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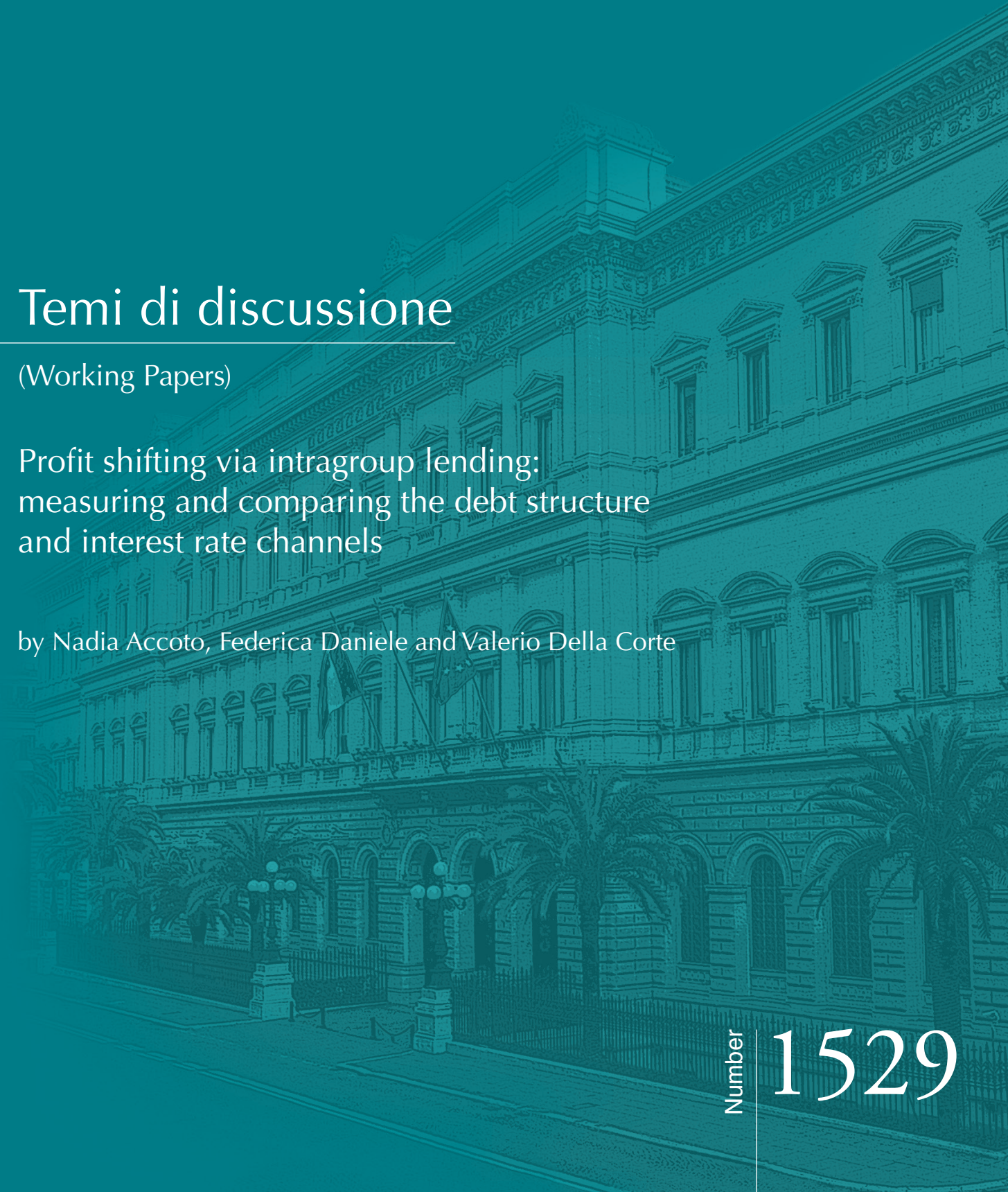

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PROFIT SHIFTING VIA INTRAGROUP LENDING: MEASURING AND COMPARING THE DEBT STRUCTURE AND INTEREST RATE CHANNELS

by Nadia Accoto*, Federica Daniele* and Valerio Della Corte*

Abstract

Multinational groups can use intragroup lending to shift their profits to low-tax jurisdictions so as to minimize their tax liability. We provide novel evidence on the extent of profit shifting via intragroup lending. Our findings suggest that firms are more likely to take on a greater share of related foreign party debt than non-related foreign party debt when the multinational group they belong to has affiliates in low-tax jurisdictions; we have also found that the interest rate paid on related party debt tends to be higher than the interest rate paid to non-related counterparties. The importance of tax motivations is confirmed by the disproportionate reliance on internal borrowing from affiliates in countries listed as tax havens among firms with higher EBITDA and spare interest deductibility capacity. Finally, we try to quantify the amount of corporate tax dodged via intragroup lending in Italy over the 2013-2022 period and show that it is relatively modest overall.

JEL Classification: F30, G30, G32, G38, H2, H25, H26.

Keywords: multinationals, FDI, intragroup lending, profit shifting, debt bias, transfer-pricing.

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* Banca d'Italia, DG Economics, Statistics and Research.

1 Introduction[1]

Intragroup lending is one of the channels through which profit shifting takes place, besides transfer pricing and the strategic location of intangible assets (OECD, 2016; Beer et al., 2020; Anzuini et al., 2023). Profit shifting via intragroup lending exists because companies can deduct interest payments from the definition of taxable income, unlike the return on equity capital. Companies have then an incentive to prefer debt to equity capital ("debt bias"). Among multinational enterprises (MNEs), they further have an incentive to minimize taxes at the group level by having affiliates in low-tax jurisdictions lending to affiliates in high-tax ones. Interests paid by one affiliate are received by another one, so that income at the group level stays the same. However, taxable income at the group level declines, since the drop in taxes due in the country with high taxation exceeds the increase experienced in the country with low taxation.

Despite the policy initiatives undertaken to curb profit shifting via intragroup lending,[2] legal loopholes allowing MNEs to shift profits via intragroup lending continue to exist. Cross-country harmonization of legislation is lagging behind, and existing rules are hard to implement in practice. For instance, it can be challenging for tax authorities to enforce the arm's length principle on the remunerations of financial transactions because intragroup lending could be designed so as to justify high interest rates, for instance by introducing equity-like features, or exploiting 'hybrid mismatch arrangements', i.e. by making use of entities and/or financial instruments classified differently in different countries (Anzuini et al., 2023).[3] In addition, transfer pricing tests require significant effort and administrative capacity that tax authorities often lack.

In this paper, we present a detailed assessment of profit shifting via intragroup lending among Italian corporations. First, we provide evidence suggesting that multinationals tend to shift profits away from Italy via intragroup lending.

[1]The views expressed are our own and are not necessarily shared by Banca d'Italia or the Eurosystem. We thank Stefano Federico, Fadi Hassan, Alfonso Rosolia, Silvia Sabatini, Pietro Tommasino, Roberto Torrini and two anonymous referees for useful comments.

[2]For example, Action 4 of the BEPS (Base Erosion and Profit Shifting) Action Plan dedicated to profit shifting via intragroup lending (OECD, 2016) recommends the adoption of a fixed ratio rule to be applied to the company's EBITDA (earnings before interests, taxes, depreciation and amortization) to limit (net) interest payments deductibility. At the EU level, Directive n. 2016/1164/UE, so-called Anti-Tax Avoidance Directive 1 or "ATAD 1" Directive, clarifies that tax-exempt income should be excluded from the definition of EBITDA used to calculate the cap for net interest deductions and introduces a 5-year time limitation to how many years can unused EBITDA be carried forward.

[3]2022 OECD's Transfer Pricing Guidelines establish the so-called "arm's length principle", according to which transactions between related entities of a multinational group must be priced on the same basis as transactions between third parties under comparable circumstance.

Second, we make an attempt at quantifying the phenomenon. Our analysis has the advantage of considering profit shifting via both the uptake of debt with related parties (i.e. with entities within the same MNE group) and the interest rate charged on it, while previous studies had only considered one of the two distinct channels (typically the debt one).

In the first part of the analysis, we focus on borrowing patterns from related vs. non-related parties. Our empirical strategy relies on a double comparison. Specifically, we compare the difference between foreign debt with related parties and foreign debt with non-related parties in firms that *have* vis à vis firms that *do not have* profit shifting opportunities, the latter captured by the presence of the group in tax haven countries. Our baseline estimates suggest that firms tend to borrow more heavily from related parties as opposed to other parties but only when the multinational group they belong to has an affiliate in tax havens – particularly conduit tax havens.[4]

Tax haven countries may also provide non-tax incentives to multinational firms. Group-affiliates may have easier access to capital markets and thus act as financial centers of the business group, which might partly explain our results (Col et al., 2020; Santioni et al., 2020). In an effort to tie our findings more closely to tax advantages that these countries might offer, we show that firms rely more on related-party vs. non-related party borrowing the lower the minimum statutory corporate income tax rate available within the group. Additionally, we provide evidence that the greater uptake of foreign debt with related parties is particularly pronounced for firms with higher profitability, and hence with a higher capacity to reduce their taxable income. We argue that this evidence is at odds with the competing non-tax incentives hypothesis, which implies that low-profitability firms should display greater reliance on internal borrowing from group affiliates as they face greater financing needs and more difficult access to external financing.

To further corroborate our findings, we rely on disaggregated bilateral data allowing to control for the country of origin of the funds. These more granular data confirm the tendency of firms in our sample to rely more on related-party compared to non-related party debt, especially when the borrowed funds originate from countries that classify as tax havens. For a subsample of firms featuring at least one other Italian group-affiliate in the database, we show that in a given business group it is especially the high-profitability group-affiliates that borrow relatively more from related parties located in countries classifying as tax

[4]Intuitively, conduits are countries where corporate entities are domiciled, usually used to channel financing originating from other economies, and therefore witnessing a large share of cross-border capital passing-through (and not staying) in the economy.

havens.[5] This pattern does not hold for non-related party borrowings. This piece of analysis lends further credibility to the profit shifting hypothesis in explaining observed patterns of cross-border related-party borrowing from low taxation jurisdictions.

Next, we analyze the interest rate charged on foreign debt with related parties. According to the "financing advantage" interpretation of internal capital markets (Buchuk et al., 2014), borrowing conditions on related-party debt – including a lower interest rate – should be more favorable compared to non-related party debt. However, the incentives created by profit shifting opportunities can outweigh those related to internal markets' financing advantages and thus lead to higher interest rates on related-party compared to non-related party debt. We find evidence in line with a positive spread, especially when the within-group minimum corporate income tax rate is low, though sample size limitations suggest that these findings should be interpreted with some caution.

In the final part of the paper, we attempt to provide a quantification of profits shifted via intragroup lending away from Italy during 2013/22. Our back-of-the-envelope calculation places the amount of shifted profits via this channel in the ballpark of 280 million euros on average per year (or 67 million euros of avoided tax). This number can be reconciled with existing micro-based estimates in the range of 0.6 to 5 billion euros. More specifically, based on a sample of firms taking part to the trade in services survey conducted by the Bank of Italy, Accoto et al. (2024) estimate shifted profits to range between 0.6 and 1.4 billion euros per year, while Bratta et al. (2021) estimate it to be closer to 5 billion euros based on Country-by-Country-Reporting data. The relatively low share of total shifted profits accounted for by intragroup lending is consistent with the results of other studies according to which this channel is of second order compared to other profit shifting strategies (Heckemeyer and Overesch, 2017; Tørsløv et al., 2023). For instance, similarly to us, Buettner and Wamser (2013) find that while there is evidence of strategic allocation of internal debt among German multinationals, the overall tax implications are quite limited.

Furthermore, we show that profit shifting via intragroup lending seems to have declined since 2019. This evidence is compatible with the implementation of the first Anti-Tax Avoidance Directive in Italy in 2018 that aimed at curbing tax avoidance via interest payments shifting, even if other factors taking place over the same period, including the pandemic shock, the reduction in the Italian corporate income tax rate in 2017, the rise in interest rates and potential composi-

[5] We define a group-affiliate as a firm belonging to the same multinational group as the Italian reporting firm, with which the Italian reporting firm may (or may not) have a direct/indirect shareholding link.

tional differences in the stock of debt, do not allow us to draw a firm conclusion on this.

Overall, our work suggests that the potential benefits of tax avoidance via intragroup lending, such as the increase in private investment highlighted in de Mooij and Liu (2021), may need to be weighed against its costs in terms of reduced tax revenues. Yet, private investment can be stimulated without need for a tax base erosion. Several policy instruments are available to counter profit shifting via intragroup lending and align the fiscal treatment of debt and equity. In particular, limitations to the possibility to deduct interest payments would seem to be the most direct tool, without implying an additional cost for public finances (as in the case, for example, of the allowance for corporate equity). The steps taken in recent decades to strengthen and harmonize at an international level such limitations appear to go in the right direction.

The rest of the paper is structured as follows. Section 2 provides a literature review of profit shifting via intragroup lending; Section 3 introduces the institutional background; Section 4 describes the data used in the analysis; Section 5 presents the empirical analysis; Section 6 concludes.

2 Literature review

This paper is connected with several strands of literature. The first one considers the impact of tax differentials across countries on the overall level and intragroup allocation of corporate debt. Based on data on foreign affiliates' debt of around 2500 U.S. multinational firms, Desai et al. (2004) estimate that corporate debt as a fraction of assets will be 2.8 percent higher in affiliates of U.S. multinationals located in countries with a 10 percent higher tax rate. Moreover, parent debt, i.e., debt that affiliates owe to their parent company, responds more strongly to local taxation than other types of debt. Buettner and Wamser (2013) confirm this finding by showing that affiliates of German multinationals located in high taxation countries take on significantly more internal debt (i.e., debt with group-affiliates) compared to other affiliates.

The direction of debt shifting can be from affiliates to their parent, as well as between group-affiliates. Capital structure optimization should take place at the parent company level and across all affiliates belonging to the group, taking into account all affiliate countries' tax rates. The establishment of an affiliate in a high taxation country should imply a decrease in related-party debt to other affiliates and a debt shift to the affiliate located in the high taxation country. Based on data on foreign firms located in more than 30 European countries, Huizinga

et al. (2008) test this hypothesis and analyze the interconnectedness of corporate debt across the full set of countries where a multinational has operating affiliates. More specifically, they find that a 10 percent higher tax rate in a given country is associated with a 2.4 percent higher ratio of corporate debt to assets for affiliates located in that country and a 0.6 percent lower ratio for affiliates belonging to the same multinational group but located in different countries. Buettner and Wamser (2013) also show that not only affiliates of German multinationals located in high taxation countries take more related-party debt, but they do so even more if there is a group-affiliate within the same group located in a low taxation country or tax haven.

Instead of comparing the behavior of foreign-owned firms located in different countries, an alternative approach can be the one of comparing foreign-owned to domestically-owned firms located in the same country. Based on a panel of firms located in European countries, Egger et al. (2010) find that corporate debt as a fraction of total assets rises in response to an increase in the tax rate in foreign-owned firms more than in domestically-owned ones. Keeping the focus on foreign-owned firms located in a specific country and based on information contained in German inward FDI surveys, Ramb and Weichenrieder (2005) show that profitable foreign-owned firms react to an increase in the German corporate income tax rate by expanding related-party debt as a fraction of total assets more strongly than loss-making foreign-owned firms. This evidence highlights the importance of individual firms' economic situation at shaping profit shifting: affiliates that book positive profits in a given country should have a stronger incentive to partake in debt shifting strategies.

Intragroup (interest) payments data provide a more precise measurement of profit shifting. The size of these flows depends on the stock of debt, as well as on the interest rate charged on debt with related party. Existing work mostly focuses on stocks data, more easily available than data on payments. To the best of our knowledge the only exceptions are Desai et al. (2004) and Fuest et al. (2022). Desai et al. (2004) compute an implicit interest rate on the debt of U.S. multinationals' foreign affiliates based on interest payments flows data and the stock of liabilities. They show that such rate tends to be lower in high taxation countries, which can be seen as the net effect of two opposing channels: on the one hand, high taxation should encourage profit shifting and be associated with higher interest rates; on the other, strong rule of law and low country-specific risk often found in high taxation countries should encourage lower interest rates. The presence of many low-income countries in their database makes it more likely for the second channel to be relevant. Moreover, the hypothesis of profit shifting via higher interest rates charged on intragroup transactions cannot be properly tested due

to the missing breakdown of interest payments into related and third party debt. On the contrary, Fuest et al. (2022) exploit country-by-country reports (CbCRs) data containing information on payments from related parties. However, the disadvantage is that they cannot disentangle different profit shifting channels, since payments data they have use both interest payments and royalties. Overall, they find that affiliates located in low taxation countries are the destination of significantly higher intragroup payments.

Our contribution to this first strand literature is twofold. First, we develop a way to more credibly identify profit shifting via intragroup lending, hinging on the comparison of same-group Italian affiliates' borrowings according to the interaction between the tax haven status of the lender country and borrowers' profit shifting capacity, in line with interest deductibility limitations rules in place in Italy. Second, we use interest payments data to investigate whether interest rate differentials are a complementary strategy to tax avoidance via intragroup lending.

A second strand of literature considers the effect of interest deductibility limitation rules on multinationals' profit shifting strategies (see section 3 for more details on interest deductibility limitation rules).[6] Buettner et al. (2012) show that affiliates of German multinationals located in countries subject to the introduction of interest deductibility limitations reduce their related-party debt, while at the same time expanding their non-related party one. Buslei and Simmler (2012) analyze the impact of the introduction of interest deductibility restrictions in Germany in 2008 and show that firms strongly react in order to avoid the limited deductibility of interest expenses. Blouin et al. (2014) apply a similar analysis to a panel of U.S. multinationals' foreign affiliates. Both debt with the parent firm and total debt decline after the introduction of restrictions on borrowing from the parent, so that the overall effect of such policy appears to be the intended one, i.e., a reduction in corporate debt. While discouraging profit shifting, interest deductibility limitation rules raise the effective marginal tax rate and potentially reduce investment, as confirmed in de Mooij and Liu (2021). More recently, Faccio and Xu (2025) investigate the impact of the introduction of interest deductibility limitations on a global firm database between 1997 and 2022. In Italy, Law Decree n. 142/2018, which received the European Anti-Tax Avoidance 1 Directive (Council Directive (EU) 2016/1164) introduced a few changes that went into the direction of limiting interest payments deductibility (see section 3 for more details). While we cannot provide a formal evaluation of this reform due to the limited size of the sample after the reform (and its peculiar characteristics owing

[6] In 2024, 100 jurisdictions had in place some kind of rule to limit (net) interest payments deductibility out of a total of 160 surveyed jurisdictions OECD (2024).

to the pandemic period), we provide suggestive evidence that the reform might have been effective at discouraging profit shifting practices via intragroup lending.

Finally, a third and last strand of related literature has to do with the quantification of shifted corporate profits (Hebous, 2024; Accoto et al., 2024; Tørsløv et al., 2023; Ferrari et al., 2024). The approach common to several of these contributions consist of comparing the profitability of foreign to domestically owned comparable firms to derive a quantification of the stock of profits shifted away from certain jurisdictions. Bilateral trade data on the use of intellectual property (patents and trademarks), headquarter and other high value-added services are then used either to allocate shifted profits to source countries (Tørsløv et al., 2023) or to test directly the relevance of intellectual property strategic location as a profit shifting channel Accoto et al. (2024). We contribute to this literature in two ways. First, we derive an estimate of profits shifted via intragroup lending in Italy. Second, we compare the relevance of this channel against the overall magnitude of profits shifted according to existing estimates.

3 Institutional background

3.1 Rules limiting interest payments deductibility

In recent decades, several policy initiatives were taken with the specific aim of curbing profit shifting via intragroup lending. As a result of these initiatives and according to OECD Corporate Tax Statistics, as of 2024 100 jurisdictions had in place some kind of rule to limit (net) interest payments deductibility, significantly up from 67 in 2019.

The two most common interest deductibility limitation rules are i) thin capitalization rules and ii) earnings stripping rules. Thin capitalization rules normally restrict deductibility of (net) interest payments if the debt-to-equity ratio exceeds a certain threshold. Earnings stripping rules allow (net) interest payments to be deducted up to a certain percentage of the firm EBITDA (earnings before interest, taxes, depreciation and amortization). Action 4 of the BEPS (Base Erosion and Profit Shifting) Action Plan (OECD, 2016), focusing on best practices to limit profit shifting via intragroup lending, recommends the adoption of a fixed ratio rule to be applied to EBITDA, suggesting a corridor of ratios between 10 and 30%. The Action moreover recommends that the rule applies, at a minimum, to related-party debt.[7]

[7] In 2024, about 50% of jurisdictions with some kind of interest deductibility limitation rule in

In Italy, interest payments and assimilated borrowing costs are deductible (regardless of whether they refer to related or non-related party debt) up to interest receipts and assimilated lending revenues, according to article 96 of the tax code ("Testo Unico sulle Imposte e i Redditi"). Between 2008 and 2018, interest payments in excess of interest receipts were deductible up to 30% of "risultato operativo lordo (ROL) della gestione caratteristica" (a concept similar to EBITDA based on operational revenues and costs). Most importantly the relevant definition of EBITDA was the one contained in the firm balance sheet. Non-deducted net interest payments could be carried forward indefinitely, and similarly for unused EBITDA capacity.

The discipline for the deductibility of interest payments has been significantly modified by Law Decree n. 142/2018, which received the Anti-Tax Avoidance 1 (ATAD 1) Directive.[8] Starting from 2018, the EBITDA relevant for the purpose of the 30% limitation is no longer accounting-based but rarher the tax relevant one. Moreover, unused EBITDA can now be carried forward only up to 5 years.

The changes introduced by Law Decree n. 142/2018 were deemed to have made the framework for the deductibility of interest costs more restrictive.[9] While there is a large number of factors that can drive both a positive or negative wedge between accounting and tax-relevant income, the first set of factors seem to have gained strength in recent years, thus reducing tax relevant compared to accounting-based EBITDA and consequently the scope for interest payments deductibility.[10] Total accounting-based EBITDA for firms with positive EBITDA amounted in 2015 to 152 billion euros, compared to tax-relevant EBITDA of 158 billion euros, resulting into a negative wedge of 6 billion euros. However, in 2018 and 2021 the wedge was positive and equal, respectively, to 13 and 53 billion euros. Among the factors explaining this increase, for instance, income stemming from dividends and capital gains from qualifying shareholding shares, which is tax-exempt for the purpose of avoiding double taxation, more than doubled in 2022 compared to 2021, the latest fiscal year available in tax declaration data (Ministry of Economics and Finance). More importantly, according to the Italian Parliamentary Budget Office, investment tax incentives to firms – excluded from the definition of tax relevant income – witnesses a steep rise since 2016, from around 2 billion euros in 2016 up to nearly 10 billion euros in 2021 (ubP, 2024).

place restricted the application of such rules to related party debt only.

[8]Directive n. 2016/1164/UE, so-called Anti-Tax Avoidance Directive 1 or "ATAD 1" Directive, clarifies that the relevant income definition for the calculation of interest payments deductibility is the tax relevant one and no longer the accounting one.

[9]This is also the conclusion drawn in Zangari (2020).

[10]The full list of variations impacting the determination of fiscal ROL is provided at Fondazione Nazionale dei Commercialisti (2024).

Interest deductibility limitations rules are meant to tackle specifically profit shifting via intragroup lending. Other provisions of the tax code however can affect this channel by targeting firms' financing choices and the amount of total corporate debt vis à vis equity. The most significant one is the allowance for corporate equity (ACE), which introduces the possibility to deduct a notional return on positive equity variations, thus restoring the symmetry of treatment between the return on debt and the return on equity.[11] In Italy, the ACE was introduced in 2011, on an incremental basis (i.e., on the net positive variation of equity compared to the situation at the end of 2010) and it was thus already in place during the start of our sample period. The provision was repealed from 2024 onward.[12] While the ACE system may have reduced the uptake of debt by Italian companies over the sample period, the evaluation of corporate responses to the introduction of the ACE is outside the scope of this paper.[13]

3.2 Inflated interest rates and arm's length principle

In addition to shifting debt to high-tax countries (and overcapitalizing affiliates in low-tax countries), MNEs could reduce their tax burden by charging relatively high interest rates on this debt. In theory, charging unmotivated high interest rates for the sake of merely reducing the tax burden would go against the so-called 'arm's length principle' and lead to a violation of transfer pricing rules.[14] In practice, it is very complicated for tax authorities to enforce the arm's length principle on the remunerations of financial transactions because intragroup lending could be designed so as to justify high interest rates, for instance by introducing equity-like features, or exploiting 'hybrid mismatch arrangements', i.e. make use of entities and/or financial instruments classified differently in different countries (Anzuini et al., 2023). In addition, transfer pricing tests require significant effort and capacity that tax authorities may lack. Surprisingly, tax authorities may also have 'distorted' incentives that push them to analyze resident firms' trans-

[11] There is an ongoing discussion about the introduction of this kind of measures at EU level: the European Commission proposed in 2021 a Council Directive on laying down rules on a debt-equity bias reduction allowance (DEBRA) and on limiting the deductibility of interest for corporate income tax purposes (Proposal COM (2022)216).

[12] The Italian legislation also included several stringent anti-avoidance provisions targeting transactions between related parties to limit tax planning that may abuse the ACE system, for instance by reaping cascading ACE by triangulation with foreign companies controlling subsidiaries in Italy (Zangari, 2014).

[13] See Zangari (2014) and Zangari (2020) for more details on the Italian ACE system and its impact on firms.

[14] The 'arm's length principle' states that all transactions within the group should be priced as they would have been in a transaction with an external, independent, third party. It is a principle that is common in international taxation law.

actions with affiliates located in high-tax rate countries rather than with affiliates located in tax havens (Tørsløv et al., 2023). This happens because firms spend more legal resources to defend their transfer pricing optimization in tax haven and because it is easier for tax authorities to cooperate with tax authorities in similar countries than in tax havens.

As a matter of fact, when the Action 4 of the BEPS came out in 2016 only few countries had some experience in applying arm's length tests to financial transactions and financial transactions rates. This experience was considered not sufficient to significantly reduce profit shifting by itself (OECD, 2016). Further coordinated efforts on the topic were deemed necessary, eventually leading to the adoption of specific guidelines on transfer pricing on financial transactions in 2020 (OECD, 2020).

4 Data

The analysis leverages several firm-level datasets. First, we use data from the Italian direct reporting system (DRS), which covers cross-border transactions and positions, with frequencies ranging from monthly (limited to larger firms) to annual (covering a broader population), for a sub-population of about 5,500 Italian firms, resulting in a total of 57,000 firm/year observations during the period considered (2013-2023).[15] Next, we rely on Orbis Historical to get information on the structure of the corporate group that reporting firms belong to. In terms of foreign ownership characteristics, about 17,000 firm/year observations are either self-standing firms or part of purely domestic groups, around 25,000 firm/years are part of Italian multinational groups, and the remaining approximately 17,000 correspond to affiliates of foreign multinationals. Third, we associate unconsolidated balance sheet information from CERVED-CEBI to the sample of reporting firms, with a matching rate of about 90%.[16] Hence, the final sample we work

[15]The DRS is one of the data sources used for compiling Italy's balance of payments and international investment position. Surveyed firms – which are meant to be representative of internationally active firms – tend to be significantly larger than the national average. See `https://www.bancaditalia.it/statistiche/raccolta-dati/direct-reporting/edizioni-2023-2025/` for more information on the Italian direct reporting surveys.

[16]To preserve confidentiality, we anonymize the data after the matching process. The match varies according to sector: we are able to associate a balance sheet to 98% of observations in manufacturing, but only to 72% of in the financial sector or holdings. More specifically, we rely on Cerved for Italian incorporated firms with balance sheet reclassification scheme "1" (firms active in industry and services). Next, we fill in missing balance sheets from Cebi (*Centrale Bilanci*), which contains information on a subset of Italian firms (normally the largest ones) without imposing any filter on the type of economic activity. In this way, we are able to associate a balance sheet to a significant share of surveyed firms operating in the financial sector. More precisely, 94% of

Table 1: Summary statistics of different leverage ratios

	p(10)	p(50)	p(90)	Mean	Count
Overall	11	52	86	52	52509
Foreign	0	0	14	5	52509

Notes: Only firms in DRS with an associated balance sheet. Leverage ratios are calculated by taking either total (Cerved/Cebi) debt or foreign debt (DRS) as the numerator, and total assets (Cerved/Cebi) as the denominator. A firm included in the DRS annual sample that does not report any foreign debt is assigned a foreign leverage ratio of zero. Source: Banca d'Italia (DRS), Cerved/Cebi, Orbis.

with comprises approximately 52,000 firm/year observations. As Table 1 shows, foreign debt represents a small share of overall debt for the average firm: each year, about half of firms report zero foreign debt. Among those with positive foreign debt, around 40% report only foreign debt with non-related parties, 20% report only foreign debt with related parties, with the remainder reporting positive foreign debt with both non-related and related parties. Conversely, the median leverage ratio, calculated as the ratio between overall debt and total assets, is 52. As we move towards more leveraged firms, corresponding, on average, to the largest firms in the sample, foreign debt increases.

In 2023, approximately 2,400 firms reported foreign borrowings, 87% of which were part of multinational groups. Concentration of foreign borrowings within multinational enterprises is even higher when measured in terms of the value of borrowings. In 2023, 97% of foreign borrowings' value (206 billion euros) was imputable to multinational enterprises. Loans represent 60% of the total value of foreign debt positions, while related-party debt makes up two-thirds of total foreign debt positions. For all firms in sample we construct a set of leverage ratios, which take as numerator different definitions of debt, while keeping fixed total assets as denominator. [17] For the purpose of this analysis, we narrow down the focus on loans received, which comprise the majority of the stock of foreign debt and are more likely to be associated with interest debt shifting than commercial debt or other (minoritarian) types of short-term debt. Information on interest payments/receipts on foreign loans is available for a smaller subset of

balance sheets of firms operating in the financial sector or as holdings in the final database comes from Cebi (78% for firms in real estate).

[17] Firms report the type of liability (which can be "loans", "trade debt" or "other debt") and whether these are held with respect to a related counterparty, i.e., with a foreign firm that is part of the same corporate group. In the case of related-party debt, the firm must report the identity of the counterparty as well, so that the dataset breaks down foreign positions by a (anonymous) counterparty identifier. In the case of non-related party debt, conversely, the dataset breaks down foreign positions only by the country of the counterparty. Liabilities with non-related counterparties are normally borrowings with financial institutions.

firms, which however account for more than three quarters of total foreign liabilities. Total reported interest payments amount to 2.5 billion euros on average on an yearly basis (3.3 billions in 2023).

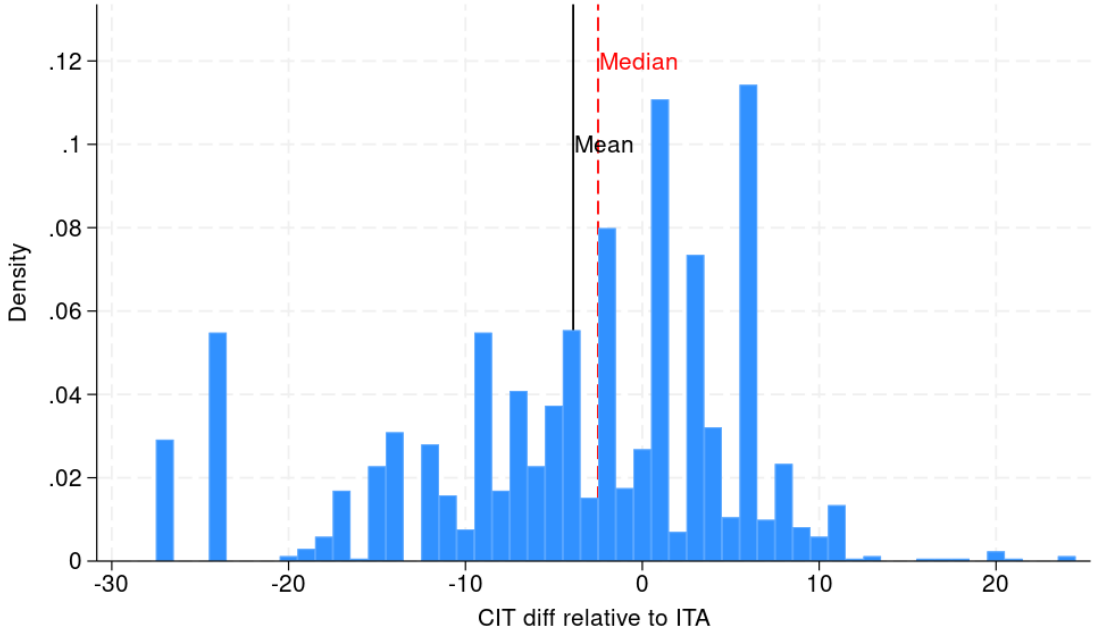
In our empirical analysis we also use several variables related to the international tax system that capture the incentive to shift profits from one location to another of the corporate group for tax optimization purposes. Statutory corporate income tax (statutory CIT) differentials provide an approximation of these tax incentives, abstracting from potential tax holidays and special regimes. Some studies use average effective tax rates. However, as argued in (Beer et al., 2020), these rates are themselves the results of profit shifting behavior and they may lead to endogeneity concerns. First, we consider the difference with respect to Italy in statutory corporate income tax rates. In Italy, in 2024 the corporate income tax rate for incorporated firms was 24%. In 2017 it was brought down from 27.5%, corresponding to the rate in 2013, the initial year of the analysis in the present paper. Corporate income tax rates are retrieved from the OCED Corporate Income Tax Rates Database, which covers 143 countries spanning our entire sample period. On average, the difference in the statutory corporate income tax rate with the Italian one is negative (Fig.1). Second, we draw on the tax haven definition as in Tørsløv et al. (2023). Based on the results by Garcia-Bernardo et al. (2017), we also identify separately a subset of countries as conduit tax haven/financial centers. Large MNEs typically set an affiliate in these countries to perform financial services for the group, taking advantage of special tax provisions or regulation for such activities. A common characteristic of these countries is that they are often not the final leg of financial exchange between related parties but act as intermediaries ("pass-through" capital). These activities may be instrumental to profit shifting in other (tax haven) countries.

The full list of countries included in each taxonomy is provided in Table A8 in the Appendix.

5 Empirical analysis

The assessment of profit shifting via intragroup lending requires the analysis of two distinct components that together determine the magnitude of intragroup net interest payments: 1) the stock of intragroup debt and 2) the interest rate paid on intragroup debt. In what follows, we deal with each part sequentially.

Figure 1: Cross-country statutory corporate income tax rates (difference with the Italian one)



Notes: Latest year available for each country is used. Source: OECD Corporate Income Tax Rates Database.

5.1 Evidence on intragroup debt

Available evidence of profit shifting via intragroup lending typically exploits variation in leverage ratios across affiliates located in different countries and subject to different corporate income tax rates (Desai et al., 2004; Buettner and Wamser, 2013). In contrast to these studies and analogously to Egger et al. (2010), our analysis looks at firms located in one country but with different degrees of exposure to profit shifting opportunities. In Egger et al. (2010) the degree of exposure to profit shifting is given by firms' multinational status; in our work we move one step forward by defining multinational groups' exposure to profit shifting exposure in terms of the corporate income tax characteristics of group-affiliates, in a similar vein to Huizinga et al. (2008). Finally, an important innovation of our analysis is to add a further level of comparison, i.e., between related and non-related debt, based on the hypothesis that only the former one should respond to the presence of profit shifting opportunities.

More formally, our empirical strategy relies on a double comparison. We leverage availability of information on both related-party and non-related party foreign debt at the firm level. Specifically, we compare foreign debt with related parties to foreign debt with non-related parties in firms that have the opportunity to engage in profit shifting vis à vis firms that do not. We use information in Orbis on the firm's group structure to proxy for profit shifting opportunities. We combine data on reporting firms' group-affiliates with tax-level information on the jurisdiction where group-affiliates are located (see Section 4). For each company in the database, Orbis calculates the firm corresponding to the global ultimate owner (GUO). Operationally, we then derive the set of group-affiliates of reporting firm i at time t as the set of all firms sharing the same GUO as firm i at time t. Next, we attach tax-level information on the jurisdiction where each group-affiliate is based. Specifically, we consider 1) the definition of tax havens as in Tørsløv et al. (2023), 2) the definition of conduits versus sinks as in Garcia-Bernardo et al. (2017)[18], 3) corporate statutory tax rates in the OECD Corporate Tax Statistics Database.

The baseline specification is:

$$\begin{aligned}\text{Foreign leverage}_{ijt} = \gamma_{it} + \beta_1 D(j = \text{RP}) + \\ + \beta_2 D(j = \text{RP}) \times D(\text{firm has aff. in TH})_{it} + e_{ijt}\end{aligned} \tag{5.1}$$

[18]They classify the following countries as conduits: the Netherlands, United Kingdom, Switzerland, Singapore, Ireland.

where γ_{it} are firm i/year t fixed effects, $j = \{$Related Party,Other Party$\}$ is the type of foreign debt, and the dummy D($j =$ RP) takes value one when $j = \{$Related Party$\}$ (i.e. for each firm-year combination we have two observations in our sample). As in Table 1, leverage is calculated as the ratio between foreign debt of a given type and total fixed assets of the firm. We include both loans and trade debt in the debt definition, unless otherwise specified. The coefficient β_1 on the dummy $D(j = RP)$ identifies the difference in foreign leverage with related vs. non-related parties for the average firm.

We include in the baseline specification a dummy variable capturing whether firm i has at least one group-affiliate based in a tax haven at time t, $D(\text{firm has aff. in TH})_{it}$ and use this as a proxy for profit shifting opportunities or exposure to profit shifting.[19] Due to the inclusion of firm i/year t fixed effects, γ_{it}, we are unable to estimate the impact of profit shifting opportunities, as proxied by $D(\text{firm has aff. in TH})_{it}$, on absolute leverage. However, we can retrieve the impact of exposure to profit shifting on the differential between leverage ratios.

More specifically, the interaction term β_2 measures variation in the difference in foreign leverage with related vs. non-related parties for firms that are part of a multinational group with at least one affiliate located in a tax haven. In case of a positively estimated interaction term, we interpret it as evidence in favor of profit shifting.

While we do not control in eq.5.1 for the country where the funds originates, this approach has the advantage of allowing for profit shifting to take place both directly and indirectly. An Italian affiliate of a foreign multinational group might indeed borrow from a group-affiliate located in a high taxation country which in turn borrows from another group-affiliate located in a low taxation country. In Section 5.2 we present an alternative specification where we leverage information on the source country of intragroup lending.

The difference in related vs. non-related party debt for the average firm in the sample is positive when we do not control for profit shifting opportunities (col.1 of Table 2). However, it turns negative after adding the interaction term, while it stays positive and grows in magnitude for firms belonging to groups exposed to profit shifting (col. 2).

The literature has emphasized the distinct role in profit shifting played by tax havens vs. conduits (Garcia-Bernardo et al., 2017). Intuitively, conduits are coun-

[19] On average in any given year, around half of firms in the sample have a group-affiliate located in a tax haven. This variable features time variation for around 20% of firms in the sample. In other words, the multinational groups corresponding to 20% of firms in the database witness a corporate transformation during the observation period, in the sense of moving from a situation of zero affiliates in tax havens to a situation of at least one affiliate in tax havens and/or vice versa at least once during 2013-23. The first type event of is weakly more frequent than the second one.

Table 2: Foreign leverage with related parties and profit shifting opportunities at the group level

	Firm's foreign leverage by debt type			
	(1)	(2)	(3)	(4)
RP_{ijt}	1.645***	-0.465***	-0.465***	-0.465***
	(0.056)	(0.047)	(0.047)	(0.047)
$RP_{ijt} \times$ Aff in TH_{it}		4.400***		
		(0.113)		
$RP_{ijt} \times$ Aff in TH/no $conduit_{it}$			1.704***	
			(0.273)	
$RP_{ijt} \times$ Aff in TH/$conduit_{it}$			4.766***	
			(0.121)	
$RP_{ijt} \times$Aff in TH/ GUO not in EU_{it}				8.434***
				(0.275)
$RP_{ijt} \times$ Aff in TH/ GUO in EU_{it}				3.177***
				(0.115)
N	105,018	105,018	105,018	105,018
R-squared	0.513	0.527	0.528	0.534

Notes: Standard errors clustered at the firm level. Estimation of eq.5.1. Firm's foreign leverage by debt type is equal to foreign debt - both loans and trade debt - divided by total assets. Winsorized foreign leverage at the 99.9%. RP_{ijt} is equal to 1 for related-party debt; Aff in TH_{it} takes value 1 if firm i has at least one group-affiliate based in a tax haven at time t. The definition of conduits is as in Garcia-Bernardo et al. (2017). Firm/year fixed effects are included. Source: Banca d'Italia, Cerved/CEBI, Orbis.

tries where corporate entities are domiciled and used as conduit for financing originating from other economies, so that they see large share of cross-border capital passing-through (and not staying) in the economy. Cross-border payments tend to be taxed mildly in these countries despite the statutory rate on corporate income not being necessarily low. These countries on average feature higher levels of tax cooperation, through for instance the participation to double tax treaties or the application of low withholding taxes, thus escaping the stricter definition of tax havens or "Controlled Foreign Corporation" rules, as well as being subject to a lower level of scrutiny from tax authorities.[20] In col.3 we therefore break down the interaction term depending on whether the firm belongs to a group with at least an affiliate located in a conduit country, thus testing whether conduits might play a differential role in incentivizing profit shifting via intragroup lending.

Our analysis indicates that the greater uptake of foreign debt with related parties for firms belonging to a group with at least an affiliate located in a tax haven hinges on the presence of conduit countries within the business group geographical perimeter (col.3). Finally, we distinguish firms based on whether their GUO is based in a European vs. not European country. The association between intragroup lending and the presence of profit shifting opportunities within the group that the firm is part of is three times larger when the GUO is in a not European country (col.4). This evidence could be explained by the greater transparency and degree of information exchange for firms based in the European Union, which might give less of a leeway to shift profits.

5.1.1 Robustness and heterogeneity checks

The evidence presented in Table 2 is robust to alternative definitions of profit shifting opportunities. In particular, in Table A3 we show results trying alternative measures of profit shifting opportunities , namely : i) the share of affiliates located in tax havens (col.1); ii) the presence of at least an affiliate located in an investment hub according to OECD (2024) definitions (col.2); and iii) the minimum statutory corporate income tax rate within the corporate group that the reporting firm belongs to (col.3). Using the minimum statutory corporate tax rate in particular allows to better separate the role of tax from non-tax incentives. Indeed, one could argue that foreign leverage with related parties might be higher compared to foreign leverage with non-related parties in firms belonging to a business group with a presence in tax havens for reasons other than profit shifting.

[20]Controlled Foreign Corporation rules state that the income earned in tax havens must be subjected to domestic corporate income tax.

Tax havens can be countries that offer investors better governance standards and from where attracting shareholders' capital can be easier (Col et al., 2020). For this reason, a multinational firm might find convenient to set up an affiliate in such countries and let these affiliates act as "financial centers" of the group, thus raising capital and redistributing it to affiliates of the rest of the group. However, consistent with tax-incentives, we find that the difference in foreign leverage with related vs. other parties grows larger as the minimum statutory corporate income tax rate within the group declines (col.3 of Table A3). More specifically, in a firm where the minimum statutory corporate income tax rate within the group is 10 percentage points below the average, intragroup foreign leverage is 4 percentage points above extra-group foreign leverage on average, against a 1.6 percentage points gap for the average firm. Hence, it appears that it is not just the attractiveness of such countries as financial centers that shapes their dominant role as origin of related party debt, but also the fiscal advantages that they offer, which can be more resolutely traced back to profit shifting behavior.

Additionally, we test whether the location of the GUO in a tax haven is associated with disproportionate related party debt uptake, and thus potentially with profit shifting behavior (col.4). The coefficient on the interaction term is positive but smaller compared to the baseline evidence, which seems to suggest that the strategic location of the group controlling firm is important but less so compared to the location of group affiliates.[21] Finally, excluding Great Britain or adding Belgium to the list of financial conduits does not alter significantly the result of a stronger preference for foreign debt with related counterparties in the case of firms where at least a group affiliate is based in a jurisdiction classified as conduit.

The findings in Table 2 survive to an additional battery of robustness checks, all displayed in Table A4. In particular, in col.2 we exclude from the sample firms that did not reply to the DRS. In col.3 we drop firms that according to Orbis Historical are not part of any group (neither domestic nor foreign). In col.4 we include in the definition of foreign leverage only loans, thus excluding trade debt. The estimated coefficient on the interaction term in eq.5.1 remains qualitatively unchanged.

Internal capital markets should be more important for affiliates with a weaker financial situation or that do not manage to access adequate funding via credit markets or the domestic equity market (Gopalan and Seru, 2007; Santioni et al., 2020). To further prop up the conclusion that part of the observed patterns in intragroup lending is due to tax incentives, we interact both the dummy on related

[21] Group controlling firms might be more salient to tax authorities while at the same time not being necessary for the implementation of profit shifting strategies, thus potentially discouraging groups from placing their global ultimate owner in tax havens.

party debt and the interaction term in the main specification with the (centered) firm's EBITDA. As described in Section 3, high-EBITDA firms have higher interest deductibility capacity and can thus take greater advantage of profit shifting via intragroup lending. According to the evidence shown in col.5 of Table A4, the coefficient on the triple interaction term is positive, thus suggesting that high-EBITDA firms belonging to groups exposed to profit shifting are those featuring the starkest difference in related vs. non-related party debt. These results lend further support to the interpretation of the coefficient on the interaction term as signaling profit shifting behavior as opposed to the internal capital markets interpretation.

Finally, the higher stock of liabilities with related counterparties is not matched by a tantamount expansion in the stock of assets in related counterparties. In col.6 of Table A4 we run the baseline specification in eq.5.1 on net foreign leverage, i.e., foreign debt minus foreign assets by type divided by the firm's total assets. The interaction term is much lower compared to the baseline but still positive and statistically significant.

5.2 Evidence on intragroup debt by location of the counterparty

In this section, we leverage geographical information on bilateral cross-border borrowing positions in order to assess whether the location of the immediate counterparty providing funding is i) more likely to be tax haven and that ii) borrowing firms are those with more capacity to reduce the tax burden. These findings combined validate further the claim that higher foreign leverage of firms with affiliates in tax haven is indeed due to profit shifting.

To do this analysis, we consider financing received by DRS firms by origin of the funds. We include in the analysis countries where DRS firms in a given year i) have at least a group-affiliate according to Orbis ownership data or ii) report related-party debt. In other words, we consider all countries in which an MNE has an affiliate from which it could potentially borrow, including cases in which related party borrowing observed in a given year is actually zero.

A standard result in the international finance literature is that cross-border financial linkages follow a gravity structure (i.e., they are affected by size of the economies, bilateral distance, language, legal system, and so forth).[22] We control for these gravity factors adopting a fixed effects empirical specification and we compare borrowing from related parties with borrowing from other parties to elicit differences when the source country is a tax haven, holding firm/year characteristics and origin country/year characteristics fixed.

[22]See for instance Aviat and Coeurdacier (2007) and Pellegrino et al. (2025).

The gravity structure implies a multiplicative model for bilateral borrowing that can then be linearized by taking the logarithm on both sides of the equation. This has however the well-known drawback of forcing to drop zero observations. We therefore estimate the model in levels using the Poisson pseudo-maximum likelihood (PPML) estimator proposed by Santos Silva and Tenreyro (2006), which is now the standard go-to tool for empirical analysis the international trade and finance literature and whose use is also advocated for corporate finance applications (Cohn et al., 2022).[23] More formally, we estimate the following empirical model:

$$\begin{aligned}\text{Borrowing}_{ijdt} = \exp(&\gamma_{guo,d,t} + \gamma_{it} + \beta_1 D(j = \text{RP}) + \\ &+ \beta_2 D(j = \text{RP}) \times D(d = \text{TH})) + e_{ijdt}\end{aligned} \tag{5.2}$$

where Borrowing_{ijdt} is the overall borrowing position of firm i at year t from counterparties in country d distinguishing if these are group-affiliates or located outside the multinational group perimeter (j) (e.g., a bank loan). We saturate the regression with fixed effects to control for unobserved factors that explain borrowing and are unrelated to profit shifting: i) $\gamma_{guo,d,t}$ are fixed effects control for all factors, possibly time-varying, that lead a specific multinational group to borrow from a specific location (e.g., because of gravity forces, regulation, lower interest rates, and so forth)[24]; γ_{it} are firm/year fixed effects controlling for firm characteristics, possibly time-varying, such as an increase in investment and thus rising financing needs, shifts in the debt-equity financing mix, etc. $D(d = \text{TH})$ is a dummy variable taking value of 1 if country d is a tax haven. Our coefficient of interest is β_2, the interaction term between the related party dummy and the tax haven indicator. This coefficient can be interpreted as a semi-elasticity capturing differences in borrowing between related and non-related parties when the lender is located in a tax haven relative to non–tax haven countries. Identification comes from within firm–year variation across destinations, comparing borrowing from related and non-related parties across countries with different tax haven status. Accordingly, firm–destination–year triples in which borrowing is always zero do not contribute to identification and can be excluded from the

[23]The results are robust if we adopt instead a log-linear model or if we specify the dependent variable as the ratio on total asset and retain a linear model like equation 5.1.

[24]Notice that because our universe is made only of Italian companies, gravity factors explaining why Italian companies tend to have stronger financial linkages with a specific country are absorbed by the destination fixed effects as they are common among all Italian firms. Here we also allow these gravity factors to vary by time and parent company (e.g. the location of the parent company may lead to different geographical preferences).

Table 3: Borrowing from related and non-related parties by origin of the funds

	Firm's borrowing by country		
	(1)	(2)	(3)
RP_{idjt}	0.825***	0.582***	0.884***
	(0.229)	(0.171)	(0.246)
$RP_{idjt} \times TH_d$	1.341***		
	(0.360)		
$RP_{idjt} \times Inv.hub_d$		1.308***	
		(0.300)	
$RP_{idjt} \times TH/conduit_d$			0.874**
			(0.397)
$RP_{idjt} \times TH/no\ conduit_d$			0.806**
			(0.381)
N. of GUO-Country-Year	102069	102077	102077
N. of Firm-Year	19273	19277	19277
N	263854	263878	263878
Pseudo R-squared	0.885	0.887	0.882

Notes: Standard errors clustered by firm in parentheses *** p<0.01, ** p<0.05, * p<0.1. Estimation of eq.5.2. Borrowings include both loans and trade debt. RP_{ijdt} is equal to 1 for related-party debt; TH_d ($Inv.hub_d$) takes value 1 if country d classifies as tax haven (investment hub). The definition of $conduit$ is as in Garcia-Bernardo et al. (2017). GUO-country-year and firm-year always included. Source: Banca d'Italia, Cerved/CEBI, Orbis.

estimation sample.[25]

Results are reported in Table 3 (col.1). First, the coefficient β_1 on the related party dummy is positive, which indicates that firms rely more on related party borrowing when getting foreign financing. Next, the coefficient on the interaction with the tax haven dummy, TH_d, is also positive and statistically significant, suggesting that firms borrow more from related parties compared to non-related parties especially if the source of the funds are countries listed as tax havens, which is consistent with profit shifting behavior. The result is robust when using the alternative tax haven list of "investment hubs", $Inv.hub_d$, produced by the OECD (OECD, 2024; col.2). We then differentiate between conduit countries and tax haven/non conduit countries. We find positive and statistically significant coefficients on both interaction terms, which are also very similar in magnitude (col.3). This indicates that higher borrowing from affiliates in tax haven countries

[25]This restriction reduces the number of observations from approximately 1.67 million to about 260,000, as firms typically borrow from only a limited subset of destinations in a given year. Coefficients estimates and inference remain unchanged if we keep them; these observations are either singletons or fully absorbed by the fixed effects (results available upon request).

is not merely a by-product of MNEs setting up financial entities in specific conduit countries to attract and redistribute liquidity to the rest of the group. We run several robustness tests to this specification. First, we re-estimate the model using several alternative fixed effects combinations. First, we try further saturating the regression, by including fixed effects by GUO-type of foreign debt or firm-type of foreign debt. Second, we test less demanding fixed effects combinations. Results remain unchanged (Table A5; columns 2-6). Secondly, we run a placebo check where we replace the tax haven dummy with a dummy for countries that are considered major (non-haven) financial centers, namely the United States and Japan. Doing so yields a statistically non significant β_2 coefficient (with a negative sign), reinforcing the tax advantage interpretation of our results. Lastly, in our sample we consider for each firm-year only countries where the firm has an affiliate from which it could potentially borrow. This could raise endogeneity concerns due to sample selection. In Table A6 we thus re-estimate the equation 5.2 including in the sample also countries where no affiliates are present (but from which the firm has positive borrowing from third parties). The coefficient β_1 is smaller, and not statistically significant in some specifications; the coefficient β_2 is always positive and statistically significant.

As a next step, in an attempt to further disentangle the profit shifting from the internal markets hypothesis and similarly to Section 5.1, we exploit information on firms' EBITDA and interest deductibility capacity. We test the hypothesis that related party borrowing from tax haven is higher for firms with higher capacity to shift profits within the same group, by looking at groups which have more than one Italian firm.[26] Thanks to the granularity of our dataset, we are thus able to implement the experiment synthetized by the following equation:

$$\begin{aligned} \text{Borrowing}_{idt}^{RP} = \exp(&\gamma_{guo,d,t} + \gamma_{ind} + \beta_{\mathbf{0}}\mathbf{X_{it}} + \beta_1 \text{DeductibilityCapacity}_{it} + \\ &+ \beta_2 \text{DeductibilityCapacity}_{it} \times D(d = \text{TH})) + \epsilon_{idt} \end{aligned} \tag{5.3}$$

In eq.5.3, we seek to compare through the interaction term $\text{DeductibilityCapacity}_{it} \times \text{TH}_d$ the evolution of related-party borrowing of firm i from related tax haven country d at time t to the evolution of related-party borrowing of another firm belonging to the same group from the same related tax haven country in the same year but that has a higher deductibility capacity. The comparison group is captured by GUO/origin of funds country d/year t fixed effects. Interest deductibil-

[26] In our sample, in each period on average 20 percent of the GUO/parent companies have more than one Italian firm in the group reporting to Bank of Italy's surveys. This translates to about 43 per cent in terms of combinations of parent company–Italian firm–year, as some parent companies have more than two Italian firms within their group.

ity capacity is measured either in a continuous fashion, using the ratio of EBITDA to total assets, or through a dummy variable taking value 1 if the firm's ratio of interest payments to EBITDA is below 30% and 0 otherwise. The last ratio mimics the Italian earnings stripping rule, according to which net interest payments are deductible up to 30% of the firm's EBITDA.

Our objective is to make a comparison across firms with the same GUO for a given country/year. For this reason we add a set of firm and time-varying controls, such as the log of total assets, the log of sales, the log of fixed tangible/intangible/financial assets, the return-on-equity of the firm. We further include 2-digit industry fixed effects γ_{ind}. The regression in eq.5.3 necessarily focuses on firm/year observations such that the number of group-affiliates (i.e., Italian firms with the same GUO) in the database is at least equal to two. This is not a representative subsample, since firms belonging to a group with at least two Italian affiliates in the DRS sample are on average larger than the rest of DRS firms. In particular, the EBITDA and total assets of firms included in this estimation are on average 30% and 27% larger, respectively, than the ones of firms that are excluded.

The evidence presented in Table 4 lends support to the profit shifting as opposed to the internal capital markets motive. As the non-interacted coefficient shows, high-deductibility capacity affiliates of the same group tend to borrow less from related parties than low-deductibility capacity affiliates on average across years and origin countries. This is consistent with the greater need to resort to internal capital markets to finance their operations for less profitable firms. However, across all definitions of tax haven, the interaction term is estimated to be positive, thus capturing that high-deductibility capacity affiliates borrow relatively more when the origin of the borrowed funds is a country listed as a tax haven. This is especially true when the origin of the borrowed funds is a country listed as conduit (col.5-6), analogously to what found in Section 5.1. The evidence is robust also to the choice of interest deductibility capacity chosen, whether it is the level of EBITDA (in relation to total assets) or the ratio of total interest payments to the EBITDA of the firm, in alignment with the cap to interest payments deductions set by the Italian law. Finally, in results not shown, we repeat the estimation of eq.5.3 on non-related party borrowings. The interaction coefficient is never statistically different from zero, although positive.

Table 4: Borrowing from related parties and firm profitability/interest deductibility capacity by origin of the funds

	Firm's borrowing from related parties by country					
	(1)	(2)	(3)	(4)	(5)	(6)
EBITDA on total assets	-4.000*		-3.965*		-3.492*	
	(2.075)		(2.218)		(2.008)	
EBITDA on total assets × TH	9.046***					
	(2.047)					
EBITDA on total assets × Inv.hub			8.918***			
			(2.181)			
EBITDA on total assets × TH conduit					8.496***	
					(2.012)	
EBITDA on total assets × TH no conduit					4.905	
					(5.382)	
D(Interests payments/EBITDA<30%)		-0.650***		-0.491**		-0.664***
		(0.194)		(0.230)		(0.208)
D(Interests payments/EBITDA<30%) × TH		1.127***				
		(0.256)				
D(Interests payments/EBITDA<30%)×Inv.hub				0.698**		
				(0.320)		
D(Interests payments/EBITDA<30%)×TH conduit						1.044***
						(0.277)
D(Interests payments/EBITDA<30%)×TH no conduit						1.419***
						(0.512)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
GUO - Country -Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R2-squared	0.950	0.946	0.950	0.945	0.950	0.946
N	20392	22770	20392	22770	20392	22770

Notes: Standard errors clustered by firm in parentheses *** p<0.01, ** p<0.05, * p<0.1. Borrowings include both loans and trade debt. EBITDA/total assets ratio winsorized at 0.1 e 99.9%. The sample comprises only firms with at least a group-affiliate. TH ($Inv.hub$) takes value 1 if country d classifies as tax haven (investment hub). The definition of $conduit$ is as in Garcia-Bernardo et al. (2017). Firm controls includes: log of total assets, log of sales, log of intangible assets, log of tangible assets, log of fixed financial assets, ROE (winsorized at bottom/top 1%.) Source: Banca d'Italia, Cerved/CEBI, Orbis.

5.3 Evidence on the interest rate paid on foreign debt

The evidence on the interest rate charged on intragroup debt as opposed to non-related party debt is rather scant, mostly due to the difficulty in accessing suitable data. Existing analysis shows that firms relying more intensely on internal borrowing seem to enjoy a "financing advantage" and to perform better, i.e., have higher investment rates and return on equity, than comparable firms that do not (Buchuk et al., 2014). This evidence is in line with the idea that borrowing conditions on intragroup debt – including a lower interest rate – should be more favorable compared to non-related party debt.

We assess more directly whether the interest rate differential between related and non-related party debt shows any association with profit shifting opportunities by leveraging access to data on cross-border interest payments/receipts for a selected sample of Italian companies. Firms included in this selected sample account for more than three quarters of total foreign liabilities, thus ensuring representativeness. Yet, they represent approximately 2.5% of the sample used for the analysis of intragroup debt. The results presented in this section should thus be interpreted with some caution, since the small sample size limits the possibility of more accurately testing for their robustness.

After implementing the cleaning procedure as described in the Appendix B, we winsorize the interest rate at the 95% percentile to shield against outliers and reporting errors and obtain an average interest rate paid on foreign liabilities of around 1.8% (see Table A1 and A2 for the key descriptive statistics of the distribution before and after the winsorization).[27]

We estimate an equation analogous to eq.5.1. Our preferred specification relies on the minimum statutory corporate income tax rate differential within the group as a proxy for profit shifting opportunities. The majority of firms (about 90%) are indeed part of a group with at least an affiliate located in a tax haven, thus leaving us with little variation in the tax haven dummy. Results are nonetheless robust to the use of the latter proxy as well. Differences in the composition of the stock of debt might explain interest rate differentials. To mitigate this concern, we control for the share of related/non-related party debt which is short-term, Share of ST loans$_{ijt}$.[28] Our estimating equation is as follows:

[27] We picked the 5% winsorization window since this is the smallest one able to guarantee stability in the winsorized variable's mean, as Table A2 shows.

[28] An additional caveat is that other debt characteristics (like the level of pledged collateral) may influence the interest rate . However, these information are not available in the dataset we rely upon.

$$\text{Interest rate}_{ijt} = \gamma_i + \gamma_t + \beta_1 D(j = \text{RP}) + \\ + \beta_2 D(j = \text{RP}) \times \text{Min. CIT}_{it} + \text{Share of ST loans}_{ijt} + e_{ijt} \quad (5.4)$$

where firm and year fixed effects replace firm/year fixed effects (too demanding given the limited sample size) without significant change in the estimated coefficients. Col.1 of Table 5 shows the estimated coefficients. The difference between the interest rate charged on related-party debt versus external debt amounts on average to 1.2 percentage points. In a firm where the minimum statutory corporate income tax rate within the group is 10 percentage points below the average the difference rises to 1.6 (col.3). This difference is quantitatively significant provided that the average interest rate in the sample amounts to 1.8%. The same result holds qualitatively the same if we replace the minimum statutory corporate income tax rate with the At least an aff in TH_{it} dummy (col.4). Finally, the interest rate might not be independent of the size of foreign loans. Therefore, in col.5 we add as a control a quadratic polynomial in the stock of loans for each type of debt. The main findings are robust to this addition.

5.3.1 Robustness

In Table A7 we perform a few robustness checks. In col.1, we exclude from the estimation sample all the zero interest rate observations; in col.2, we exclude from the estimation sample the imputations performed to reconcile the stock-flow samples as described in Appendix B. In col.3 we test the hypothesis that the interest rate spread between related and non-related debt is higher for firms belonging to groups more exposed to profit shifting opportunities especially if the firm's EBITDA (and thus interest deductibility capacity) is high. We do so by adding a triple interaction term with a dummy variable for whether the firm's EBITDA is positive. According to the presented evidence, firms with a higher EBITDA tend to pay lower interests on their debt, compatibly with the notion that they are more profitable and hence less risky. Firms with a higher EBITDA tend to experience a greater spread in the interest rate between related and non-related debt, in contrast with the financing advantage channel and compatibly with the notion that only high-EBITDA firms have sufficient interest capacity to shift profits abroad. However, this pattern does not seem to be more pronounced in firms belonging to groups more exposed to profit shifting opportunities. The coefficient on the triple interaction term is negative but not distinguishable from zero. It is important to notice that the average EBITDA of firms in the monthly DRS

Table 5: Interest rate paid on foreign debt with related vs. other counterparties

	Firm's interest rate by debt type				
	(1)	(2)	(3)	(4)	(5)
RP_{ijt}	1.563***	1.159***	1.225***	0.370	0.394
	(0.335)	(0.292)	(0.298)	(0.457)	(0.464)
Min CIT_{it}			1.594		2.329
			(1.889)		(2.207)
$RP_{ijt} \times$ Min CIT_{it}			-4.411**		-8.660***
			(2.138)		(2.742)
Aff in TH_{it}				-0.220	
				(0.334)	
$RP_{ijt} \times$ Aff in TH_{it}				0.931*	
				(0.486)	
N	240	1,086	991	991	991
R-squared	0.571	0.482	0.486	0.483	0.484
FE	Firm/year	Firm, year	Firm, year	Firm, year	Firm, year

Notes: Standard errors clustered at the firm level. The firm's interest rate by debt type is given by the ratio between interest payments by debt type in a given year and total outstanding loans of the same debt type. See the Appendix for further details on the construction of this variable. RP_{ijt} is equal to 1 for related-party debt. The minimum corporate income tax rate within the group, Min CIT_{it} (divided by 100), has been demeaned. Aff in TH_{it} takes value 1 if firm i has at least one group-affiliate based in a tax haven at time t. All regressions include the share of short-term loans for each type of debt as a control. Col.5 includes also a quadratic term in the size of foreign loans for each type of debt. Interest rates winsorized at the 95%. Source: Banca d'Italia, Cerved/CEBI, Orbis.

sample is around 20 times the average EBITDA of firms in the annual larger DRS sample. It is thus possible that the sample does not feature sufficient variability in the EBITDA, or that profit shifting via disproportionately high intragroup interest payments is the strongest for intermediate-EBITDA firms and dies out as firm's EBITDA grows large.

5.4 Estimating the size of profits shifted via intragroup lending

How sizeable is profit shifting via intragroup lending? In this last section we attempt to provide an estimation. The evidence provided so far seems to suggest that multinationals can use intragroup lending to shift profits via two channels. First, they can have affiliates in high taxation jurisdictions take on larger loans with related parties located in low taxation jurisdictions (the "stock" channel). Second, they can subject those affiliates to disproportionately high interest rates compared to the interest rate charged on non-related party debt (the "price" channel).

Only a fraction of shifted profits via interest payments is deductible according to the 30% earnings stripping rule (Fig.2). More specifically, interest payments in excess of interest receipts can be deducted up to 30% of the EBITDA.[29] Hence, in order to quantify the extent of profit shifting via intragroup debt we need to consider the aggregate of net interest payments as a whole.

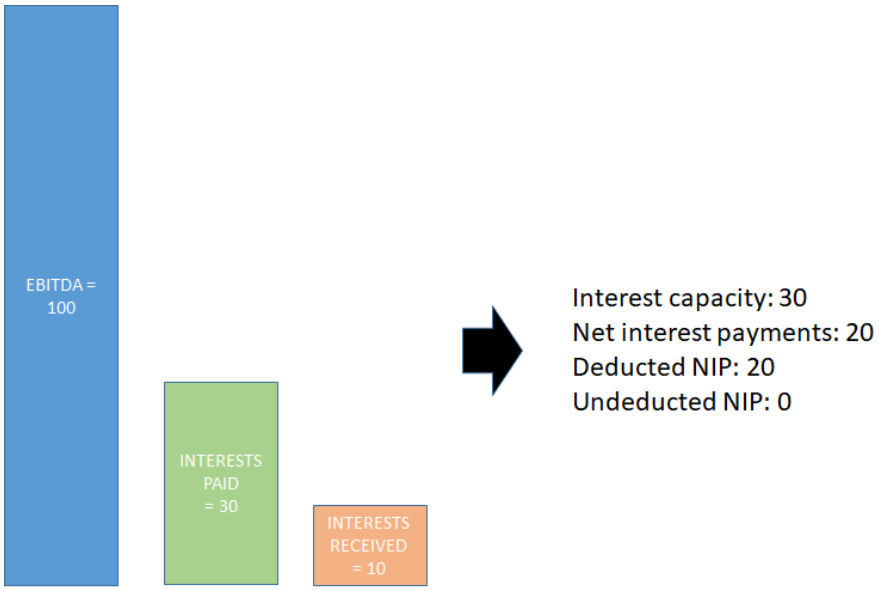
We define for each firm i at time t, NIP_{it}^{dom}, $NIP_{it}^{for,RP}$ and $NIP_{it}^{for,OT}$, equal to, respectively: i) net interest payments associated with domestic debts/credits, ii) net interest payments associated with foreign debts/credits with related parties, iii) net interest payments associated with foreign debts/credits with other parties:

$$\begin{aligned} NIP_{it}^{dom} &= \text{Interests paid to dom. parties}_{it} - \text{Interests received by dom. parties}_{it} \\ NIP_{it}^{for,RP} &= \text{Interests paid to for. related parties}_{it} - \text{Interests received by for. related parties}_{it} \\ NIP_{it}^{for,OP} &= \text{Interests paid to for. other parties}_{it} - \text{Interests received by for. other parties}_{it} \end{aligned} \tag{5.5}$$

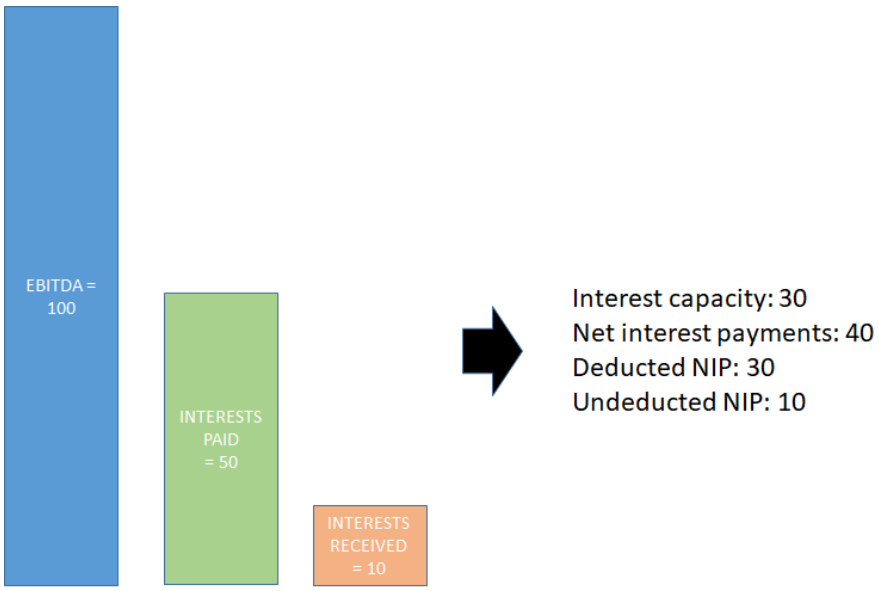
We conduct a partial equilibrium exercise and derive a counterfactual value for interests paid to foreign related parties, $IP_{it}^{for,RP}$, keeping all other balance sheet variables, and hence components of total net interest payments, fixed. Both

[29] The full rule states that interest payments in excess of interest receipts can be deducted up to 30% of the current period's EBITDA plus potential unused EBITDA from previous periods. Undeducted interest payments can be carried forward. Since we do not have access to information on unused EBITDA capacity and undeducted interest payments we abstain from introducing interperiodality in our calculations.

Figure 2: Deductibility of net interest payments (NIP) according to the 30% earnings stripping rule



(a) Full deductibility



(b) Partial deductibility

the stock and the price channel concur to the determination of interests paid (IP) to foreign related parties (RP):

$$\text{IP}_{it}^{for,RP} = \underbrace{\text{Loans}_{it}^{for,RP}}_{\text{stock channel}} \times \underbrace{i_{it}^{for,RP}}_{\text{price channel}} \tag{5.6}$$

Our approach consists of leveraging the evidence we gathered as part of the empirical analysis described in the former section. Specifically, when only the stock channel is active, counterfactual interest payments to foreign related parties are:

$$\widetilde{\text{IP}}_{it}^{for,RP} = \text{Assets}_{it} \times \widetilde{leverage}_{it}^{for,RP} \times i_{it}^{for,RP} \tag{5.7}$$

where $\widetilde{leverage}_{it}^{for,RP} = leverage_{it}^{for,RP} - \widehat{\text{RP} \times \text{TH}}$ and $\widehat{\text{RP} \times \text{TH}}$ is as in eq.5.1 estimated on the stock of loans only (col.4 of Table A4).

Symmetrically, when only the price channel is active, counterfactual interest payments to foreign related parties are:

$$\widetilde{\text{IP}}_{it}^{for,RP} = \text{Assets}_{it} \times leverage_{it}^{for,RP} \times \widetilde{i}_{it}^{for,RP} \tag{5.8}$$

where $\widetilde{i}_{it}^{for,RP} = i_{it}^{for,RP} - \widehat{\text{RP} \times \text{TH}}$ and $\widehat{\text{RP} \times \text{TH}}$ is as estimated in eq.5.4.[30]

Total net interest payments up for deduction are:

$$NIP_{it} = \max\left(0, NIP_{it}^{dom} + NIP_{it}^{for,RP} + NIP_{it}^{for,OT}\right) \tag{5.9}$$

While $NIP_{it}^{for,RP}$ and $NIP_{it}^{for,OT}$ are observed in the monthly DRS data, we rely on balance sheet information to derive a proxy for NIP_{it}^{dom}, $NIP_{it}^{*,dom}$. More specifically, we obtain domestic interest payments as the difference between total interests paid reported in Orbis by each firm in each year and interests paid to foreign counterparties according to the monthly DRS database.[31] A similar approach would be warranted for domestic interest receipts. However, information on interest receipts is bundled together with the generic voice "financial revenues" for firms active in the industrial/service sector. Hence, we refrain from subtracting domestic interest receipts from eq.5.9, potentially leading to an overestimation of total net interest payments. If total net interest payments are overestimated, the net interest payments-to-EBITDA ratio is more likely to hit the 30% corner. Shifted profits might then display a lower sensitivity to profit shifting opportunities and be, as a consequence, an order of magnitude lower.

[30] When the counterfactual leverage and interest rate are negative, we assign a value of zero.

[31] In the few instances where this is negative, we assign a zero value.

Table 6: Estimates of profits shifted and corporate tax avoided per year during 2013/22 (millions)

Channel	Stock	Price	Stock and price
Profits shifted	90	220	280
Corporate tax avoided	22	53	67

Notes: Rounding to the nearest integer. Source: Banca d'Italia, Cerved/CEBI, Orbis.

We believe this omission is unlikely to have significant implications for our back-of-the-envelope calculation of shifted profits. Firms operating in the industrial/service sector are much more likely to act as borrowers instead of lenders with respect to affiliates of the same group. Firms operating in the financial/holding sector are instead likely to operate as lenders as part of their activities; yet they account for only 10% of the sample.

Moving on and taking into account the 30% of EBITDA ceiling in the deductibility of net total interest payments, shifted taxable base $\widetilde{STB}_{it}$ for firm i in year t conditional on $EBITDA_{it} > 0$ is:

$$\widetilde{STB}_{it} = \max\left\{0, EBITDA_{it} \times \left[\min\left(0.3, \frac{NIP_{it}}{EBITDA_{it}}\right) - \min\left(0.3, \frac{\widetilde{NIP}_{it}}{EBITDA_{it}}\right)\right]\right\} \tag{5.10}$$

where $\widetilde{NIP}_{it}$ is the counterfactual where the stock and price channels were not active. Finally, firm/year estimates for shifted taxable base, $\widetilde{STB}_{it}$, are multiplied by the weights of individual firms in the DRS annual sample. Next, they are aggregated up and the thus obtained aggregate is further divided by 0.65 to capture the fact that only two thirds of foreign assets reported in the annual sample are represented in the monthly sample.

The calculations for total shifted profits are reported in Table 6. Yearly shifted profits during 2013/22 amounted to 90 million euros when only the stock channel is active (col.1). The figure tripled when both channels are active, rising to 280 million euros (col.3). This calculation implies a yearly tax gap of 67 million euros, or 670 million euros over a ten year interval.

It is important to note that while this calculation provides a ballpark of the size of profit-shifting via the intragroup lending channel, it is likely to be under/overestimated for different sets of reasons, thus suggesting some caution when interpreting the exact magnitudes. First and as already discussed, not accounting for domestic interest receipts can translate into an underestimation. Second, the firm might have at its disposal a stock of "unused" EBITDA from earlier

periods, which would raise the amount of deductible interest payments and the magnitude of shifted profits. At the same time our back-of-the-envelope calculation could be overestimated for at least two reasons. First, the effective tax rate paid by corporations is often lower than the statutory corporate income tax rate. Firms indeed have at their disposal a variety of tax credits that reduce the amount of taxes effectively paid. Secondly, our calculation of the amount of net interest payments that can effectively be deducted is based on accounting EBITDA, which can differ significantly from tax-relevant EBITDA against which to compute interest deductions since 2018. Both mechanisms tend to inflate our calculation of shifted profits.

It is useful to compare our back-of-the-envelope calculation of shifted profits *via intragroup lending* to available estimates of *overall* shifted profits.[32] In general, estimates of profit shifting may vary widely based on the approach and the data used. Macro approaches — i.e. methodologies relying on macro statistics (such as national accounts, balance of payments and foreign affiliates statistics) — usually result in larger values than those obtained through micro analyses, which instead normally rely on firm-level data to estimate the elasticity of firm profits to tax rates.

Using the former approach, Wier and Zucman (2022) estimate *overall* profit shifting for Italy to be about 24 billion euros p/y over the period 2015-2019. In contrast, Bratta et al. (2021, 2024) using confidential Country-by-Country Reporting (CbCR) micro data (related to MNEs having at least one entity in Italy), estimate profit shifting away from Italy to amount to 5 billion euros in 2017. Accoto et al. (2024) analyze a sample of 2,600 firms that take part to the trade in services survey conducted by the Bank of Italy and estimate profit shifting to be between 0.5 and 1.4 billion euros in 2015 (depending on the approach).

Empirical literature that tries to pin down the share of the different channels of profit shifting suggests that financial strategies, such as the one studied in this paper, could be of second-order compared to other profit shifting strategies (ranging from 12% of total shifted profits and up to 25 % according to Heckemeyer and Overesch, 2017; 15% according to Tørsløv et al. (2023)).

Our back-of-the-envelope calculation of 280 million euros shifted p/year is thus consistent with an overall amount of shifted profits in the range of 1.9 billion euros p/year (assuming a share of 15%), which is located halfway between existing estimates for Italy in micro-level studies. The relatively limited relevance of this channel in terms of tax elusion is in line with Buettner and Wamser (2013),

[32]Heckemeyer and Overesch (2017),Beer et al. (2020) and Anzuini et al. (2023) offer meta-analyses and literature reviews on profit shifting. Anzuini et al. (2023) in particular focus on profit shifting by Italian firms.

who also find that while there is evidence of strategic allocation of internal debt among German multinationals, the overall tax implications are quite limited.

Finally, the amount of estimated shifted profits is not evenly distributed during the period examined (2013-2022). Specifically, it is higher at the beginning of the sample, while it declines as of 2018. Indeed, starting from 2019, the difference between the average interest paid on foreign debt with other parties vs. with related parties turns from negative into positive. The average interest rate on related parties in 2023, the last year of the sample, was 3.5%, as opposed to 1.5% for related parties. Ten years before in 2013, they stood at, respectively, 1.5% and 2.5%. As a result, shifted profits on a yearly basis via intragroup lending have declined significantly. Multiple factors might have contributed to this change. First of all, average firm profitability declined during Covid. In 2020, profitability as proxied by EBITDA went down for nearly 60% in the sample, as opposed to 45% on average in other years. The incentives to shift profits are then lower when profits themselves are lower. This could explain the drop in the average interest rate charged on debt with related parties in 2021.[33] Second, interest rates started rising at the end of 2021, thus potentially making it less tolerable for affiliates to bear a further increase in interest bills due to the transfer pricing premium on related-party borrowing. Third, there could be differences in the composition of the two stocks of loans affecting the spread between the interest rates and their evolution over time. The only characteristic we can control for with the data at our disposal is the share of loans with short-duration (less than 6 months) for each debt category. While differences along this dimension do not seem to be able to explain differences in the interest rate spread, there could be other factors playing a role and that we are unable to account for. Last, the reversal observed in Fig.**??** could be the result of the Law Decree n. 142/2018, which aimed at curbing profit shifting channels, including via intragroup lending (see Section 3). Recent work by Faccio and Xu (2025) points towards the effectiveness of such measures by showing that the strengthening of interest deductibility limitations impacts positively firm behavior by reducing leverage. In the absence of a sufficiently long post-reform sample size, we refrain from deriving an assessment of the effectiveness of this reform and demand this to future research.

[33]The fiscal effects of declining profitability in 2020 can be seen with one year delay, hence in 2021.

6 Conclusion

In this paper, we provide evidence in favor of profit shifting behavior by Italian firms through the channel of intragroup lending. Despite significant effort, at the international and domestic level towards curbing down this behavior, firms that belong to business groups with a foothold in tax havens appear to rely disproportionately on related party foreign debt compared to non-related party debt, while the opposite is true for firms that do not have access to profit shifting opportunities. This evidence is more pronounced for high-EBITDA firms, consistent with the view that firms with sufficient interest deductibility capacity are the ones taking take advantage of this profit shifting channel.

We show that firms with access to profit shifting opportunities tend to pay a higher interest rate on related party debt compared to the one that they pay on non-related party debt. The theory according to which firms rely on internal markets to be able to enjoy a "financing advantage" is unable to explain this pattern, while the hypothesis that firms use intragroup interest payments to shift profits can.

Finally, we provide a quantification of profits shifted via intragroup lending away from Italy during 2013-22 by leveraging the evidence gathered in the rest of the analysis. Our back-of-the-envelope calculation places the amount of shifted profits in the ballpark of 280 million euros per year. This number is relatively small and it makes for a rather limited share of overall profits shifted away from Italy estimated by other studies, thus confirming the second order role of this profit shifting strategy. While it is still too early to assess the effects of recent anti–profit-shifting measures, our findings suggest that even if the intragroup lending channel were successfully curbed, the resulting increase in tax revenues would likely be modest.

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Appendix

A Additional figures and tables

Table A1: Main variables before and after winsorization

	Raw		Winsorized	
	Foreign leverage			
	Rel.Parties	Other Parties	Rel.Parties	Other Parties
Mean	0.03	0.02	0.03	0.02
Max	10.91	4.88	1.04	0.77
	Interest rate			
	Rel.Parties	Other Parties	Rel.Parties	Other Parties
Mean	3.43	11.87	1.91	1.80
Max	228.98	1160.75	8.67	8.67

Notes: Winsorized leverage ratios at the 99.9%. Winsorized interest rates at the 95%. Source: DRS, Cerved, Orbis.

Table A2: Interest rate data sensitivity to different winsorization choices

Winsorization window	Mean	Standard deviation	Max
Raw	6.17	48.92	1160.75
92.5%	1.73	1.99	6.12
95%	1.88	2.36	8.67
99%	3.14	10.20	89.20
99.9%	5.70	39.29	631.78

Table A3: Foreign leverage with related vs. other counterparties and the interaction with the fiscal structure of the corporate group: alternative definitions of profit shifting opportunities

	Firm's foreign leverage by debt type			
	(1)	(2)	(3)	(4)
RP_{ijt}	1.645***	-0.427***	1.645***	0.694***
	(0.056)	(0.048)	(0.055)	(0.180)
$RP_{ijt} \times$ Share of aff in TH_{it}	0.138***			
	(0.009)			
$RP_{ijt} \times$ Aff in Inv.hub$_{it}$		4.395***		
		(0.115)		
$RP_{ijt} \times$ Min CIT_{it}			-22.795***	
			(0.627)	
$RP_{ijt} \times$ GUO in TH_{it}				1.654***
				(0.246)
N	105,018	105,018	105,018	105,018
R-squared	0.518	0.527	0.528	0.513

Notes: Standard errors clustered at the firm level. Firm's foreign leverage by debt type is equal to foreign debt - both loans and trade debt - divided by total assets. Winsorized foreign leverage at the 99.9%. RP_{ijt} is equal to 1 for related-party debt; GUO in TH_{it} takes value 1 if the global ultimate owner is based in a tax haven; Share of aff in TH_{it} measures the share of group-affiliates based in a tax haven at time; Aff in Inv.hub$_{it}$ is a dummy variable taking value 1 if the firm is part of a multinational group featuring at least an affiliate located in an investment hub according to the OECD (2024) definition; Min CIT_{it} is the minimum corporate income tax rate among group-affiliates. The share of affiliates in tax havens and the minimum corporate income tax rate within the group (divided by 100) have been demeaned. Firm/year fixed effects are included. Source: DRS, Cerved, Orbis.

Table A4: Foreign leverage with related vs. other counterparties and the interaction with the fiscal structure of the corporate group: robustness checks

	Firm's foreign leverage by debt type					Net foreign leverage
	(1)	(2)	(3)	(4)	(5)	(6)
RP_{ijt}	-0.465***	-0.558***	-0.296**	0.137**	-0.548***	0.375***
	(0.077)	(0.093)	(0.121)	(0.054)	(0.081)	(0.091)
$RP_{ijt} \times$ Aff in TH_{it}	4.400***	5.601***	4.279***	2.066***	4.275***	0.682***
	(0.111)	(0.136)	(0.151)	(0.077)	(0.117)	(0.131)
$RP_{ijt} \times EBITDA_{it}$					-2.131*	
					(1.173)	
$RP_{ijt} \times$ Aff in $TH_{it} \times EBITDA_{it}$					3.267***	
					(1.246)	
N	105,018	84,816	76,884	105,018	91,704	105,018
R-squared	0.527	0.525	0.524	0.517	0.528	0.504

Notes: Standard errors clustered at the firm level. Baseline specification (col.1); dropping firms that did not reply to the questionnaire (col.2); dropping firms not belonging to any business group (col.3); leverage calculated based on only loans (col.4); interaction term with firm's EBITDA (in billions and demeaned) (col.5); foreign leverage minus foreign assets, or net foreign leverage, as dependent variable (col.6). Winsorized leverage ratios at the 99.9%. Firm/year fixed effects are included. Source: DRS, Cerved, Orbis.

Table A5: Borrowing from related and non-related parties by origin of the funds: robustness checks

	Firm's borrowing by country							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RP_{idjt}	0.825***					0.825***	0.604***	1.250***
	(0.229)					(0.229)	(0.212)	(0.214)
$RP_{idjt} \times TH_d$	1.341***	1.598***	1.360***	1.285**	1.343**	1.341***	1.352***	
	(0.360)	(0.400)	(0.313)	(0.540)	(0.563)	(0.360)	(0.354)	
TH_d		-0.191						
		(0.155)						
$RP_{idjt} \times PlaceboTH_d$								-0.603
								(0.371)
GUO - Country - Year	Yes	No	No	No	No	No	Yes	Yes
Firm - Year	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Guo - Related Parties	No	Yes	Yes	Yes	No	No	No	No
Country - Year	No	No	Yes	No	Yes	Yes	No	No
Guo - Country	No	No	No	Yes	Yes	No	No	No
Firm - Related parties	No	No	No	No	Yes	No	No	No
Firm - Year controls	No	No	No	No	No	Yes	No	No
Pseudo R-squared	0.89	0.64	0.77	0.91	0.89	0.72	0.86	0.88
Observations	263854	249871	249848	248010	240926	263854	220790	263878

Notes: Standard errors clustered by firm in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Borrowings include both loans and trade debt. Source: DRS, Cerved/CEBI, Orbis.

Table A6: Borrowing from related and non-related parties by origin of the funds (including origin countries where the firms has no affiliates)

	Firm's borrowing by country		
	(1)	(2)	(3)
RP_{idjt}	0.390*	0.0973	0.317
	(0.220)	(0.151)	(0.233)
$RP_{idjt} \times TH_d$	1.398***		
	(0.355)		
$RP_{idjt} \times Inv.hub_d$		1.223***	
		(0.302)	
$RP_{idjt} \times TH/conduit_d$			1.075***
			(0.383)
$RP_{idjt} \times TH/no\ conduit_d$			1.012***
			(0.373)
GUO-country-year FE	Yes	Yes	Yes
Firm-year FE	Yes	Yes	Yes
Pseudo R-squared	0.878	0.875	0.872
N	620308	622220	622220

Notes: Standard errors clustered by firm in parentheses *** p<0.01, ** p<0.05, * p<0.1. Borrowings include both loans and trade debt. Source: DRS, Cerved/CEBI, Orbis.

Table A7: Interest rate on foreign debt with related vs. other counterparties and the interaction with the fiscal structure of the corporate group: robustness checks

	Firm's interest rate by debt type		
	(1)	(2)	(3)
RP_{ijt}	1.722***	1.490***	1.128***
	(0.364)	(0.329)	(0.389)
Min CIT_{it}	2.354	2.491	5.988**
	(2.298)	(2.270)	(2.500)
$RP_{ijt} \times$ Min CIT	-9.706***	-10.165***	-9.361***
	(3.205)	(2.937)	(3.545)
$EBITDA_{it} > 0$			-0.608
			(0.423)
$RP_{ijt} \times EBITDA_{it} > 0$			1.002*
			(0.592)
Min $CIT_{it} \times EBITDA_{it} > 0$			-6.031
			(3.788)
$RP_{ijt} \times$ Min $CIT_{it} \times EBITDA_{it} > 0$			-0.569
			(7.493)
N	721	896	849
R-squared	0.467	0.522	0.488
FE	Firm, year	Firm, year	Firm, year

Notes: Standard errors clustered at the firm level. Estimation of eq.5.4. The firm's interest rate by debt type is given by the ratio between interest payments by debt type in a given year and total outstanding loans of the same debt type. See Appendix B for further details on the construction of this variable. RP_{ijt} is equal to 1 for related-party debt. In col.1, we exclude from the estimation sample all the zero interest rate observations; in col.2, we exclude from the estimation sample the imputations performed to reconcile the stock-flow samples as described in Appendix B. The minimum corporate income tax rate within the group, Min CIT_{it} (divided by 100), has been demeaned. Interest rates winsorized at the 95%. Source: DRS, Cerved, Orbis.

Table A8: Tax haven/conduit definitions

	Tørsløv et al. (2023)	OECD (2024)	Garcia-Bernardo et al. (2017)
Andorra	x		
Anguilla	x	x	
Antigua and Barbuda	x		
Aruba	x		
Bahamas	x	x	
Bahrain	x		
Barbados	x	x	
Belgium	x		
Belize	x		
Bermuda	x	x	
British Virgin Islands	x	x	
Cayman Islands	x	x	
Curacao		x	
Cyprus	x	x	
Gibraltar	x	x	
Great Britain			x
Grenada	x		
Guernsey	x	x	
Hong Kong	x	x	
Hungary		x	
Ireland	x	x	x
Isle of Man	x	x	
Jersey	x	x	
Lebanon	x		
Liberia		x	
Liechtenstein	x		
Luxembourg	x	x	
Macau	x		
Malta	x	x	
Marshall Islands	x	x	
Mauritius	x	x	
Monaco	x		
Netherlands	x	x	x
Panama	x		
Puerto Rico	x	x	
Samoa	x		
Seychelles	x		
Singapore	x	x	x
St. Kitts and Nevis	x		
St. Lucia	x		
St. Vincent	x		
Switzerland	x	x	x
Turks and Caicos	x		
Vanuatu	x		

B Cleaning the DRS data to estimate interest payments of foreign loans by related/non-related party debt

The main difference between the monthly survey sample and the annual survey sample data (other than the frequency and the focus, the former being geared towards flow data, as opposed to stocks) is that monthly sample focus on a narrower sample of firms compared to annual data. Calculating the average interest rate on the amount of outstanding foreign debt entails performing a merge between flow-based and stock-based data for each type of counterparty. The following procedure is implemented.

- the stock of loans at time t, L_{it}, are matched with the interest payments at time t, I_{it}, by type of debt;
- if the stocks at time t are missing despite positive interest payments, then we impute $L_{it} = L_{it-1}+\text{new issuance}_{it}-\text{reimbursement}_{it}$, where new issuance_{it} ($\text{reimbursement}_{it}$) are the flows associated with the new issuance (reimbursement) of debt with a specific counterparty reported by firm i during time t;[34]
- we set the denominator of the average interest rate on the amount of outstanding loans as $L^*_{it} = (L_{it} + L_{it-1})/2$;
- in case L_{it-1} is missing, we set $L^*_{it} = L_{it}$ (around 200 observations);
- in case L_{it-1} and L_{it} are both missing, we set $L^*_{it} = D_{it}$, where D_{it} identifies deposits of firm i at time t with the same type of counterparty (around 20 observations).

The final dataset comprises 1100 firm/year/type of debt observations, while around 190 observations in the original monthly dataset stay unmatched. We calculate the average interest rate on the amount of outstanding loans as $IR_{it} = I_{it}/L^*_{it}$ and winsorize the variable so as to remove outliers.

[34] We collapse monthly data at the yearly level.