular, the SDID method, similarly to SC, reweights and matches pre-exposure trends to weaken the reliance on parallel-trends type assumptions. The underlying model regression can be expressed by the following specification:

$$Y_{it} = \alpha_i + \gamma_t + X'_{it}\beta + \tau D_{it} + \epsilon_{it} \quad (1)$$

where Y_{it} is the outcome variable of the unit i observed at time t , α_i captures the unit-fixed effects, γ_t captures time-fixed effects, X'_{it} are potential covariates for the unit i at time t , D_{it} is the treatment variable that is equal to 1 for unit i , if the unit is treated at time t .

In practice, the SDID model is estimated through a regression where units and times are weighted following an optimisation approach based on the minimisation of the difference between the pre and post treatment means. The average treatment effect coefficient, τ is therefore estimated as the difference between the outcome variable of the treated and the control group in the treatment period:

$$\hat{\tau} = \sum_{t \in Post} \lambda_t \left(\bar{Y}_t^{Treat} - \sum_{i \in Control} \omega_i Y_{it} \right) - \sum_{t \in Pre} v_t \left(\bar{Y}_t^{Treat} - \sum_{i \in Control} \omega_i Y_{it} \right) \quad (2)$$

where λ_t and v_t are the time weights assigned, respectively, to the post-treatment and pre-treatment periods, and ω_i are the unit weights chosen to match the pre-treatment outcomes of the treated and control units.

The SDID framework is well suited to settings where all treated units are exposed to the intervention at the same point in time, as in the present study⁴. The authors find that SDID is competitive (or dominates) DID and SC respectively in applications where those methods have been used in the past. For illustrative purposes, the authors also apply SDID to assess the effects of a tax policy change, regarding cigarette taxation in California, showing that the method is suitable for this kind of analysis.

3. Data

Our work utilises an extensive dataset of microdata. We use firm-level microdata available to the Italian tax administration and public-access data available from a commercial database.

First, we use *Country-by-country reporting* data to define the scope of the analysis. Country-by-country reporting (CbCR) is a global reporting framework developed under Action 13 of the OECD/G20 Base Erosion and Profit Shifting (BEPS) Project and it constitutes one of the minimum standards of the project. It requires large multinational enterprises with annual global turnover of at least 750 million euros to annually submit a standardised report detailing the allocation of their global activities. For each tax jurisdiction in which the group operates, the report includes a set of key variables, such as revenues (to unrelated and to related parties), profits, taxes paid and accrued, tangible assets, number of employees, and a list of the group entities located in that jurisdiction. Financial variables are reported in Table 1 of the report; Table 2 reports the jurisdiction-level list of group entities, which are identified by entity name and tax identification number (TIN). Possible descriptive information on Table 1 and Table 2 content voluntarily transmitted by the MNE is recorded in Table 3. The aim is to enhance tax transparency and enable tax authorities to assess transfer pricing risks and other base erosion concerns. Typically, each MNE

⁴ Subsequent extensions of the SDID methodology are also applicable to settings with staggered treatment adoption.

submits its CbCR to the tax authority of the jurisdiction where the group's Ultimate Parent Entity (UPE) is resident⁵. Action 13 of the BEPS project establishes a system of automatic exchange of CbCRs among tax administrations of participating countries. Through this exchange mechanism, each tax authority gains access not only to the reports filed by domestic multinational groups, but also to those submitted by foreign multinational enterprises—provided that such groups have at least one entity operating within the authority's jurisdiction.

The GMT regulation requires that relevant taxable base, covered taxes and applicable exclusions are derived from financial accounts figures. Financial accounts data are retrieved from the database Orbis-Moody's which is characterised by an extensive coverage of businesses located in Italy and Europe. Financial variables are expressed at the unconsolidated level as required by the GloBE rules, serving as the initial basis of the GMT calculation. Key variables include pre-tax profit and loss, current and deferred taxes, tangible assets, payroll and the number of employees.

The final dataset encompasses also crucial microdata from tax returns. Specifically, we select appropriate information in tax declarations filed at entity-level. Our sources are represented by the Italian CIT tax return (*Modello Redditi Società di capitali*) and *Certificazione Unica* declaration, an annual tax certificate filled out by tax withholding agents (i.e. employers) summarising income and withholdings for employees. Because of the time lag between the tax payments and the submission of tax returns, tax returns are not a timely source to investigate the extent and variation in tax revenues. Exhaustive tax return data are available after three calendar years from the relevant tax year. To fill the information gap on most recent years, which represent the focus of our analysis, we exploit up-to-date microdata on tax payments by firms. Taxes payable are effectively paid by taxpayers through a standardised form, denominated *Modello F24*. Each single tax is identified by the relative identification number (*codice tributo*) along with the tax year to which the payment refers. Using this source, it is therefore possible to reconstruct the tax payment of corporate income tax for each single entity. In particular, in accordance with the tax payment terms established by the Italian tax law, for each entity and tax year we sum up the two advance payments (*Primo e Secondo Acconto*) and the final payment (*Saldo*). As an example, for a taxpayer with the accounting year coinciding with the calendar year, the first advance payment is due within the end of June and the second advance payment is due by the end of November. The first advance payment is equal to 40% of the CIT tax paid in the previous year, while the second is the remaining 60%. The residual final payment is payable after the end of the accounting year, at the end of June of the following year ($t+1$).

Our dataset incorporates panel data from 2018 to 2024 with different time coverages among sources according to the different use of each source. For example, CbCRs are utilised to define the perimeter of groups included in the analysis. Therefore, the essential data are taken from the 2018 reporting year vintage, the first year of the time series we select to be investigated. On the other hand, financial and tax data incorporate the most recent years

⁵ Alternative modalities include the submission of CbCR by an ad-hoc designated entity (Surrogate Parent Entity, SPE) or by a local entity upon request by the local tax authority, in case the CbCR is not submitted by either the UPE or a SPE.

available at the time of writing: accounting data and CIT returns extend through 2023, while tax payments reflect final payments made in 2025 for the 2024 CIT year⁶.

4. Context and dataset description

TABLE 1 shows the distribution of MNEs in the dataset by the Ultimate Parent Entity's jurisdiction of tax residence. Subgroups with Italian UPE represent 5% of the overall number of subgroups, but account for more than 20% of all entities. The relatively high representativeness of domestic subgroups is even more evident looking at the average share of CIT contribution. Despite the small number of Italian groups, they account for more than 40% of the total annual CIT payments. In absolute terms, the majority of entities and CIT payments come from multinationals with a foreign UPE, reflecting the strong presence of foreign multinational groups within the Italian economic landscape.

TABLE 1. MULTINATIONAL GROUPS BY UPE TAX JURISDICTION

UPE jurisdiction	Number of MNEs	Number of entities	Average percentage of CIT payments (2018-2024)
Italy	109	2,088	41%
Foreign	2,190	7,102	59%
Total	2,299	9,190	100%

Source: CbCR and tax payments returns (2018 – 2024).

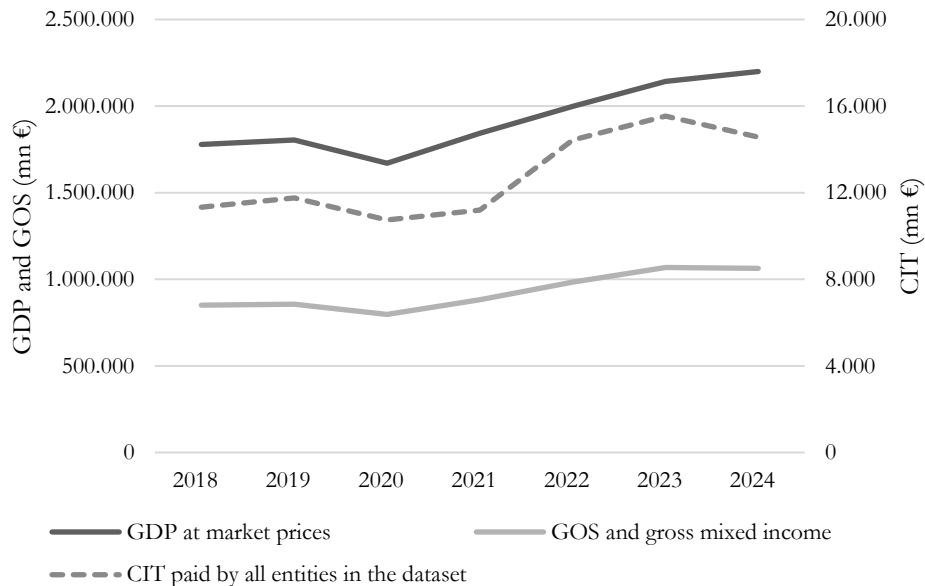
From a macroeconomic point of view, the time period covered in the analysis has been characterised by the consequences of two main factors: the COVID-19 pandemic crisis between 2020 and 2021 and the inflation rise from 2022 following the rebound from the crisis and new geopolitical tensions which affected commodity market prices. FIGURE 1 shows the trend of the Gross Domestic Product (GDP) and the Gross Operating Surplus (GOS) in Italy from 2018 to 2024. Both GDP and GOS show a general upward trend over the period, with a drop in 2020 corresponding to the pandemic crisis, followed by a rebound in the subsequent years.

GDP and GOS trajectories help situate tax payments in the broader perspective of the economic growth and the evolution of corporate profitability. CIT payments of MNEs in scope of GMT also show a similar pattern, with a dip in 2020 and a notable increase in 2022 and 2023. Possible discrepancies between tax payments and corporate profits are attributable to the differences between the definition of profit or loss before tax for accounting purposes and the definition of taxable income. Also, tax payments can present timing differences in cases of early or deferred

⁶ For 2024, tax payments include CIT final payments paid within the end of June 2025 (ordinary terms of payments established by the law).

tax payments compared to the terms of payments prescribed by the tax law. Notably, several tax deferrals were introduced to support taxpayers most impacted by the pandemic's economic downturn.

FIGURE 1. GDP, GOS AND CIT PAYMENTS (2018-2024)

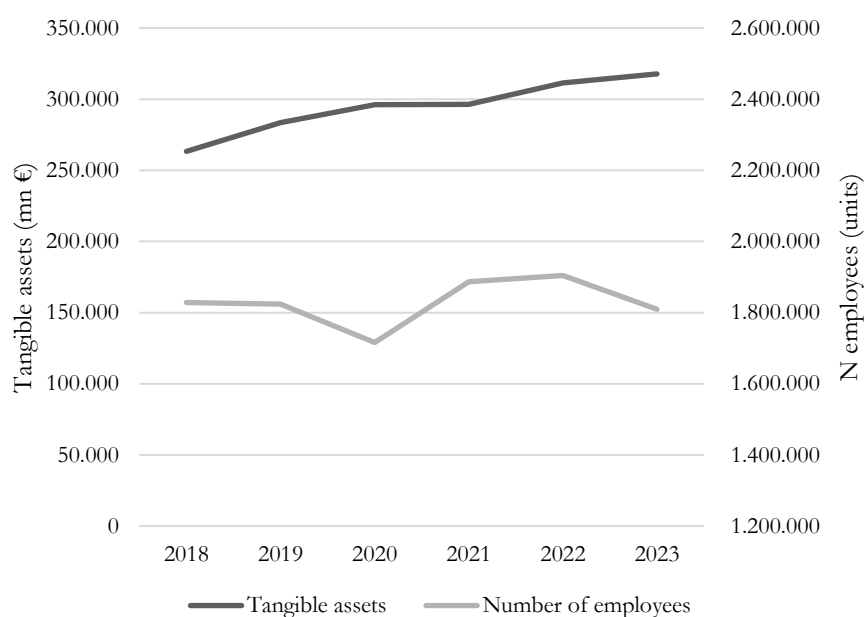


Source: ISTAT, National Accounts series.

Large MNEs economic activity represents a conspicuous part of the overall firm's activity in Italy. According to the *OECD 2024 Corporate Tax Statistics*, MNEs expected to comply with the *Country-by-country reporting* requirements contribute to 46% of the total CIT revenues in 2021. FIGURE 2 shows the trend of two proxy variables of the MNEs' economic activity in Italy, i.e. tangible assets value and the number of employees. While the stock of tangible assets shows a steady increase in the period 2018-2023, from 260 to 320 billion euros, the number of employees follows a pattern consistent with the macroeconomic indicators for the period, with a marked decrease in 2020 followed by a recovery in 2021 and, more moderately, in 2022. MNEs' labour force reached its peak in 2022, when it counted more than 1.9 million employees; it returned to the pre-crisis level in 2023.

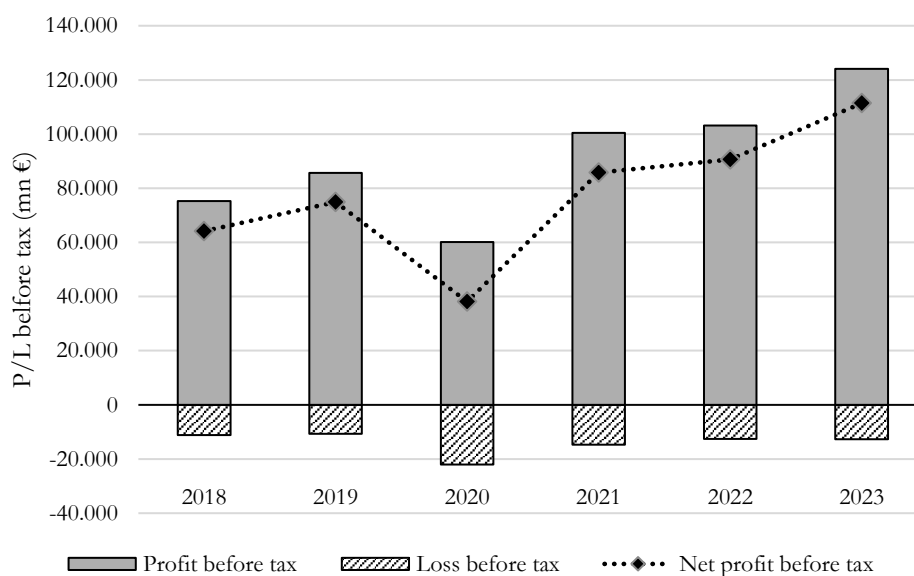
The overall profitability of the MNEs subgroups in the sample reflects the same stylised pattern. Of the 2,299 MNEs in the sample, around 70% report positive pre-tax profit. Positive profits surged after the pandemic crisis, doubling from 60 in 2020 to more than 120 billion euros in 2023. The remaining 30% of MNEs report losses accounting around 10 billion euros per year, with an exceptional increase in 2020 when the reported losses doubled.

FIGURE 2. TANGIBLE ASSETS AND NUMBER OF EMPLOYEES (2018-2023)



Source: Orbis Moody's and tax returns (*Certificazione Unica*).

FIGURE 3. PROFIT AND LOSS BEFORE TAX (2018-2023)



Source: Orbis-Moody's unconsolidated financial accounts data.

5. Methodological approach

a. Identification of in-scope multinational groups and selection of the groups exposed to the top-up tax

The identification of multinational groups potentially affected by the GMT regulation has been carried out using different sources. As explained in the previous section, our dataset combines administrative data, such as Country-

by-Country Reports (CbCRs) and tax returns, with financial account data, available from the commercial database Orbis-Moody's. Moving from a comprehensive dataset, our goal is to micro-simulate the ex-ante impact of the reform on each single MNE located in Italy. This preliminary assessment is static and does not assume any behavioural reactions of MNEs related either to reductions in profit shifting or to changes in internal tax optimisation strategies.

Our analysis is restricted to multinational groups having presence in Italy, with either an Ultimate Parent Entity (UPE) resident in Italy for tax purposes or a foreign UPE. The universe of MNEs subject to the minimum taxation was determined through the following procedure. First, we use CbCRs to draw up the list of all entities (e.g. subsidiaries, permanent establishments) in Italy belonging to multinational groups. The list was extracted from Table 2 of the CbCR, in which every multinational group has to report the list of entities present in each tax jurisdiction, indicating the entity name and the Tax Identification Number (TIN), but without providing financial variables for each single individual entity.

Once the relevant entities have been identified, our dataset is composed by matching tax return data and financial account data. The combination of different sources has been possible through the entity identifier (TIN) reported in CbCR, which corresponds to tax code or the VAT number. Financial statements considered in the analysis included data for the fiscal years from 2018 to 2023 prior to the implementation of the reform.

According to the GloBE rules, each multinational group is required to calculate the GMT tax liability at the jurisdictional level. To reconstruct the Italian subgroup of each MNE, we thus sum the relevant variables for all entities in the group to obtain their values at the Italian subgroup level.

Multinationals primarily engaged in maritime transport of goods or passengers, are excluded from the scope of application as specified by law⁷. On the contrary, purely-domestic groups are included in the dataset as provided by the Italian legislation on GMT. Since they do not have CbCR requirements, all entities belonging to Italian corporate groups with consolidated revenues exceeding 750 million euros but without international presence were selected from the Orbis – Moody's database based on financial year 2021.

b. Ex-ante estimation of subgroup-level ETR and top-up tax

The ETR was calculated for each multinational enterprise by reconstructing the numerator and denominator for all group entities operating in Italy. For each entity within the scope, the relevant income or loss ("Qualifying income or loss") was determined based on pre-tax profit reported in the financial statements, adjusted according to the directive using available quantitative data. Primary adjustments to pre-tax profit included the exclusion of dividends, participation exemptions, and adjustments due to exchange rate fluctuations. Similarly, covered taxes ("Covered Taxes") for all in-scope entities were derived from the "total taxes" reported in the financial statements. The total taxes figure already encompasses deferred and prepaid taxes. The main adjustment applied involved the

⁷ Specifically those with NACE codes 5010 and 5020.

“recasting” of deferred taxation, where separately disclosed in the financial statements, at the minimum rate of 15% as required by applicable rules.

Upon completion of this process, the effective tax rate (ETR) can be determined at the subgroup level. If the ETR is at least 15%, no additional top-up tax is required from the subgroup. Conversely, if the ETR is below 15%, the subgroup is subject to the applicable top-up tax. However, the substance-based income exclusion (SBIE), which considers the capital and labour intensity of the subgroup, may reduce the actual tax liability. As a result, even with an ETR below 15%, no top-up tax may be due if the SBIE sufficiently offsets the calculated amount.

The ETR simulation for each group is performed annually across the years represented in the dataset. The selected period from 2018 to 2022 intentionally precedes the implementation of GMT. A key objective of this study is to determine whether the agreement on GMT led MNEs to undertake any strategic, anticipatory responses prior to its actual implementation. In this regard, actual QDMTT tax payments may have been lower than estimated if firms substituted them with higher ordinary CIT payments.

c. Econometric model

To assess whether the introduction of GMT rules leads to an increase in ordinary tax payments, a Synthetic Difference in Differences (SDID) model was applied. This approach estimates the average effect of the policy on a group of companies affected by the change, compared to a control group not affected. Unlike the standard Difference in Differences (DiD) method, SDID constructs the control group to ensure that both groups followed similar trends before the policy was introduced. The outcome provides the average difference in the dependent variable attributable to the policy. If the policy spans several years, the coefficient can be interpreted as the average annual effect. The analysis focuses on Italian subsidiaries of multinational groups subject to GMT, treating all resident companies in the same group as a single entity.

Groups exposed to the policy were identified using a similar methodology applied in the technical report. Specifically, groups with an effective tax rate (ETR) below 15% in at least two years in the period 2018-2022 were considered treated. If a group had an ETR below 15% in only one year, this was assumed to be due to temporary factors rather than ongoing tax planning.

TABLE 2. NUMBER OF MNE GROUPS INCLUDED IN THE ECONOMETRIC SAMPLE.

Years with <i>ETR</i> < 15%	Number of groups	% of Total	Sum of number of groups	Cumulative %
0	1,417	79.6%	1,646	92%
1	229	12.9%		
2	87	4.9%	135	8%
3	28	1.6%		
4	15	0.8%		
5	5	0.3%		
Total	1,781	100%	1,781	100%

Note: CbCR and authors' calculations on financial accounts and tax returns (2018 – 2022).

It was assumed that the policy could have produced effects over two years, 2023 and 2024, considering that companies might have started changing their behaviour as early as 2023, following the approval of the EU directive in December 2022. For robustness, the analysis also considered possible anticipatory treatment effects starting in 2022, after the OECD/G20 announcement and the publication of the model rules in December 2021 and, alternatively, treatment effects starting in 2024, the year immediately following the transposition of the directive in Italy (results are included in Annex 1).

Groups that did not pay taxes for more than two years (neither IRES nor IRAP) were excluded, as they did not provide useful information for the analysis. These are often groups with missing financial or tax data, or that reported zero profits every year. Additional robustness checks were performed using alternative criteria for identifying non-informative groups (see Annex 1). However, even after this exclusion, some groups in the panel still have zero taxes paid in one or more years. This means typically they have no taxable profits and no IRAP tax base in those years. Because the dependent variable is expressed in logarithms, observations with zero values cannot be included directly. Following a common empirical practice, in the sample resulting after the exclusions, observations with zero amounts of taxes paid were replaced with one monetary unit before the log transformation, so that $\log(1) = 0$. Given the scale of the variable, one euro is economically indistinguishable from zero, and the transformation preserves observations that would otherwise be lost from the analysis.

The model was also estimated for different subgroups based on economic sector, analysing separately: i) financial groups and holdings, and ii) all other groups. Sectoral differences during the analysis period may have influenced companies' ability to generate income and pay taxes. For example, high profitability in the financial and energy sectors in recent years led to higher tax payments for those companies. Tax planning strategies may also vary by sector. Companies in the same sector often have similar business models and tax practices. For this reason, two separate models were estimated: one for financial and holding companies, which are typically larger and may be

more affected by the new rules, and one for all other groups. Specific checks for the energy sector and other analyses are reported in Annex 1.

The dependent variable in all models is the natural logarithm of the sum of IRES and IRAP paid. The coefficient for the average treatment effect indicates the average percentage change in taxes paid by the treated group compared to the control group, relative to the period before the policy. For large coefficients (e.g., $\beta > 0.2$), the percentage change should be calculated using the formula: $e^\beta - 1$.

6. Results

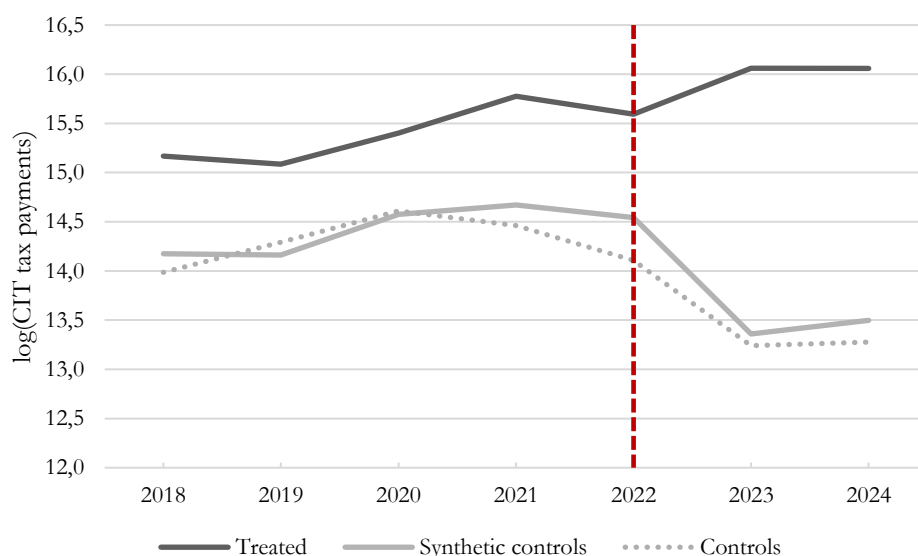
FIGURE 4 and FIGURE 5 show the estimated average of the dependent variable both for treated and control groups, in the latter case before and after the application of the SDID methodology. As discussed in the previous sections, the SDID estimation strategy ensures that the treated and the control groups have parallel trends in the pre-treatment period, before the policy implementation (2018-2022), allowing the inference on the causal effects of the policy introduction. As the two figures show, the synthetic controls produced by the SDID closely reproduce the pre-treatment evolution of the treated firms. Although some differences in outcome levels remain, particularly for non-financial firms, these differences are stable over time. The pre-treatment fit statistics reported in TABLE 4 suggest a satisfactory pre-treatment fit.

FIGURE 4 plots the trend of MNE subgroups classified as mainly operating as holding companies or active in the banking and finance industry. The choice of testing the GMT effects on this business separately is justified by the extraordinary profitability reported by the banking and financial institutions in the latest years in comparison with the rest of the economy⁸. Treated units report higher tax payments compared to the units in the control group. The parallel trend diverges dramatically as of 2023, when we assume the expectations on the upcoming GMT introduction trigger behavioural responses of treated MNEs. In particular, average CIT payments of the treated subgroups increased remarkably between 2022 and 2023, while they decreased dramatically in the control group, followed by a slight rebound in the last year. As the plotted variable is expressed in logarithmic terms, the difference between two points can be roughly interpreted as the percentage difference in tax payments. Because of the non-linearity of the variable, even moderate differences may mask very large differences in absolute terms, as it happens right after the policy implementation. Differential results are driven by both an increase of the outcome of the treated and a decrease of the outcome of the synthetic controls⁹ still showing a divergence of the trend of treated and synthetic controls after the year of treatment. The main divergence is observed in 2023, and this divergence persists in 2024, despite a slight increase of the synthetic controls in that year.

⁸ The energy industry reported a trend similar to that observed in the banking sector. Results remain robust to the exclusion of the energy MNE as shown in the Annex.

⁹ A detailed analysis of all the determinants that might have influenced the tax payments of the holding and finance sector is beyond the scope of this paper, and it is a difficult exercise, given the heterogeneity in this sector, encompassing both groups operating in the financial sector and holding companies operating in other sectors. Moreover the period has been characterized, *inter alia*, by sizeable variations in interest rates, which very likely influence profitability of groups in the financial sector in ways that can be different to each group.

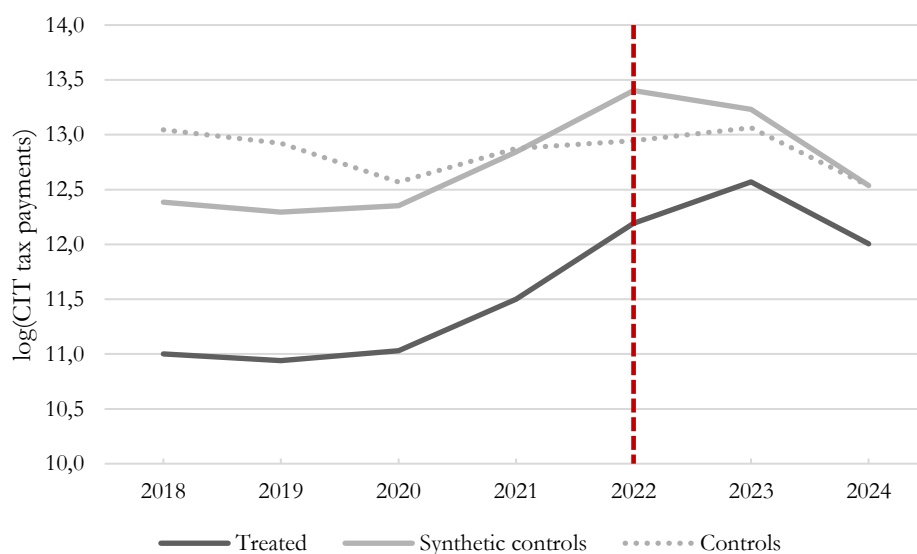
FIGURE 4. ESTIMATED AVERAGE: HOLDING AND FINANCE SECTOR



Note: authors calculations. The dashed vertical line marks the end of the pre-treatment period. The policy intervention takes effect from 2023 onwards

FIGURE 5 shows the trend for the rest of the MNEs operating in the remaining economic sectors. In the pre-treatment years, the overall trend is aligned with the general macroeconomic performance observed in the period, characterised by a decline due to the pandemic crisis and a sharp increase in the aftermath. In this case, treated subgroups pay less CIT than the control groups on average over the period in absolute terms. However, after the policy implementation, control subgroups experienced a decline in both subsequent years. Conversely, the treated subgroups experienced a sizeable increase in 2023, while declining again in 2024. As in the case of the holding and finance group, the main divergence is observed in 2023, and this divergence persists in 2024, although the outcomes of both treated units and synthetic controls decreased in that year.

**FIGURE 5. ESTIMATED AVERAGE: ALL INDUSTRIES
(EXCEPT HOLDINGS AND FINANCE)**



Note: authors calculations. The dashed vertical line marks the end of the pre-treatment period. The policy intervention takes effect from 2023 onwards.

The annual average treatment effect (ATE) is positive and statistically significant for both subgroups. TABLE 3 presents the estimated coefficients for the two subgroups. Although the sample size is limited (111 entities), the financial and holding sector shows much higher coefficients than other sectors, which include more entities. The effect remains positive and significant across different model specifications and time periods. A coefficient of 1.674 means the average effect is approximately +433%, corresponding to a level about five times the counterfactual while a coefficient of 0.713 means +108%, corresponding to a level approximately twice as high as the counterfactual. The main result is that the policy seems to have triggered a clear and significant impact on companies' tax payment behaviour.

TABLE 3. AVERAGE TREATMENT EFFECTS OF THE GMT INTRODUCTION

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with positive tax payments in at least 5 years	Treatment period: 2023 and 2024	
	Holding and financial groups (1)	All other groups (2)
ATE	1.674*** (0.516)	0.713*** (0.275)
Number of MNE treated groups	12	123
Number of MNE controlled groups	99	1547

Note: Standard error in parentheses.

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

TABLE 4. MEASUREMENT OF PRE-TREATMENT FIT

Sample	Mean pre-treatment gap	Mean	Root	RMSE
		Absolute Error (MAE)	Mean Square Error (RMSE)	(% of treated pre-treatment mean)
Holdings and finance	0.9790	0.9790	0.9839	6.4%
All industries (except holdings and finance)	-1.3223	1.3223	1.3236	11.7%

Note: The statistics are computed using the annual average values of the outcome variable for the treated group and the weighted synthetic control group over the pre-treatment period (2018–2022). The Mean Gap is the average difference between treated and synthetic controls, the MAE is the average absolute difference, and the RMSE summarizes the magnitude of the annual pre-treatment deviations. The last column reports the RMSE as a percentage of the average pre-treatment outcome of the treated group, providing an additional summary measure of pre-treatment differences.

7. Conclusion

The results of this work indicate that, following the GMT reform's announcement and implementation, affected MNEs' subgroups significantly increased their CIT payments compared with their synthetic counterfactual. The effect is particularly pronounced in the holding and financial sectors, where CIT payments of the treated are approximately five times the counterfactual level, while in other sectors treated subgroups' payments doubled.

These findings suggest that the reform might have prompted spontaneous compliance among multinationals by aligning CIT effective tax rates with the new minimum, generating positive fiscal outcomes even before the first scheduled payments of the domestic minimum tax.

This result is compatible with MNEs' willingness to prevent reputational risks as part of their CSR commitments, in line with a growing body of literature in this field, as described in Section 1 of this work, although our dataset is not suitable for empirically identifying this mechanism, and to the best of our knowledge there are no other datasets that can be used for such analysis. However, this intuition is supported by the fact that, in cases where the ETR is lower than 15%, the explicit payment of a Qualified Domestic Minimum Top-Up Tax would not require any additional payment in terms of penalties or legal interest; it would merely signal to stakeholders that the subgroup has extensively benefited from tax incentives in the jurisdiction. This signal might not be appreciated by stakeholders who are attentive to CSR, giving the impression that the MNE has not paid its fair share of taxes in that jurisdiction. Consequently, the behavioural effect we have identified in Italy might emerge not only in other jurisdictions implementing the QDMTT, but also in those not implementing it, as tax payments arising under the Income Inclusion Rule or the Under-Taxed Profit Rule might send the same signal of low CSR, caused by not having paid the fair share of taxes in some jurisdictions. Future similar work on other jurisdictions would be extremely useful to establish whether this intuition is correct.

Future research would also be desirable to investigate more precisely the drivers behind the increase in CIT payments among the treated subgroups. In particular, when financial accounts and tax returns become available for the affected years, it will be interesting to assess which specific behaviours MNEs have adopted that resulted in additional CIT payments. For example, one could investigate which tax incentives were not utilized or how corporate strategies have changed. Moreover, it would also be interesting to assess the effects of the new treatment of substance-based tax incentives introduced in early 2026.

References

- Arkhangelsky, D., Athey D., Hirshberg D.A., Imbens G.W. & Wager, S. (2021). "Synthetic Difference-in-Differences." *American Economic Review* 111 (12): 4088–4118. <https://doi.org/10.1257/aer.2019015>
- Auerbach, A. J., & Hines J. R. Jr. (1987). The Effects of Taxation on Capital Accumulation. *University of Chicago Press*, chap. 5, <https://www.nber.org/books-and-chapters/effects-taxation-capital-accumulation/anticipated-tax-changes-and-timing-investment>
- Austin, C. R., & Wilson, R. J. (2017). An examination of reputational costs and tax avoidance: Evidence from firms with valuable consumer brands. *Journal of the American Taxation Association*, 39(1), 67–93. <https://doi.org/10.2308/atax-51634>
- Baudot, L., Johnson, J. A., Roberts, A., & Roberts, R. W. (2020). Is corporate tax aggressiveness a reputation threat? *Journal of Business Ethics*, 163, 197–215. <https://doi.org/10.1007/s10551-019-04227-3>
- Clarke, D., Pailańir, D., Athey, S., & Imbens, G. (2024). On synthetic difference-in-differences and related estimation methods in Stata. *The Stata Journal*, 24(4), 557–598. <https://doi.org/10.1177/1536867X241297914> (Original work published 2024)
- Dhaliwal, D. S., Goodman, T. H., Hoffman, P. J., & Schwab, C. M. (2022). The incidence, valuation, and management of tax-related reputational costs: Evidence from a period of protest. *Journal of the American Taxation Association*, 44(1), 49–73. <https://doi.org/10.2308/JATA-18-065>
- Gallemore, J., Maydew, E. L., & Thornock, J. R. (2014). The reputational costs of tax avoidance. *Contemporary Accounting Research*, 31(4), 1103–1133. <https://doi.org/10.1111/1911-3846.12055>
- Gómez-Cram, A., & Olbert, M. (2023). Measuring the Expected Effects of the Global Tax Reform. *The Review of Financial Studies* 36 (2023) 4965–501, Oxford University Press. <https://doi.org/10.1093/rfs/hhad038>
- Graham, J. R., Hanlon, M., Shevlin, T., & Shroff, N. (2014). Incentives for tax planning and avoidance: Evidence from the field. *The Accounting Review*, 89(3), 991–1023. <https://doi.org/10.2308/accr-50678>
- Hanlon, M., & Slemrod, J. (2009). What does tax aggressiveness signal? Evidence from stock price reactions to news about tax shelter involvement. *Journal of Public Economics*, 93(1–2), 126–141. <https://doi.org/10.1016/j.jpubeco.2008.09.004>
- Hoi, C.K., Wu, Q., & Zhang, H. (2013). Is corporate social responsibility (CSR) associated with tax avoidance? Evidence from irresponsible CSR activities. *The Accounting Review*, 88(6), 2025–2059. <https://doi.org/10.2308/accr-50544>
- Hugger, F., González Cabral, A.C., Bucci, M., Gesualdo, M. & O'Reilly, P. (2024). The Global Minimum Tax and the taxation of MNE profit. *OECD Taxation Working Papers*, No. 68, OECD Publishing, Paris. <https://doi.org/10.1787/9a815d6b-en>.

- Hugger, F., Gonzalez Cabral, A.C. & O'Reilly, P. Effective tax rates of MNEs and the global distribution of low-taxed profit. *Int Tax Public Finance* (2025). <https://doi.org/10.1007/s10797-024-09869-2>
- Krieg, D., & Li, S. (2021). A review of corporate social responsibility and reputational costs in the tax avoidance literature. *Social Science Research Network*. <https://scispace.com/papers/a-review-of-corporate-social-responsibility-and-reputational-24yh19hph4>
- Lanis, R., & Richardson, G. (2015). Is corporate social responsibility performance associated with tax avoidance? *Journal of Business Ethics*, 127(2), 439–457. <https://doi.org/10.1007/s10551-014-2052-8>
- OECD (2022). Tax Incentives and the Global Minimum Corporate Tax: Reconsidering Tax Incentives after the GloBE Rules. OECD Publishing, Paris, <https://doi.org/10.1787/25d30b96-en>.
- OECD (2024), *Corporate Tax Statistics 2024*, OECD Publishing, Paris, <https://doi.org/10.1787/9c27d6e8-en>.
- O'Reilly, P., Parra Ramirez, K. & Stemmer, M. (2019), “Exchange of information and bank deposits in international financial centres”, *OECD Taxation Working Papers*, No. 46, OECD Publishing, Paris, <https://doi.org/10.1787/025bfebe-en>.
- Tuinsma, T., De Witte, K., Janský, P. Miroslav, P. & Vitezslav T (2025). Effects of corporate transparency on tax avoidance: evidence from country-by-country reporting. *Int Tax Public Finance* 32, 1366–1398. <https://doi.org/10.1007/s10797-025-09885-w>
- Mertens, K., & Ravn, M. O. (2011). Understanding the aggregate effects of anticipated and unanticipated tax policy shocks. *Review of Economic Dynamics*, 14(1), 27-54. <https://doi.org/10.1016/j.red.2010.07.004>

Annex 1. Robustness checks

Further model specifications are presented below, covering different subsamples of groups based on their economic sector, alternative definitions of the analytical sample, and various treatment periods, with the aim of validating the robustness of the estimated results. Where different treatment periods are applied, the treated and control group are defined using the years prior to the year of treatment. In each table, the alternative definitions compared to the main specification described in the body of the paper are highlighted in orange. Specifically, the two subsamples used in the main estimation—namely (1) “Holdings and financial sector” and (2) “All groups except holdings and financial sector”—are identified accordingly. Additional alternative subsamples are indicated as (3) “All groups” and (4) “All groups except holdings, financial sector, and energy sector.” All reported specifications demonstrate robustness in the estimation.

a. Other sub-samples based on economic activity

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with positive tax payments in at least 5 years	Treatment period: 2023 and 2024	
	All groups (3)	All other groups except holding/financial & energy sector (4)
ATE	0.759*** (0.263)	0.697** (0.301)
Number of MNE treated groups	135	119
Number of MNE controlled groups	1646	1527

Note: Standard error in parentheses.

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

The table above shows, in column (3), that the analysis is statistically significant with $p < 0.01$ when considering all groups together. This indicates that the significance observed in the main specification is also present in a simpler specification, where the analysis is conducted on a single sample including groups operating in all economic sectors.

Robustness checks were also performed to ensure that the particular trends in the energy sector during the period under review—characterised by strong fluctuations in energy prices—did not affect the significance of the results. Specifically, column (4) demonstrates that the analysis remains significant at $p < 0.05$ for all groups, excluding not

only holdings and the financial sector but also the energy sector. The exclusion of the energy sector appears to slightly reduce the significance of the analysis; therefore, it is advisable to retain this sector in the sample.

Additionally, a further specification (not shown in the table) was tested for a subsample including all groups except those in the energy sector. The results of this estimation are also statistically significant and consistent with those of the main analysis, providing further evidence that the inclusion of energy sector groups does not distort the findings.

b. Other identifications of the econometric sample

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with <u>positive tax payments</u> <u>in at least 1 year</u>	Treatment period: 2023 and 2024	
	All groups (3)	All other groups (2)
ATE	0.631** (0.251)	0.567** (0.251)
Number of MNE treated groups	164	150
Number of MNE controlled groups	1871	1753

Note: Standard error in parentheses.

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

The use of a much broader sample, which also includes multinational groups with only one year of positive tax payments, still yields statistically significant results. However, as shown in column (3) and (2), the p-value increases.

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with <u>positive tax payments</u> <u>in all the 7 years</u>	Treatment period: 2023 and 2024	
	Holding and financial groups (1)	All other groups (2)
ATE	0.886* (0.522)	0.350** (0.137)
Number of MNE treated groups	12	82
Number of MNE controlled groups	80	1249

Note: Standard error in parentheses.

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

The use of a much narrower sample, which includes only multinational groups with positive tax payments in every year, still yields statistically significant results. However, as shown in column (1), the p-value increases, in particular for the subsample comprising holdings and the financial sector.

c. Other treatment periods

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with positive tax payments in at least 5 years	Treatment period: 2022, 2023 and 2024	
	Holding and financial groups (1)	All other groups (2)
ATE	1.598*** (0.321)	0.645** (0.288)
Number of MNE treated groups	6	93
Number of MNE controlled groups	105	1577

Note: Standard error in parentheses. In this specification the first year of treatment is 2022, so the treated group is defined as companies with ETR<15% in at least two financial years between 2018 and 2021.

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

As shown in the results of the table above, the analysis remains robust even when considering 2022 as the initial treatment period, taking into account the publication of the OECD model rules in December 2021. According to this specification, there appear to be anticipatory effects in the behaviour of multinational groups as early as 2022.

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with <u>positive tax payments</u> <u>in all the 7 years</u>	Treatment period: 2024	
	All groups (3)	All other groups (2)
ATE	0.242** (0.104)	0.246*** (0.0939)
Number of MNE treated groups	106	94
Number of MNE controlled groups	1317	1237

Note: Standard error in parentheses. In this specification the first year of treatment is defined as 2024, so the treated group is defined as companies with ETR<15% in at least two financial years between 2018 and 2023.

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

The analysis remains robust even when considering only 2024 as the initial treatment period, which is the year immediately following the transposition of the directive in Italy and the first year of actual implementation of the new regulatory framework. As shown in column (3), the significance for all groups is at a p-value less than 0.05, which is lower compared to the use of 2023 as the first treatment year. In this specification, however, there is not a statistically significant effect on the holdings and financial companies (data not reported in the table).

d. Other definition of the main specification without extreme low/high observations

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with positive tax payments in at least 5 years & <u>drop of groups with average tax payments <</u> <u>pct(1) average tax payments > pct(99)</u>	Treatment period: 2023 and 2024	
	Holding and financial groups (1)	All other groups (2)
ATE	1.869** (0.740)	0.678** (0.319)
Number of MNE treated groups	10	122
Number of MNE controlled groups	92	1521

Note: Standard error in parentheses.

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

As shown in the table above, even after excluding from our panel entities that fall at the extremes of the distribution of the annual average payments for each group, the estimated average treatment coefficients remain of the same order of magnitude as those presented in the main section, albeit with a lower level of statistical significance. Therefore, the analysis is not compromised by the behaviour of outlier groups. Nevertheless, as big multinationals are the main target of the GMT policies, it is desirable to keep those observations in the sample.

e. Other definition of the main specification controlling by the average pre-treatment tax payment

Dependent variable: <i>log (CIT tax payments)</i>		
MNE groups with positive tax payments in at least 5 years & <u>covariate of the logarithm of the tax payment</u> <u>average in the pre-treatment period</u>	Treatment period: 2023 and 2024	
	Holding and financial groups (1)	All other groups (2)
ATE	1.674*** (0.516)	0.750*** (0.275)
Number of MNE treated groups	12	123
Number of MNE controlled groups	99	1547

Note: Standard error in parentheses.

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

Compared to the estimation presented in the main section, the results in the table above assess the effect of including an additional independent variable (covariate) corresponding to the average level of payments in the period prior to treatment. This was done to ensure that the statistical significance of the estimate was not influenced by different starting levels between treated and untreated entities. For subsample (1), the estimate is identical to the main specification. For subsample (2), the estimate is slightly higher and maintains the same level of significance.

It should also be noted that these results are confirmed by an additional specification (not shown in the table), in which the average level of tangible fixed assets was used as an additional independent variable (covariate), in order to account for an indicator of group size.

Annex 2. Descriptive statistics of payments by treated and controls, before treatment

TABLE 5. AVERAGE AND MEDIAN TAX PAYMENTS BEFORE TREATMENT

TABLE 5 shows some figures for IRES and IRAP payments before the policy for each group. These data are useful to give an idea of the order of magnitude of the estimated effect of the policy. On average, payments by holdings and financial sector entities are much higher than those of other groups, and treated groups of the holding and financial sector have higher average and median payments than control groups. In other sectors, control groups tend to have higher average and median payments.

TABLE 5. AVERAGE AND MEDIAN TAX PAYMENTS BEFORE TREATMENT

Tax payments before the treatment (2018-2022)	Sub-sample	
	Holding & financial groups (1)	All other groups (2)
Observed mean		
Controls	27,884,542	5,210,520
Treated	35,890,203	2,725,503
Observed median		
Controls	2,791,062	635,755
Treated	6,125,412	585,080

Note: amounts in euros.