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The Effect of Global Anti-Tax Avoidance Efforts on Sub-National Profit Shifting

The Effect of Global Anti-Tax Avoidance Efforts on Sub-National Profit Shifting*

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Abstract

This paper examines whether multinational enterprises (MNEs) adapt to international anti-tax avoidance regulation by intensifying domestic profit shifting activities. We compile a novel dataset by mapping MNE ownership network structures that link international to sub-national tax haven subsidiaries over time. Our analyses show that tighter international rules lead more strongly affected firms to intensify their presence in sub-national tax havens, consistent with strong increases in profit tax revenues at these locations. This shift indicates that international tax policies have had bite in constraining cross-border tax avoidance. At the same time, our findings reveal MNEs' strategic flexibility and highlight domestic spillovers and local consequences of global tax reforms.

Keywords: Corporate Networks, Geospatial Data, ATAD, CbCR

JEL classification: H26, H71, K10

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1 Introduction

Global efforts to curb tax avoidance by multinational enterprises (MNEs) have intensified in recent years. Initiatives such as the Global Minimum Tax, Country-by-Country Reporting (CbCR), and the Anti-Tax Avoidance Directive (ATAD) implemented in the European Union aim to limit profit shifting activities that exploit cross-border tax differences. These measures seek to protect national tax bases and mitigate harmful tax competition (OECD, 2016). However, while such regulations constrain international channels of tax avoidance, they may also generate unintended consequences (Suárez Serrato, 2019). Rather than abandoning tax-savings strategies altogether, firms may adapt by reallocating profits through alternative channels.

The impact of international anti-tax avoidance initiatives on cross-border profit shifting is well-documented (e.g., (de Simone and Olbert, 2022)). Much less is known, however, about their effect on firms' domestic strategies. If possibilities to shift profits abroad become more restricted, MNEs may increasingly exploit tax rate differentials within a country. At the same time, firms that are already dependent on domestic arrangements may expand these strategies. This paper addresses this gap by examining whether MNEs respond to global anti-tax avoidance initiatives by establishing sub-national "profit hubs". By exploring the footprint of MNEs at the local level, we study whether local profit shifting is a complement or a substitute for international profit shifting. Our findings have implications for policymakers: If local shifting is a substitute, international anti-tax avoidance efforts increase the relevance of local variation in corporate tax rates for firms, hence potentially intensifying local tax competition.

To study these questions, we combine geocoded ownership network data with a triple-difference research design. Unlike prior studies that hold ownership structures fixed, we analyze changes in the local realization of firm networks as outcome variables. Specifically, we map subsidiaries of MNEs to the local, i.e., municipal level in Germany and exploit the implementation of international tax reforms as a source of plausibly exogenous variation relative to local policy. We employ a triple difference design to compare changes in firms' ownership structures and subsidiary locations before and after the implementation of these regulations. Our empirical strategy compares firms that are differentially affected by the new regulations. For this purpose, we juxtapose firms exceeding the EUR 750 million revenue threshold for CbCR, and those located in international tax havens before 2015, with unaffected peers, both before and after the reforms.

Germany provides an ideal setting for our analysis. Local profit tax rates vary by as much as 14 percentage points across municipalities, creating strong incentives for sub-national profit

shifting. At the same time, the tax base is calculated under uniform national rules, ensuring comparability between municipalities. Moreover, local tax law lacks certain anti-tax avoidance instruments, such as exit taxation, typically found in international contexts, reducing barriers to sub-national profit shifting.¹ Finally, as in the international setting, enforcement suffers from a lack of coordination: local tax authorities benefiting from inward-shifted profits have limited incentives to challenge aggressive arrangements. At the same time, complex tax planning strategies and corporate ownership structures obfuscate domestic profit shifting strategies.

Our analyses reveal three key findings. First, we descriptively observe that municipalities continuously classified as sub-national tax havens throughout the entire observation period experience significant increases in local profit tax revenue per capita following the implementation of international tax regulations. On average, the differential increase in tax revenue (treated vs. control) amounts to 740 EUR per inhabitant in the post-period. That is, the increase (change) in the local profit tax revenue per inhabitant in local tax havens is twice as large as the average local profit tax revenue per inhabitant in Germany. Second, we document that MNEs affected by international anti-tax avoidance regulation and active in international tax havens react differently than their unaffected peers. MNEs with revenues above the EUR 750 million threshold and previously active in international tax havens increase their number of subsidiaries in these domestic tax havens by approximately 0.8 entities, implying a difference in semi-elasticity of 344% compared to control firms. Third, these effects manifest at the intensive margin only, with firms expanding their existing presence, i.e., the number of subsidiaries in low-tax municipalities rather than newly entering.

Our study makes two contributions to the literature. First, we show that restrictions on cross-border profit shifting reshape MNEs' tax avoidance strategies beyond the international allocation of profits. Specifically, we document that heightened international regulation induces firms to substitute towards sub-national tax planning, highlighting an important but previously underexplored margin of tax avoidance. Consequently, our results shed light on the interplay between international policy initiatives and sub-national spillovers. Efforts to curb international tax avoidance come with the side-effect of inadvertently intensifying tax competition at the local level, as firms seek alternative means to reduce their overall tax liabilities.² Second, we demonstrate the value of combining ownership network data with geo-spatial analysis to understand firms' strategic behavior in response to regulatory changes. By mapping the complex ownership structures of MNEs and their spatial

¹In the domestic context, formula apportionment is intended to limit illegitimate practice – we review in section 2.2 how this is circumvented.

²Arguably the 'lesser evil', given that the combined minimum level of local and national taxation for corporate profits in Germany is 22.875%.

distribution, we offer a nuanced perspective on how firms navigate the evolving landscape of tax regulation. From a policy perspective, our findings suggest that while international efforts to enhance tax transparency are crucial, they may lead to unintended consequences for other (subsidiary) levels of government. On the one hand, this may encourage coordinated policies and consideration of impacts at the local level. On the other hand, local variation of profit tax rates within a country allows for spatial sorting. This may, even in the presence of profit shifting at the sub-national level, be preferred from a singular ('national' welfare) point of view to an alternative that lacks this degree of freedom, if firms' real activities are very tax-elastic.

The remainder of this paper is structured as follows. Chapter 2 develops our hypotheses. Chapter 3 describes our research design and data sources. Chapter 4 presents the empirical analyses and findings. Chapter 5 concludes.

2 Hypotheses Development

2.1 International Efforts to Curb Tax Avoidance

International tax avoidance by MNEs has long posed a major challenge to governments and international organizations. For decades, firms have strategically exploited differences in corporate tax rates and regulatory regimes to minimize their global tax liabilities by reallocating profits across jurisdictions (e.g., Hanlon and Heitzman (2010); Hines and Rice (1994); Lester and Olbert (2025)). Generally, the literature documents a systematic relationship between tax rate differentials and the geographic allocation of reported profits, highlighting the central role of tax considerations in organizational and location decisions of MNEs (Tørsløv et al., 2023).

A large body of research identifies three key mechanisms through which MNEs engage in international profit shifting (Parra Ramirez and Vicard, 2026). One prominent channel is transfer pricing, whereby firms strategically set prices for intra-group transactions to shift profits toward low-tax jurisdictions (e.g., Clausing (2003), Laudage Teles et al. (2026)). A second important mechanism involves the allocation of intangible assets. Because intellectual property (IP) generates highly mobile income streams, firms frequently locate patents, trademarks, and other intangibles in low-tax jurisdictions, enabling them to attribute substantial profits to the respective entities (e.g., Dischinger and Riedel (2011); Grubert (2003)). In addition, MNEs engage in intra-group financing and debt-shifting strategies, using internal loans to allocate interest expenses to high-tax jurisdictions while allocating interest income to low-tax affiliates (e.g., Huizinga et al. (2008)). Meta-analyses and survey evidence confirm that these channels are widely used and economically significant,

leading to substantial reductions in effective tax rates and increases in after-tax profitability (e.g., Dharmapala (2014); Heckemeyer and Overesch (2017)). In summary, this literature establishes that MNEs systematically respond to tax rate differentials using various income-shifting instruments.

A closely related literature focuses on the role of tax havens in multinational tax planning. Early studies document the widespread use of low-tax and no-tax jurisdictions within multinational group structures (Dyreng and Lindsey, 2009; Hines and Rice, 1994), a finding corroborated by more recent evidence using detailed firm-level data and ownership link information (Dyreng et al., 2016, 2020; Law and Mills, 2022; Olbert et al., 2024). Extending this literature, Delis et al. (2025) use a large global firm-level dataset and a nonparametric estimation approach to provide firm-year estimates of profit shifting, documenting substantial heterogeneity across firms, industries, and ownership structures, with especially strong responses to tax rate differentials among MNEs connected to tax havens. Together, these studies show that tax haven affiliates play a central role in facilitating profit shifting, often despite limited real economic activity. Recent evidence reviewed by Lester and Olbert (2025) emphasizes that while so-called "paper profit shifting" remains a dominant strategy, increased scrutiny has led some firms to relocate real investment and employment to tax haven jurisdictions to substantiate their tax positions.

Beyond their tax implications, tax haven structures are also linked to corporate opacity and information frictions. Several studies document associations between haven activity and lower transparency, weaker reporting quality, and higher financing costs, although effects may depend on governance and disclosure environments (Atwood and Lewellen, 2019; Balakrishnan et al., 2019; Chen et al., 2018; Bennedsen and Zeume, 2018; Lewellen, 2023). Empirically, identifying tax haven activity remains challenging due to limited disclosure and potential mismeasurement in commonly used data sources, which can bias inference on the extent and sensitivity of profit shifting (Blouin and Robinson, 2025; Dyreng et al., 2023). Importantly, this literature cautions that restricting haven-related income shifting can generate unintended consequences, including changes organizational complexity, investment location, and firms' choices across alternative tax planning margins (Müller et al., 2024; Nesbitt et al., 2023; Suárez Serrato, 2019). Overall, these findings suggest that firms actively adapt their behavior in response to regulatory constraints, rather than passively accepting higher tax burdens.

In response to concerns over base erosion and profit shifting, governments have implemented a range of regulatory frameworks aimed at enhancing transparency and limiting international tax avoidance. A key initiative is the Organisation for Economic Co-operation and Development's

(OECD) Base Erosion and Profit Shifting (BEPS) Project, launched in 2013, which introduced 15 action items designed to curb aggressive tax planning by MNEs (OECD, 2016). Among these, Action 13 established Country-by-Country Reporting (CbCR), requiring large MNEs to disclose key financial information on a jurisdictional basis. Other initiatives include the OECD’s Common Reporting Standard (CRS), which facilitates the automatic exchange of financial account information between tax authorities globally (OECD, 2014). Within the EU, the ATAD introduced measures to counter tax avoidance, including limiting interest deductions, strengthening controlled foreign company (CFC) rules, and addressing hybrid mismatches (European Commission, 2016). Most recently, the OECD initiated a Global Minimum Tax of 15% to reduce incentives for shifting profits to low-tax jurisdictions (OECD, 2021), which has been implemented in EU member states (Spengel et al., 2026).

The empirical evidence on the effectiveness of international anti-tax avoidance measures is mixed. While some studies document modest reductions in international profit shifting following the introduction of anti-tax avoidance regulations (Beer et al., 2020), others highlight more nuanced responses. For example, de Simone and Olbert (2022) show that although CbCR enhances transparency, its direct impact on reducing tax avoidance is limited and may induce a reallocation of real economic activity. Related work finds that firms adjust their tax planning strategies along alternative margins when traditional profit-shifting channels become more constrained (de Simone et al., 2022). Taken together, this literature suggests that international regulation may alter the form and location of tax planning activity, raising the possibility that firms substitute away from increasingly constrained cross-border strategies toward alternative, less regulated channels.

Despite the extensive focus on cross-border income shifting, comparatively little is known about whether and how firms adjust their tax planning behavior within national borders when international opportunities become more constrained. This gap is particularly relevant in countries with substantial sub-national tax variation, such as Germany, where municipalities retain autonomy over local business tax rates (Fuest et al., 2018; Link et al., 2024).³ These tax differentials create incentives for firms to reallocate profits and, in some cases, mobile functions across municipalities (Kochems, 2025). More generally, evidence in other settings suggests that firms engage in domestic tax planning in response to local tax rate differentials (e.g., Klassen and Shackelford (1998); Mintz and Smart (2004)).

We therefore consider the possibility of a *substitution effect*: as international profit shifting becomes more constrained, MNEs may increasingly substitute highly profitable cross-border strategies

³Other countries with sub-national variation of profit taxes are, for example, Italy, Switzerland, and the US.

with less profitable but more feasible domestic shifting strategies. Importantly, many mechanisms prominently used for international profit shifting, including transfer pricing, IP allocation, and intra-group financing, can, in principle, be adapted to exploit sub-national tax differentials (see section 2.2). While both international and domestic profit shifting are driven by tax rate differentials, they operate under distinct institutional and enforcement regimes (Bartelsman and Beetsma, 2003). Understanding whether international anti-tax avoidance measures merely redirect tax planning toward domestic margins is crucial for evaluating their overall effectiveness. Our analysis addresses this gap by examining whether MNEs reallocate profits domestically in response to constraints on international tax avoidance.

2.2 Sub-National Tax Planning Strategies in Germany

In Germany, corporate profits are subject to both federal and municipal taxation. At the federal level, corporations face a statutory corporate income tax rate of 15%, to which a solidarity surcharge of 5.5% applies. This results in an effective corporate income tax rate of 15.825% ($= 15\% \times 1.055$). In addition, corporations are liable for the local business tax (*Gewerbesteuer*), which constitutes a major source of revenue for municipalities (Bundesministerium der Finanzen, 2023).

While the tax base of the local business tax is determined under federal law and largely corresponds to the taxable profit subject to corporate income tax⁴, the tax rate is set at the municipal level. Specifically, each municipality chooses a tax multiplier $v_{m,t}$, which is applied to a federally fixed base rate $\theta_{federal}$ of 3.5%. The resulting local business tax rate is given by:

$$\tau_{m,t} = \theta_{federal} \times v_{m,t}.$$

As of 2023, municipal multipliers range from 200% to 900%, with an average of approximately 400%, implying effective local business tax rates between 7% and 31.5% (see table 1, section 3.3). Municipalities may adjust their multipliers on an annual basis, subject to local budgetary decisions. With nearly 11,000 municipalities and roughly 10% of them changing their tax rate in a year (untabulated), Germany exhibits substantial spatial and temporal variation in local business tax rates. This variation has been exploited to study the real and fiscal effects of taxation, including firm location choices, investment, employment, and tax revenues (Becker et al., 2012; Fuest et al., 2018; Langenmayr and Simmler, 2021; Jacob et al., 2023; Link et al., 2024).

For firms operating establishments in multiple municipalities, local business tax liabilities are, by default, apportioned across municipalities based on payroll shares (§ 28 GewStG), ensuring that the

⁴For local business tax purposes, this profit is modified by certain add-backs and deductions to reduce the effect of financing choices on the tax burden, avoid double taxation, and remove income from foreign operations from the tax base (Endres and Spengel, 2015).

tax base reflects the geographic distribution of economic activity. Moreover, each legal entity within a corporate group, i.e., parent companies and subsidiaries, is assessed separately for local business tax purposes. These rules define the baseline framework for sub-national taxation in Germany.

A distinctive feature of the German tax system is fiscal unity (*Organschaft*), which constitutes an exception to this entity-based and payroll-apportioned taxation framework. Under this regime, a parent company (*Organträger*) and its controlled subsidiaries (*Organgesellschaften*) may elect to be treated as a single entity for corporate income tax and local business tax purposes (§§ 14–19 KStG; § 2 GewStG). A requirement for setting up a fiscal unity is that the subsidiaries' profits and losses are fully attributed to the parent company. As shown below, both features are central to the design of domestic tax planning strategies.

While fiscal unity simplifies loss offsetting and reduces administrative burdens, it also plays a crucial role in shaping sub-national tax planning strategies. By selectively including or excluding entities from the fiscal unity, firms can influence whether profits are subject to formulary apportionment across municipalities or taxed exclusively at the location of a specific subsidiary.

Municipal tax rate differentials create strong incentives for firms to engage in sub-national profit shifting. Unlike international tax planning, these strategies operate entirely within a single legal framework. Relocating substantial real economic activity, such as production facilities or headquarters, from high-tax to low-tax municipalities is often costly or infeasible. As a result, firms rely on more flexible strategies that allow them to reallocate profits without changing their operational footprint.

In practice, this is achieved by shifting location-elastic functions, such as licensing, financing, personnel administration, or asset ownership, to subsidiaries located in low-tax municipalities. Conceptually, sub-national tax planning in Germany can be grouped into two main approaches that differ in how taxable income is allocated across municipalities. First, firms can manipulate the apportionment of the local business tax base by influencing the payroll-based allocation. Second, firms can shift profits directly to a low-tax municipality by allocating mobile income streams to legally separate entities that are excluded from fiscal unity and therefore taxed separately at the entity's place of establishment. The models described below implement one or both approaches in practice.

Drawing on practitioner-oriented and academic analyses (Kollruss et al., 2013; Neugebauer et al., 2020; Sixt, 2024), we distinguish four prominent sub-national tax planning models used in Germany: the licensing model, the financing model, the employee leasing model, and the real estate model.

Licensing Model

Building on the entity-based taxation and formula apportionment rules described above, the licensing model shifts profits by allocating income to a legally separate subsidiary that is deliberately excluded from fiscal unity. As a consequence, licensing income is not subject to payroll-based apportionment across municipalities but is taxed exclusively at the location of the licensing entity. By isolating licensing income in a standalone entity with a single permanent establishment, the group ensures that profits are taxed solely at the municipal rate applicable to the licensing subsidiary's location.

An illustration of the licensing model is provided in Figure A.1. In this structure, a corporate group centralizes IP in a subsidiary located in a low-tax municipality. The parent company, typically situated in a high-tax municipality, transfers or grants usage rights of the IP to the licensing entity, which subsequently sub-licenses the IP to operating subsidiaries in exchange for royalty payments. These royalties reduce taxable income in high-tax municipalities and generate income in the low-tax municipality without triggering formulary apportionment. The licensing entity typically performs only limited administrative functions.

The precise tax consequences depend on the legal form of the entities involved. If both the parent and the licensing entity are partnerships, the IP can generally be transferred at book value pursuant to § 6(5) EStG, thereby avoiding the realization of hidden reserves. The licensing partnership then sub-licenses the IP to operating entities and accumulates royalty income in the low-tax municipality.⁵ An additional advantage arises upon a later disposal of the IP: any hidden reserves are realized at the level of the licensing partnership and are therefore subject only to the lower municipal tax rate. This structure has long been known in practice; in 2016, the German Federal Council called upon the federal government to address such arrangements (Bundesrat, 2016), yet no comprehensive reform has followed.

If the entities are corporations, a tax-neutral transfer at book value is generally not available (Neugebauer et al., 2020). Instead, the parent corporation may grant the licensing subsidiary a royalty-free right to use the IP. Such a gratuitous grant does not trigger the realization of hidden reserves and does not constitute a hidden capital contribution, as mere usage rights are not considered transferable assets for purposes of § 8(3) KStG (Hey et al., 2023). Because the licensing entity receives the usage right free of charge, no royalty expense arises at its level, thereby avoiding local business tax add-backs under § 8 No. 1 GewStG. At the same time, the parent company

⁵For individual partners, the local business tax paid at the partnership level may be partially credited against personal income tax pursuant to § 35 EStG. However, the credit is capped and depends on the individual income tax rate, such that differences in municipal multipliers remain economically relevant. Corporate partners are not entitled to this credit.

does not receive royalty income, so no corresponding taxable income is generated at the parent level. Income is instead created exclusively through sublicensing to operating subsidiaries at arm's length, concentrating taxable profits in the low-tax municipality. Profits retained at the level of the licensing subsidiary are taxed at the lower municipal tax rate. Upon distribution to the parent corporation, dividends are generally 95% exempt under the participation exemption regime (§ 8b KStG), with 5% deemed a non-deductible business expense.

In both partnership and corporate structures, the key design feature is the separation of the licensing entity from fiscal unity. By refraining from entering into a profit and loss transfer agreement, the group ensures that the licensing subsidiary is not treated as part of the fiscal unit and that its profits are not subject to payroll-based apportionment.

Overall, the licensing model combines (i) separate-entity taxation outside fiscal unity with (ii) the concentration of highly mobile royalty income in a low-tax municipality. By exploiting legal form distinctions and local tax rate differentials, firms can reallocate profits domestically while remaining within the formal boundaries of German tax law.

Financing Model

With the financing model, a corporate group establishes a financing subsidiary in a low-tax municipality that provides loans to operating subsidiaries located in higher-tax municipalities. This model enables the group to shift profits in the amount of the market interest on the intercompany loan while circumventing the interest barrier rules (§ 4h EStG, § 8a KStG) and local business tax add-backs (§ 8 No. 1 GewStG).

An illustration of the financing model is provided in Figure A.2. Similar to the licensing model, the structure relies on a triangular relationship: a parent company and an operating subsidiary, both located in a high-tax municipality and linked through fiscal unity, and a financing subsidiary located in a low-tax municipality that is deliberately excluded from the fiscal unity.

The financing subsidiary grants a loan to the operating subsidiary at a below-market interest rate. The operating subsidiary deducts only the actual (below-market) interest expense from its taxable income. At the same time, tax law requires an income correction at the level of the financing subsidiary: the difference between the market interest rate and the actual interest rate is treated as a hidden profit distribution. As a result, the financing subsidiary recognizes taxable income equal to the full market interest on the loan.

Crucially, this income correction does not generate a corresponding deductible expense at the

level of the operating subsidiary because the implicit benefit from the below-market loan does not qualify as a deductible contribution for tax purposes (Hey et al., 2023). To prevent double taxation within the group, a notional expense deduction arises at the level of the parent company. Importantly, this deduction is classified as a participation-related expense rather than as interest expense. Consequently, it is not subject to the interest barrier rules nor to local business tax add-backs. By combining the income correction at the financing subsidiary with the notional participation-related deduction at the parent level, the group effectively shifts profits in the amount of the market interest from a high-tax municipality to a low-tax municipality (Kollruss et al., 2013).

Employee Leasing Model

The employee leasing model exploits the payroll-based apportionment of the local business tax base. Under the default formula apportionment rule, the tax base is allocated across municipalities according to wage payments to a firm's own employees. By contrast, payments to third parties for the provision of labor (e.g., leased workers) do not qualify as wages for apportionment purposes. Corporate groups can therefore reduce the share of the tax base allocated to high-tax municipalities by relocating formal employment to a leasing entity in a low-tax municipality and supplying labor to operating entities via intra-group leasing contracts.

The leasing entity invoices operating subsidiaries for wages plus a markup, allowing profits linked to labor input to be taxed at lower rates. To ensure that wages are attributed to the leasing entity rather than reattributed to the operating entity, the leasing arrangement must be structured as a genuine, profit-oriented service with an arm's length markup.

Real Estate Model

The real estate model exploits the extended property reduction clause in § 9 No. 1 Sentence 2 GewStG. A group-owned real estate company, though not necessarily based in a low-tax municipality, leases property to an operating subsidiary, typically at below-market rates. The reduced rent generates a hidden profit distribution at the real estate company, which the parent company records as a participation expense rather than rental income. As a result, neither the interest barrier rules nor local business tax add-backs apply. At the same time, the real estate company can fully deduct its rental income, including the deemed distribution, under the extended property reduction. Consequently, the full market rent is effectively exempt from local business taxation, allowing firms to shield substantial income from municipal tax bases even without locating the real estate entity in a low-tax municipality.

Altogether, these models illustrate how firms exploit sub-national tax rate differentials within a single national tax system. By reallocating mobile functions rather than real activity, firms can substantially reduce their overall tax burden while remaining formally compliant with taxation rules. Such practices erode municipal tax revenues and undermine horizontal equity, prompting increasing regulatory attention and public scrutiny (see appendix A.3). Understanding these mechanisms is essential for assessing whether international anti-avoidance efforts merely redirect tax planning toward the domestic sphere and, ultimately, designing effective anti-tax avoidance measures.

2.3 Hypotheses

In recent years, the international tax environment substantially changed due to the introduction of coordinated anti-tax avoidance efforts such as CbCR, the ATAD, the EU Blacklist, and the Global Minimum Tax (Spengel et al., 2026). These initiatives have increased transparency, tightened enforcement, and raised compliance costs for MNEs, thereby constraining traditional forms of cross-border profit shifting (Lester and Olbert, 2025). As international tax arbitrage opportunities become more limited, firms may reassess their tax planning strategies and substitute toward alternative margins.

Germany provides a particularly suitable institutional setting to study such behavioral responses. While international profit shifting has become increasingly restricted, substantial tax rate differentials persist at the sub-national level, as municipalities retain discretion over local business tax multipliers. This creates scope for firms to engage in domestic profit shifting within a single legal framework. Against this background, we formulate two hypotheses that capture potential adjustment mechanisms at the municipal and firm level, respectively.

Our first hypothesis focuses on the municipal level. If international profit shifting becomes less feasible or profitable, low-tax municipalities may become relatively more attractive locations for profit allocation within national borders. In this case, international anti-tax avoidance measures could unintentionally intensify sub-national tax competition, as municipalities with comparatively low business tax rates effectively function as domestic tax havens. We thus formulate and test the following first hypothesis:

H₁: Following global anti-tax avoidance efforts, municipalities with low local business tax rates, i.e., domestic tax havens, experience a relative increase in profit allocation and local business tax revenues compared to higher-tax municipalities.

This hypothesis is consistent with the theory of tax competition in which jurisdictions compete for mobile capital and economic activity by adjusting their fiscal policies (Wilson, 1999). Empirically, we test this hypothesis by comparing the evolution of tax rates, tax bases, and net local business tax revenues between persistently low-tax municipalities ("always havens") and other German municipalities before and after the implementation of key international reforms (see section 3.1).

Our second hypothesis focuses on firm-level behavior. As international tax planning becomes more complex and costly due to enhanced reporting and compliance requirements, affected MNEs may substitute away from cross-border profit shifting toward domestic tax planning strategies. In particular, firms may increasingly reallocate profit-generating but location-elastic functions, such as licensing, intra-group financing, or personnel administration, to subsidiaries located in low-tax municipalities. We thus formulate and test the following second hypothesis:

H₂: Following the introduction of global anti-tax avoidance efforts, MNEs more strongly affected by international efforts to curb tax avoidance, increase their presence in sub-national tax havens.

This implies that international and sub-national tax planning act as substitutes rather than complements. Empirically, the substitution effect may be observed in changes to firms' domestic ownership networks, including the establishment, retention, or expansion of legal entities in sub-national tax havens. We test this hypothesis using firm-level data on ownership structures and a triple-difference research design that exploits differential exposure to international regulations across firms, based on prior use of international tax havens and reporting thresholds (see section 3.2).

Altogether, these hypotheses allow us to assess whether international anti-tax avoidance measures reduce overall tax avoidance or instead redirect it toward domestic margins. By jointly analyzing municipal outcomes and firm-level organizational responses, our empirical approach sheds light on potential unintended sub-national consequences of global anti-tax avoidance efforts.

3 Research Design & Data

3.1 Tax Policy and Revenue of German Municipalities

Prima facie, it is unclear how tax revenues in German municipalities are interdependent with efforts to curb international tax avoidance. On the one hand, local tax rates are one decisive criterion for the location of FDI (Becker et al., 2012). Hence, if international profit shifting becomes

more difficult to implement due to increased regulations, differences in sub-national tax burdens may become more important for both the location of real economic activity and profit shifting strategies. On the other hand, recent studies have shown that corporations react globally to measures such as CbCR concerning their profit shifting activities (Joshi et al., 2020). These policies can induce real effects that may adversely affect high-tax locations (de Simone and Olbert, 2022). Considering that the lowest possible statutory burden in Germany for corporate profits is 22.875%, Germany's attractiveness for tax purposes is limited in an international comparison. However, as tax differences within Germany are seizable, international anti-tax avoidance efforts may influence corporate behavior at the local, i.e., sub-national, level.

From a corporate perspective, decisions regarding profit shifting can be made at both international and national levels. Within Germany, municipalities that are particularly attractive for profit shifting purposes are often located on the outskirts of large urban areas. These small jurisdictions impose local business tax rates much lower than their neighbors, effectively internalizing the requirements described in section 2.2. By offering lower tax rates, they become appealing locations for firms seeking to minimize their tax liabilities (Kochems, 2025).

Identifying these sub-national *tax havens* involves a positive definition, similar to the approach used in the literature on international tax havens. Researchers have established several broadly accepted sets of locations that are especially attractive for tax purposes, e.g., Dharmapala and Hines (2009); Hines and Rice (1994). However, even in this realm, the classification depends on the specific tax subject, the nature of the tax in question, and other general considerations such as the rule of law. For instance, the tax haven characteristics of Switzerland may differ from those of the Isle of Man. An advantage of the sub-national perspective is the limited set of options available to municipalities to enhance their investment attractiveness. As explained in section 2.2, municipalities in Germany have control over the tax rates but not the determination of the tax base. Furthermore, municipalities have limited responsibility with respect to public goods provision. Local roads, schools etc. are, e.g., maintained by the municipalities, whereas infrastructure particularly relevant to corporations, such as highways or waterways, is provided for by higher levels of government.

We use institutional characteristics to identify sub-national tax havens. These are based on German tax law and implementation notes from practitioners (Neugebauer et al., 2020; Sixt, 2024). Specifically, companies rely on requirements idiosyncratic to the interpretation of the German tax code. That is, to implement tax planning strategies as outlined above, they need to make plausible that strategic decision-making occurs at the respective location and that the location is actively

used. Although the precise requirements differ depending on the tax planning strategies outlined in section 2.2, practitioners use a spatial distance of up to 25 kilometers from metropolitan areas to account for the practical proximity required for such activities (Neugebauer et al., 2020). We thus classify a municipality as a tax haven if it is located within 25 kilometers of a larger urban center and features a "lower" statutory tax rate. We consider statutory tax rates as "low" if they are more than two standard deviations below the average of all municipalities within a 50-kilometer concentric cluster surrounding the municipality in question.⁶ Applying this definition to Germany for the period from 2010 to 2022 yields 27 municipalities continuously classified as sub-national tax havens ('always havens'), 30 municipalities that became tax havens at some point during the period, and 44 municipalities that ceased to be classified as tax havens during the sample time period.⁷

To rule out that differences between havens and non-havens arising over time are due to municipalities switching into being tax havens, we balance our set of tax havens to include only the 27 municipalities that are continuously classified as sub-national tax havens ('always havens'). Subsequently, we compare the differential development of tax rates and tax revenues over time between these 'always havens' and other German municipalities. Here, we remain descriptive with respect to our mode of inference. The main reason is that the potential increase in the involvement of firms in sub-national tax havens may result from various factors, including the broader dissemination of tax avoidance strategies independent of international efforts to curb tax avoidance, e.g., simultaneous with media coverage, as shown in appendix A.3. To illustrate the development of the tax rate and net tax revenue (after equalization) descriptively, we estimate the following regression model:

$$Y_{i,s,t} = \alpha + \sum_{t=2012(\neq 2015)}^{2022} \gamma_t \times D_{i,s,t} + \phi_i + \mu_{s,t} + \epsilon_{i,s,t}, \quad (1)$$

where $Y_{i,s,t}$ represents the outcome variable for municipality i in state s at time t (either the tax rate or the net local business tax revenue). γ_t are the coefficients of interest, capturing the year-specific difference relative to the baseline year of 2015. The variable $D_{i,s,t}$ is a binary variable indicating whether municipality i is an 'always haven' in year t . We estimate this basic equation with two different sets of fixed effects. One accounts for unobserved differences at the municipality (i) and year levels (t). In a second approach, we control for unobserved heterogeneity at the level

⁶If we classify a municipality as a tax haven, we will carry forward this classification unless the municipality upward adjusts its tax rate again to be less than one standard deviation below the average cluster tax rate.

⁷See appendix A.4 for a detailed description of these tax havens and their spatial distribution.

of the municipality (i) as well as the state-year level $s \times t$.⁸ We choose 2015 as the baseline year because it precedes significant international anti-tax avoidance measures, allowing us to observe changes before and after their implementation.

Additionally, we estimate a difference-in-difference (DiD) model to describe average changes over time between 'always havens' and other municipalities more broadly:

$$Y_{i,s,t} = \alpha + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 (Treat_i \times Post_t) + \phi_i + \mu_{s,t} + \epsilon_{i,s,t}, \quad (2)$$

where $Treat_i$ is a treatment indicator equal to one for 'always havens' and zero otherwise, and $Post_t$ is a time indicator equal to one for years after the implementation of international anti-tax avoidance measures and zero otherwise. The interaction term ($Treat_i \times Post_t$) captures the DiD estimator β_3 , representing the differential effect on 'always havens' after the policy changes. Again, $Y_{i,s,t}$ takes on different values as outcomes. We show between-group differences, including the tax base, tax rate, and net tax revenue.

3.2 Firms' Ownership Networks

Corporate ownership structures often span multiple municipalities within Germany and extend across international borders. Previous studies have analyzed these ownership ties within Germany, but have generally treated them as static (Bilicka et al., 2023). In this study, we relax this assumption by investigating *how* the links between legal entities of a corporation change in response to the introduction of international measures aimed at curbing profit shifting. The differential impact of these regulations on firms, based on their characteristics, allows us to identify behavioral responses and estimate a triple-difference specification.

Taxes affect the after-tax user cost of capital (Hall and Jorgenson, 1967) and are thus considered in the location decisions of a firm. Firms may seek to reduce their tax burden by utilizing low-tax jurisdictions, either by shifting real economic activity or by implementing tax avoidance strategies that solely shift paper profits without substantial changes in operations. When firms successfully shift paper profits, high local tax rates in their primary operating jurisdictions do not necessarily result in higher effective tax rates, as the tax base is reduced through profit shifting mechanisms. Thus, corporations may remain indifferent to the higher tax rates in their primary operating jurisdictions.

⁸The results do not differ substantially; however, the fact that reference rates for fiscal equalization are fixed at the state level leads us to include state-year fixed effects. In any case, we remain descriptive in our mode of inference regarding the findings at the municipal level.

The strategic presence of MNEs in tax-favorable locations is well documented in the literature (Lester and Olbert, 2025). However, as international regulations tighten, firms may adapt their strategies, including revising their ownership structures and location decisions to "optimize" their tax obligations. For example, de Simone and Olbert (2022) illustrate how, in order to substantiate their activity in certain low-tax countries, corporations increasingly adjust their real activity in these jurisdictions. Similarly, jurisdictions may adapt their tax policies, potentially shifting tax competition to different domains (de la Feria, 2024). Building on these findings, we investigate how MNEs adjust their national footprint when international channels for profit shifting become less viable. Specifically, we examine whether these firms are more likely to maintain ties to or establish new legal entities in sub-national tax havens within Germany.

To address this research question, as reflected in our first hypothesis, we employ a triple-difference (DDD) specification. We compare multinational corporations with a footprint in Germany that previously used international tax havens to those that did not. Furthermore, we differentiate between corporations with revenues above and below a EUR 750 million threshold around the time of the introduction of the CbCR and ATAD policies. The EUR 750 million threshold determines whether firms are subject to certain international reporting requirements, such as CbCR. Our analysis is conducted at the level of the global ultimate owner, focusing on fully owned subsidiaries (with 100% direct ownership). For mean differences, we specify the following regression equation:

$$\begin{aligned}
Y_{i,t} = & \alpha + \beta_1 Post_t + \beta_2 AboveThresh_{.i} + \beta_3 Int.HavenFootp_{.i} \\
& + \beta_4 (AboveThresh_{.i} \cdot Post_t) + \beta_5 (Int.HavenFootp_{.i} \cdot Post_t) \\
& + \beta_6 (Int.HavenFootp_{.i} \cdot AboveThresh_{.i}) \\
& + \beta_7 (Int.HavenFootp_{.i} \cdot AboveThresh_{.i} \cdot Post_t) + \epsilon_{i,t},
\end{aligned} \tag{3}$$

where $Y_{i,t}$ represents the outcome variable, i.e., the decision to locate a legal entity in a German 'always tax haven'. We measure the linked entities' exposure to sub-national tax havens on both the extensive and intensive margins. First, we consider an indicator for whether a company operates a subsidiary in any of the sub-national 'always tax havens' in a given year. Second, we use the number of legal entities within sub-national 'always tax havens'. $Int.HavenFootp_{.i}$ is an indicator equal to one for all multinationals that operated legal entities in international tax havens in 2015, and zero otherwise.⁹ $AboveThresh_{.i}$ is an indicator equal to one if the corporation is generating

⁹We rely on the international tax havens classification of Dharmapala and Hines (2009) and consider the following jurisdictions as tax havens in our analysis: Andorra, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Cyprus, Dominica,

revenues of more than EUR 750 million in 2015, and zero otherwise. $Post_t$ is an indicator equal to zero for all years up to and including 2015 and one for 2016 onward.

The coefficient of interest is on the triple interaction term (β_7), which captures how multinationals with an international footprint in tax havens, and which are affected (more strongly) by international efforts to curb tax avoidance (due to exceeding the revenue threshold), adjust their set of legal entities compared to their international and unaffected (less affected) counterparts post 2015. Hence, if locating in German tax havens is only a matter of organizational learning or mobility, we would expect similar increases in presence over time among all international corporations, regardless of previous exposure to international tax avoidance strategies. Our hypothesis H_2 reflects these considerations. If international and sub-national tax planning are complements, we expect the coefficient β_7 to be negative or statistically indiscernible from zero. If international and sub-national tax planning are substitutes, we expect that MNEs previously utilizing international tax havens will increasingly use sub-national tax havens following the tightening of international regulations, resulting in a positive coefficient β_7 .

While ordinary least squares estimation is informative for establishing mean differences, our dependent variable involves discrete outcomes and count data (i.e., the number of entities). Therefore, we employ a Poisson pseudo-maximum likelihood (PPML) estimation as our main specification to achieve a better functional fit; see model 4. The PPML approach allows us to estimate both binary and count outcomes without specifying a particular distributional assumption for the dependent variable (Correia et al., 2020; Gourieroux et al., 1984). Again, we include unit and time-fixed effects in alternative specifications and estimate with the package provided by Correia et al. (2020):

$$\begin{aligned}
X_{i,t} = \exp & \left[\phi_i + \mu_t + \beta_1 Post_t + \beta_2 AboveThresh_{.i} + \beta_3 Int.HavenFootp_{.i} \right. \\
& + \beta_4 (AboveThresh_{.i} \cdot Post_t) + \beta_5 (Int.HavenFootp_{.i} \cdot Post_t) \\
& + \beta_6 (Int.HavenFootp_{.i} \cdot AboveThresh_{.i}) \\
& \left. + \beta_7 (Int.HavenFootp_{.i} \cdot AboveThresh_{.i} \cdot Post_t) \right] + \epsilon_{i,t},
\end{aligned} \tag{4}$$

where $X_{i,t}$ represents the outcome variable of interest, capturing either the extensive margin (whether a firm operates in a sub-national tax haven, i.e., zero or one) and the intensive margin (the number of legal entities in sub-national tax havens). The indicator variables are specified as stated above.

Gibraltar, Grenada, Hong Kong, Ireland, Isle of Man, Jordan, Lebanon, Liberia, Liechtenstein, Luxembourg, Macao, Maldives, Malta, Marshall Islands, Mauritius, Monaco, Montserrat, Nauru, Netherlands Antilles (dissolved in 2010), Niue, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Seychelles, Singapore, Switzerland, Tonga, Turks and Caicos Islands, Vanuatu, Virgin Islands (U.S.).

In the PPML estimation, the coefficients on the indicators are interpreted as semi-elasticities. Specifically, an increase in the explanatory variable of one results in a corresponding percentage change in the dependent variable. The interaction terms provide the differences in semi-elasticities in percentage points. For the extensive margin, the coefficients indicate changes in the probability of a firm locating an entity in a German 'always haven'. For the intensive margin, they reflect the percentage increase or decrease in the number of entities a firm has in such municipalities. We discuss the interpretation of our results in section 4.2. We cannot, in principle, distinguish between real economic activity and paper profit shifting performed at the entity level. As is the case in the international setting, we are unable to observe what exact services are performed or actions are taken inside the legal entity in the tax haven and for the respective MNE group. Going forward, we aim to address this limitation by adding data on zoning regulations with respect to the location of the legal entity in the tax haven.

3.3 Descriptive Statistics

German Municipalities

Table 1 provides descriptive statistics for German municipalities over the period from 2012 to 2022. The observations are at the municipality-year level, covering nearly 11,000 municipalities annually.¹⁰ On average, a German municipality has approximately 7.5 thousand citizens and is located about 50 kilometers in flight distance from the boundary of a large urban agglomeration (> 100,000 inhabitants).

The average local tax rate on business profits is 12.59%, with a minimum of 7% and a maximum of 31.5%. This implies that the total tax burden on business profits for a company subject to both corporate tax and local business tax ranges between slightly over 22.875% and below 46.6% during the sample years. Outliers at the upper and lower ends are scarce, giving rise to the notion of tax havens in the German context.

On average, municipalities collect around EUR 4.7 million in business taxes annually. After reallocation to other levels of government, they are left with net revenues from the local business profit tax of approximately EUR 4.1 million on average. The data indicates that business taxes are the most important source of revenue for municipalities that they control. Property taxes account for roughly one-quarter of local tax revenues. In addition to the taxes collected at the local level,

¹⁰We present descriptive statistics for the entire panel used to classify entities in 'always tax havens' and other municipalities. For our analysis in section 4.1, we use the same panel from 2012 onwards to exclude initial reactions by companies to municipalities selecting into becoming a tax haven.

municipalities receive tax revenue from higher levels of government that they do not control directly (e.g., a share of the value-added tax and income tax collected).

Table 1: Municipality Level Descriptive Statistics

	N	Mean	StDev	p25	p50	p75
Inhabitants [N]	120,749	7,497.53	48,825.90	640	1,751	5,397
Distance to Urban Center [Meter]	120,749	48,747.24	37,020.81	21,366	40,301	66,749
Patent Applications [N]	120,749	15.02	169.87	0	0	5
Workers [N]	116,861	2,990.92	23,521.16	65	316	1,482
Road Accidents [N]	120,734	34.48	231.23	2	7	23
Prop. Tax Rate Agricult. [Multiplier]	120,744	331.76	75.59	300	320	360
Prop. Tax Rate Building [Multiplier]	120,744	371.37	68.39	330	365	400
Local Business Profit Tax [%]	120,749	12.59	1.31	12	13	13
Tax Rev. Prop. Tax Agricult. [k EUR]	120,273	36.23	52.05	7	19	44
Tax Rev. Prop. Tax Building [k EUR]	120,579	1,218.85	11,063.14	57	176	605
Tax Rev. Business Profit Tax [k EUR]	119,964	4,713.11	47,960.98	81	412	1,915
Profit Tax Reallocation [k EUR]	118,830	653.08	5,813.19	11	60	282
Net Profit Tax [k EUR]	119,893	4,068.61	42,628.68	69	348	1,625

Notes: This table presents descriptive statistics for municipalities in Germany between 2010 and 2022. "Inhabitants" refers to the number of residents as reported by the Federal Statistical Office. "Distance to Urban Center" is calculated based on annual vintages of shapefiles of German administrative boundaries from the Federal Agency of Cartography and Geodesy. "Patent Applications" is the number of patent applications filed from an address within the respective municipal boundaries; the data source is the PatStat Database. "Workers" refers to the number of workers registered under an address in a municipality according to the Federal Employment Agency. "Road Accidents" is the number of accidents recorded by the German Police in a municipality; the source is the Federal Statistical Office. "Prop. Tax Rate Agricult." and "Prop. Tax Rate Structures" are the multipliers for property taxes on agricultural and built-on property, respectively. "Local Business Profit Tax" is the rate each municipality imposes on business profits as a percentage. Data on tax bases, reallocation bases (untabulated), and "Net Profit Tax Revenue" are obtained from the Statistical Office of the States, i.e., "Realsteuervergleich" (statistic: 71231).

Corporate Ownership Networks

Understanding the structure and dynamics of corporate ownership networks is crucial for analyzing how MNEs adjust their organizational structures in response to international tax regulation. By examining these networks, we can identify changes in firms' legal entities and ownership ties that indicate shifts in tax planning strategies.

We utilize the Orbis Global Ownership database and access flatfile vintages to retrieve all active ownership links between legal entities¹¹ of a corporation over time¹². Using the Python library NetworkX, we construct a network of nodes (legal entities) and edges (ownership links) for

¹¹We exclude 'individual' type shareholder entities, i.e., entity types 'I' and 'D' from the data.

¹²We only consider 100% legal ownership, as provided in Orbis, and the last available observation within each year.

each yearly vintage. We then iterate through all network components¹³, defining each connected component as a corporate conglomerate with a unique identifier. From this data, we identify all global ultimate owners of which at least one legal entity has a footprint in Germany in any given year of our analysis. We add financial data for the global ultimate owners, such as revenues, assets, and the number of employees. To enhance the spatial dimension of our analysis, we geocode the address data of the European legal entities using a geocoding API, obtaining precise geographic coordinates for each entity. For entities outside Europe, we assign the locations based on the Alpha-2 country codes available in Orbis.

Subsequently, we map these coordinates onto the administrative boundaries of German municipalities. Using spatial joins, we obtain one-to-one matches between the flatfile vintages (Orbis) containing the legal ownership structures and the shapefile vintages of German administrative boundaries (i.e., municipalities). This process allows us to 1) count the number of entities and their inbound and outbound ownership links at both the local and international level, and 2) categorize corporate entities as being invested in international tax havens, sub-national German tax havens, or neither at a given point in time. Retrieving the global ultimate owner then facilitates a comprehensive analysis considering both the local and international exposure of each corporate conglomerate, i.e., its global footprint. Furthermore, the precise geolocation of entities allows us to understand where *exactly* multinationals are located within the sub-national context, i.e., whether there are multiple entities at a single address in a residential area or one single legal entity in a commercial/industrial park. We then match this data with geospatial data on land usage based on the CORINE land coverage taxonomy provided by the Federal Agency for Cartography and Geodesy of Germany. This addition allows us to assess the nature of the locations where entities are situated, distinguishing between residential, commercial, industrial, and other land uses.¹⁴

Figure 1a illustrates the granularity of our data, the spatial distribution of legal entities in Germany, and the network of ownership ties connecting these entities. The number of legal entities is highest in areas with high population density, such as the region north of Bonn, major cities such as Berlin and Munich, and the Rhine-Main area in south-west Germany. Ownership links between entities, represented by blue arrows, reveal focal points of corporate ownership ties across Germany. Plotted ownership links represent 100% ownership and, for clarity, only domestic links are displayed, although international links are considered in our analysis as well.

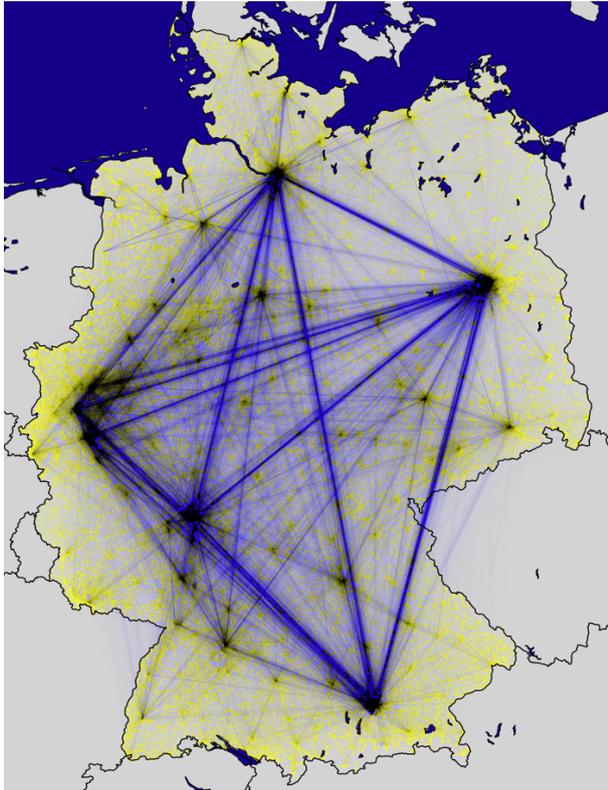
To provide a more detailed perspective at the local level, we focus on two 'always tax havens'

¹³A component in the ownership network consists of all legal entities of an MNE.

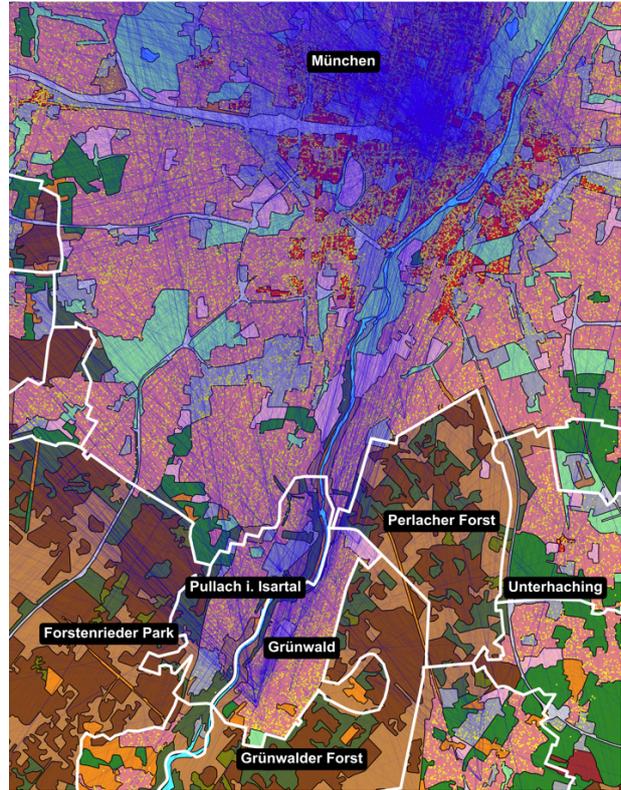
¹⁴Source: Corine Land Cover Taxonomy – Federal Agency of Cartography and Geodesy.

Figure 1: Ownership Links between Corporate Entities

(a) Germany



(b) South Munich Area



Notes: The figure provides a visual representation of the spatial variation of firm locations (yellow dots) and ownership links (blue arrows) between legal entities. Figure 1a displays a map of Germany and a cross-section of the data based on the year 2022. For clarity, only domestic ownership links are plotted, even though the entities are in part connected internationally as well. The network illustrates that ownership links between legal entities span the entire country, with large urban centers acting as hubs of economic activity. Figure 1b zooms in on the southern Munich ("München") area. The white borders indicate municipal boundaries. The municipalities of "Grünwald" and "Pullach i. Isartal" are highlighted due to their strong legal ownership ties, compared to neighboring municipalities such as "Unterhaching". The former two municipalities are classified as 'always havens'.

located in the immediate vicinity of Munich: the municipalities of Grünwald and Pullach im Isartal. Figure 1b shows the city of Munich in the north and the municipalities of Grünwald and Pullach im Isartal, as well as neighboring municipalities that do not feature low profit tax rates (e.g., "Unterhaching") to the south. In this figure, we validate the locations of legal entities by overlaying the land usage taxonomy. The graph shows considerable variation at the local level concerning the number and spatial distribution of entities (yellow dots). Legal entities are predominantly located in urban areas (red), areas intended for industrial use (grey), and areas of mixed usage (light red), rather than in pastures (orange) or woodland (dark green and brown).

Graphically, it is indistinguishable whether the number of legal entities in an 'always haven' exceeds those in other German municipalities. One reason is that multiple entities can be registered to one address. However, the graphical representation reveals that the entities in these havens exhibit a higher density of ownership links than those in comparable municipalities on the same

urban outskirts. This suggests a concentration of ownership structures, potentially aimed at tax optimization.

Table 2: Descriptive Statistics of Corporate Network Components

Panel A: All Components	N	Mean	StDev	Min	p25	p50	p75	Max
N Entities in Component	94,886,456	3.07	24.72	2	2	2	3	52,138
N Entities in Germany	94,886,456	0.10	1.50	0	0	0	0	3,138
Ind. Entity in Germany	94,886,456	0.03	0.18	0	0	0	0	1
N Entities in Int. Haven	94,886,456	0.04	0.60	0	0	0	0	798
Ind. Entity in Int. Haven	94,886,456	0.02	0.13	0	0	0	0	1
N Entities in Ger. Haven	94,886,456	0.00	0.16	0	0	0	0	557
Ind. Entity in Ger. Haven	94,886,456	0.00	0.02	0	0	0	0	1
Operating Rev. [M EUR]	6,253,945	80.61	1,685.30	0	0	1	3	511,282
Total Assets [M EUR]	10,185,877	208.83	11,599.01	0	0	1	2	9,440,143
Number of Employees	8,170,175	198.32	4,603.97	0	2	3	12	2,300,000
Panel B: 'GER' Component	N	Mean	StDev	Min	p25	p50	p75	Max
N Entities in Component	1,911,928	6.43	92.72	2	2	2	4	52,138
N Entities in Germany	1,911,928	3.48	7.67	0	2	2	3	757
Ind. Entity in Germany	1,911,928	0.99	0.12	0	1	1	1	1
N Entities in Int. Haven	1,911,928	0.14	1.58	0	0	0	0	388
Ind. Entity in Int. Haven	1,911,928	0.05	0.22	0	0	0	0	1
N Entities in Ger. Haven	1,911,928	0.03	0.99	0	0	0	0	557
Ind. Entity in Ger. Haven	1,911,928	0.01	0.12	0	0	0	0	1
Operating Rev. [M EUR]	152,595	935.42	6,721.47	0	2	15	120	414,817
Total Assets [M EUR]	328,179	1,948.14	41,365.49	0	1	3	19	3,305,288
Number of Employees	311,757	1,489.69	13,268.80	0	4	21	110	1,608,000

Notes: The table presents descriptive statistics for corporate network components that have some network ties to Germany. Observations are pooled for the years 2010 to 2021. A component consists of at least two legal entities, and we consider only entity types other than 'I' (one or more known individuals or families) and 'D' (unnamed private shareholders, aggregated). Ownership links are based on 100% ownership stakes. Panel A includes all components, while Panel B focuses on components with at least one legal entity located in Germany in 2015.

At the international level, beyond taxation, many other factors differ across countries, such as the rule of law, literacy of the population, and market size. Within Germany, however, many of these factors are constant at the national level, reducing the likelihood that they drive the observed pattern. Although there is some local variation in population density, education, and local market size, institutional factors such as the rule of law are expected to be similar across locations. On a very local level, we rule out these alternative explanations and attribute the increased density of inbound and outbound ownership links in 'always havens' to the local tax advantage offered by these municipalities. Notably, in the case of Grünwald and Pullach im Isartal, both municipalities

lack extensive industrial zones (indicated in gray), with land usage primarily classified as mixed-use. This observation aligns with the notion that firms may establish entities in these areas primarily for tax purposes rather than for significant real economic activity.

Table 2 presents descriptive statistics for the MNEs. The level of observation is the corporation-year level. We include two panels: Panel A displays data for all corporate components, while Panel B narrows the sample to components with at least one legal entity located in Germany in 2015, which we use for our subsequent analysis. This reduces the sample to around 1.9 million observations.

In Panel B, corporate conglomerates include some of the largest corporate components, with more than 50 thousand entities globally (each connected through 100% ownership links). The largest component comprises 757 entities located in Germany in a given year and a total of 388 entities situated in international tax havens as classified by Dharmapala and Hines (2009). On average, the components are much smaller, comprising 6.43 legal entities in total: 3.48 in Germany, 0.14 in an international tax haven, and 0.03 in a German tax haven. On average, 5% of all components have entities in international tax havens, and 1% have entities in sub-national German (always) tax havens.

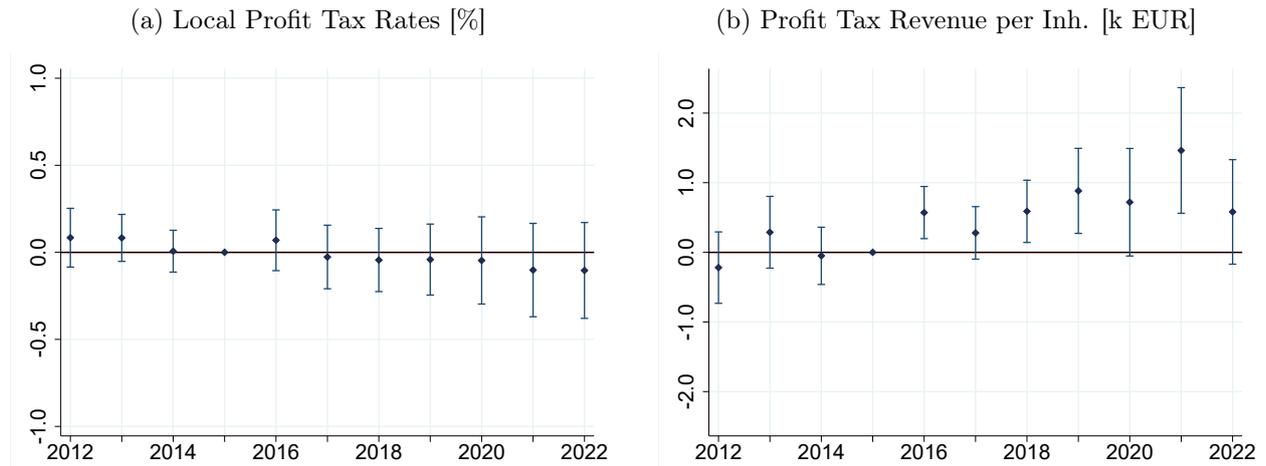
We rely on Orbis for financial data to determine whether a corporation is treated with respect to the threshold for the CbCR. Adding this data at the level of the identified global ultimate owner reduces the number of observations, particularly for variables derived from profit and loss statements. For Panel B, we receive 152,595 corporation-year matches for operating revenues and a little over 310 thousand corporation-year matches for total assets and the number of employees. This constraint is in part due to the coverage of Orbis data highlighted by Kalemli-Özcan et al. (2024) and the fact that, in Germany, smaller companies are not required to publish full annual reports. Disclosure requirements vary based on company size, something that some tax avoidance schemes use to their advantage (see section 4.3).

4 Results

4.1 Tax Haven Outcomes

We begin by examining how tax rates and tax revenues have changed in municipalities classified as 'always havens' compared to other German municipalities over the period of our study. To assess these changes, we estimate the model specified in equation 1 and present the results graphically. Figure 2a illustrates the development of local business profit tax rates in 'always havens' relative to all other German municipalities. The tax rates in both groups of municipalities have evolved roughly

Figure 2: Taxation in 'Always Havens' and German Municipalities



Notes: The figure displays the coefficients and 95% confidence intervals from estimating equation 1. Standard errors are clustered at the municipal level. In figure 2a, the dependent variable is the local business profit tax rate. In figure 2b, the dependent variable is the net profit tax revenue per inhabitant (after equalization). Tax rates in 'always havens' and other municipalities in Germany moved roughly in parallel before 2015. 'Always tax havens' did not significantly change their tax rates; differences arise mostly from a slight upward trend in tax rates over time by the control group. Tax revenues (as measured by pre-equalized local business tax revenue) developed roughly in parallel before 2015 as well. Starting in 2015, a rising trend is visible, interrupted by economic downturns in 2020 (COVID-19 pandemic) and 2022 (energy crisis due to war).

in parallel. A slight divergence over time is primarily driven by rising local business profit tax rates in other municipalities, whereas 'always havens' have, on average and by definition, refrained from increasing their tax rates as strongly. Hence, the relative tax advantage of 'always havens' has increased, though this increase is negligible and statistically insignificant.

We further explore this trend by regressing the local business profit tax rate on relevant indicators, as specified in equation 2. Table 3 presents the estimation results. Without fixed effects (column 1 of table 3), the average tax rate of a municipality before and including 2015 is 12.32%, while the average tax rate of 'always tax havens' is 9.97%. Although this difference may appear modest at first sight, they become more substantial – up to nearly 4 percentage points – when we restrict the sample to more urban areas (column 4 of table 3) or weighting the differences by municipality population sizes (table B.1).

Following 2015, municipalities increased their tax rates by an average of 0.44 percentage points. 'Always tax havens' also raised their tax rates slightly, but to a lesser extent. In columns 2 and 3, the coefficients β_1 and β_2 are absorbed due to the inclusion of fixed effects. The interaction term (β_3) indicates that tax havens have had smaller increases in tax rates over time – ranging from 0.09 to 0.15 percentage points – compared to other municipalities. This corresponds to approximately a 0.01% increase relative to the pre-2015 average tax rate in 'always havens'. The results are consistent when controlling for the size of the labor market (workers), local demand (inhabitants), innovative

activity (number of patent applications), and local activity more generally (road accidents). These findings align with previous studies on changes in local tax rates in Germany (e.g., Foremny and Riedel (2014); Fuest et al. (2018)). On average, municipalities change their tax rates infrequently, about once every ten years.

Table 3: Mean Differences Tax Rates – Municipality Level

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Tax Rate					
Haven (β_1)	-2.35***			-2.69***		
	(0.25)			(0.25)		
Post (β_2)	0.44***			0.43***		
	(0.01)			(0.01)		
Interaction (β_3)	-0.14	-0.15	-0.09	-0.13	-0.14	-0.09
	(0.12)	(0.12)	(0.11)	(0.12)	(0.12)	(0.11)
Constant (α)	12.32***	12.59***	12.59***	12.65***	12.90***	12.90***
	(0.01)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Observations	119,891	119,832	119,810	35,759	35,744	35,722
Unit FE	No	Yes	Yes	No	Yes	Yes
Year FE	No	Yes	No	No	Yes	No
State-Year FE	No	No	Yes	No	No	Yes

Notes: The table presents estimation results from regressing the local business profit tax rate on the indicators as specified in equation 2. Columns 1-3 compare 'always havens' to all other municipalities in Germany. Columns 4-6 restrict the sample to urban areas, including only municipalities within a 25-kilometer radius of an urban agglomeration with more than 100,000 inhabitants. Different fixed effects structures are applied: Columns 1 and 4 are estimated without fixed effects; Columns 2 and 5 include municipality and year fixed effects; Columns 3 and 6 include municipality and state \times year fixed effects. Standard errors are clustered at the municipal level and are given in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Turning to tax revenues, figure 2b depicts the changes in net profit tax revenue per inhabitant in 'always havens' over time, compared to the control group. Before 2015, tax revenues in both groups of municipalities developed similarly, with no systematic relative differences between 2012 and 2014 and the base year 2015. However, starting in 2015, a noticeable upward trend emerges in 'always havens', indicating a substantial increase in tax revenues relative to other municipalities. This trend is interrupted in 2020 and 2022, corresponding to the economic impacts of the COVID-19 pandemic and the energy crisis stemming from geopolitical events.

Table 4 presents the results from estimating equation 2 to quantify the changes in tax revenues of 'always havens' over time. Columns 1-3 show results for a panel of all municipalities, while columns 4-6 give results for a smaller sample that only includes municipalities in the urban surrounding area. Relative to 2015, 'always havens' experienced an average increase in net profit tax revenue per inhabitant (net of equalization) of approximately EUR 720 to 740 relative to other municipalities, depending on the specification. The average business tax revenue per inhabitant in 'always havens' is EUR 2,120 between 2012 and 2015, compared to EUR 250 for other municipalities. The results

indicate that tax revenues in 'always havens' increase by around EUR 820 per inhabitant to about EUR 2,960 per inhabitant in the post-period, whereas tax revenues per inhabitant increased to EUR 350 per inhabitant in the average German municipality. When focusing on urban centers (Columns 4–6), the baseline estimate increases, since municipalities in the hinterlands generally collect less tax revenue from the local profit tax. Although the post-2015 coefficient decreases slightly by EUR 10 per inhabitant, the coefficient on the interaction term (β_3) remains quantitatively unchanged.

Table 4: Mean Differences Tax Revenues – Municipality Level

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Tax Rev.					
Haven (β_1)	1.87*** (0.55)			1.86*** (0.55)		
Post (β_2)	0.10*** (0.00)			0.09*** (0.00)		
Interaction (β_3)	0.74** (0.29)	0.73** (0.29)	0.72** (0.29)	0.74** (0.29)	0.74** (0.29)	0.74** (0.29)
Constant (α)	0.25*** (0.01)	0.31*** (0.00)	0.31*** (0.00)	0.26*** (0.01)	0.33*** (0.00)	0.33*** (0.00)
Observations	119,891	119,832	119,810	35,759	35,744	35,722
R-squared	0.01	0.62	0.62	0.12	0.75	0.75
Unit FE	No	Yes	Yes	No	Yes	Yes
Year FE	No	Yes	No	No	Yes	No
State-Year FE	No	No	Yes	No	No	Yes

Notes: The table presents estimation results from regressing net profit tax revenues per inhabitant (after equalization) on indicators as specified in equation 2. Columns 1-3 compare 'always havens' to all other municipalities in Germany. Columns 4-6 restrict the sample to urban areas within a 25-kilometer radius of an urban agglomeration with more than 100,000 inhabitants. Different fixed effects structures are applied: Columns 1 and 4 are estimated without fixed effects; Columns 2 and 5 include municipality and year fixed effects; Columns 3 and 6 include municipality and state \times year fixed effects. Standard errors are clustered at the municipal level and are given in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

The differences in tax revenues are quantitatively large, and we question whether they can be attributed to negligible relative changes in tax rates, as described above. Although we remain cautious in making causal inferences at the municipal level with respect to the introduction of international regulations due to potential confounding factors (e.g., organizational learning or increased awareness of tax planning strategies), the pattern observed in figure 2b is noteworthy from a municipal finance point of view. The years 2020 and 2022, marked by the COVID-19 pandemic and energy crisis, adversely affected the German economy. According to figure 2b, 'always tax havens' appear to be relatively more impacted by these downturns compared to other municipalities, even after controlling for *state* \times *year* fixed effects. This suggests that profits arrive at these locations selectively, making havens more sensitive to global economic conditions.

We interpret these findings as indicative of profit shifting at the sub-national level. However, given that local taxes are endogenous to firm location choices (i.e., low taxes attract firms, and a high firm presence facilitates low taxes to sustain sufficient tax revenues), this may place firms located in German tax havens on a different growth path more generally. To determine whether the presence in local German tax havens is, on average, a substitute or complement to their international presence in a tax-favorable location, we need to compare corporations differentially affected by international tax regulation. This requires examining the legal ownership ties between entities at both national and international levels. Hence, we continue by analyzing corporate ownership structures around the introduction of several key anti-tax avoidance measures in section 4.2. Observing these differences in tax revenues underscores the relevance of examining the impact of international legislation at the sub-national level.

4.2 Outcomes for Corporate Groups

We investigate whether sub-national profit shifting acts as a substitute for international profit shifting among multinational corporations. Using the data on corporate firm networks, we estimate the models specified in equations 3 and 4 on our sample of entities active in Germany in 2015 (Panel B). The dependent variables are (1) an indicator equal to one if the corporation has at least one subsidiary in a sub-national tax haven in Germany and zero otherwise (extensive margin), and (2) the number of subsidiaries in sub-national tax havens (intensive margin). The regression results are presented in table 5. Columns 1-3 display the results for the extensive margin, columns 4-6 present the results for the intensive margin.

Concerning the extensive margin, we find that prior to 2015, around 2% of untreated corporate components were present in a German tax haven. There is no statistically significant change for the untreated components in the post-period. Corporations with revenues exceeding EUR 750 million have a 4 percentage points higher probability of maintaining an entity in a sub-national tax haven in the pre-period, corresponding to an increase of 246% ($\exp(1.24)-1$) as shown by the semi-elasticity in column 2. This probability does not change significantly in the post-period.

Having operations in international tax havens increases the likelihood of maintaining an entity in a sub-national tax haven by 1 percentage point compared to the baseline in the pre-period. Likewise, this effect does not exhibit significant changes in the post-period, as indicated by the coefficient on interaction 1 (β_4). Entities that are both large (revenues over EUR 750 million) and present in an international tax haven in 2015 are slightly less likely to have a presence in a German 'always tax

haven'. While the OLS estimate remains insignificant for this coefficient, the PPML estimation suggests a semi-elasticity of -30% ($\exp(-0.35)-1$). Importantly, the coefficient on the triple interaction term (β_7) is not statistically different from zero. This suggests that corporate components subject to increased scrutiny due to global anti-tax avoidance efforts did not significantly change their probability of establishing or ceasing presence in a sub-national tax haven in Germany compared to their peers. This qualitative assessment remains consistent when using the main PPML specification in column 3.

Table 5: DDD Results Panel B – Corporations with Footprint in Germany in 2015

	Extensive Margin			Intensive Margin		
	(1)	(2)	(3)	(4)	(5)	(6)
	Model 3	Model 4	Model 4	Model 3	Model 4	Model 4
Post (β_1)	0.00 (0.00)	0.02 (0.04)		0.01 (0.02)	0.19** (0.10)	
AboveThresh (β_2)	0.04*** (0.00)	1.24*** (0.10)		0.97*** (0.07)	3.26*** (0.37)	
Int.HavenFootp. (β_3)	0.01*** (0.00)	0.44*** (0.08)		0.12*** (0.03)	1.43*** (0.47)	
Interaction 1 (β_4)	0.00 (0.00)	0.03 (0.13)	0.02 (0.13)	-0.62*** (0.09)	-1.11** (0.54)	-1.20*** (0.32)
Interaction 2 (β_5)	0.00 (0.00)	0.08 (0.10)	-0.06 (0.11)	-0.05 (0.05)	-0.46 (0.52)	-0.74 (0.47)
Interaction 3 (β_6)	-0.00 (0.00)	-0.35*** (0.13)		-0.84*** (0.08)	-2.65*** (0.61)	
DDD (β_7)	0.00 (0.01)	-0.04 (0.18)	0.06 (0.18)	0.69*** (0.11)	1.49* (0.77)	1.64*** (0.57)
Constant (α)	0.02*** (0.00)	-4.06*** (0.04)	-0.26*** (0.02)	0.04*** (0.01)	-3.25*** (0.06)	2.71*** (0.06)
Observations	152,595	152,595	5,250	152,595	152,595	5,250
(Pseudo)R-squared	0.01	0.03	0.11	0.00	0.10	0.72
Unit FE	No	No	Yes	No	No	Yes
Year FE	No	No	Yes	No	No	Yes

Notes: This table reports the results from estimating equations 3 and 4 on the sample of corporate components with at least one entity located in Germany in 2015. Columns 1-3 present results for the extensive margin, while columns 4-6 present results for the intensive margin. Columns 1 and 4 show results from OLS regression, while columns 2 and 5 use PPML estimation without fixed effects. Columns 3 and 6 report PPML estimates, including unit (corporation) and time fixed effects. Standard errors, clustered at the unit (corporation) level, are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Turning to the results for the intensive margin (columns 4 to 6), our main coefficient of interest, the triple interaction term β_7 , is positive and statistically significant at conventional levels. The

positive coefficient of 0.69 (column 4) implies a relative increase in the number of subsidiaries in sub-national tax havens for corporate groups subject to both treatments in the post-period. This finding suggests a substitutive relationship between the use of sub-national and international tax havens on the intensive margin. This equals to a relative difference in semi-elasticities of 344% (column 5) or 416% considering the fixed effect specification (column 6), and is reflective of a difference in conduct by treated and control firms. Evaluated at average predicted outcomes (based on column 5), this corresponds to an increase (pre-post) in the number of entities from 3.8 to 4.6 for firms that both treatment categories apply to, to an increase from 0.91 to 1.1 entities for firms which have revenues over EUR 750 million in 2015 but did not main a presence in an international tax haven at that time.

We interpret the triple interaction term (β_7) in the intensive margin as evidence of a substitutive relationship between international and sub-national profit shifting for corporations subject to increased regulations. The set of feasible tax planning strategies in Germany is similar to those used internationally, and firms may face a trade-off in their choice of location-specific implementations of financing or licensing structures and the allocation of real economic activity. As long as international profit shifting is feasible, large firms may prefer it over purely domestic shifting due to the relative disadvantage of the latter (e.g., a statutory tax burden of at least 22.825% in Germany). However, as international shifting becomes more costly due to measures such as CbCR, these corporations may increase their sub-national shifting activities within Germany. Our findings indicate that this shift is evident on the intensive margin: corporations subject to more rigorous reporting requirements increase the number of subsidiaries in sub-national tax havens.

4.3 Discussion

Our analysis shows that firms differentially affected by recent international efforts to curb tax avoidance exhibit changes in behavior at the sub-national level. Specifically, firms subject to increased scrutiny due to new international regulations adjust their domestic footprint associated with profit-shifting activities. This finding highlights the local consequences of international developments in corporate taxation.

A limitation of our current analysis is that we are thus far unable to distinguish between real economic activity and paper profit shifting. Establishing an entity in a low-tax jurisdiction may involve genuine business operations and could reflect spatial sorting, where mobile firms locate in areas offering favorable tax conditions. From a welfare perspective, spatial sorting is not necessarily

undesirable, as it aligns with the inverse elasticity rule, wherein more mobile firms should face lower taxes. By offering different tax rates at the local level, Germany’s municipalities facilitate a form of tax competition that provides for this condition.

For example, SAP SE, a German multinational software corporation headquartered in Walldorf, a municipality classified as a sub-national tax haven, illustrates this phenomenon. SAP SE employs approximately 100,000 people worldwide. Walldorf has a population of around 16,000 inhabitants and one of the lowest local profit tax rates in Germany. As SAP SE’s business model is relatively mobile, the low tax rate may have influenced its decision to maintain significant operations in Walldorf. The existence of sub-national tax havens is thus not necessarily detrimental to tax revenues. It depends on the counterfactual. If the alternative for the very mobile firms is to relocate profits or operations entirely out of Germany, allowing for some degree of local tax rate discrepancies, i.e., increasing the local choice set for firms, could be advantageous after all. This, however, depends on the success of shutting down shifting that arises solely from local tax differentials and is tied to otherwise immobile business models within this economy.

For researchers, data on the profit and loss statements of entities purposefully excluded from fiscal unity is not available. One of the express reasons for this is that size-dependent reporting requirements, as outlined in § 267a of the German Commercial Code¹⁵ prevent publishing of profit and loss statements. This institutional detail explains why MNEs opt to register multiple legal entities in a tax haven. Generally, an increased number of entities may thus obfuscate what is happening at the level of each individual entity.

5 Conclusion

We investigate whether MNEs respond to international anti-tax avoidance measures by increasing sub-national profit shifting within Germany. By mapping ownership networks over time and leveraging geo-spatial analysis, we provide evidence that international regulatory tightening induces a shift toward domestic tax planning strategies. This behavior indicates substitution: Firms rely on similar organizational structures and institutional features within the domestic tax system that were previously used in international tax planning when faced with increased regulatory constraints at the international level.

¹⁵According to § 267a of the German commercial code in 2022 (2026), entities that do not exceed more than two of three following criteria are subject to less stringent reporting obligations: (a) balance sheet total exceeding EUR 350(450) thousand, (b) revenues exceeding EUR 700(900) thousand, and (c) more than ten employees on average during the last business cycle. By distributing activities across several small entities, firms can avoid comprehensive disclosure requirements.

Given the comparatively small tax advantage gained via domestic shifting, this finding is surprising. Sub-national shifting is less profitable for firms, hence it affects the effectiveness of international policies only lightly. However, the analysis reveals potential unintended consequences that have previously been disregarded. If the counterfactual to profit shifting is the relocation of real economic activity, the possibility of sorting or even shifting paper profits at the sub-national level for *mobile firms* may cushion against corporate groups relocating productive operations outside a respective domestic economy. In this sense, fiscal federalism and local variation in taxes on mobile capital may provide an adjustment margin by increasing the firms' choice set.

From a policy perspective, our findings underscore the interconnected nature of tax systems across different levels of government. Measures designed to curb international base erosion generate (unintended) sub-national consequences by intensifying domestic tax competition. Policy makers thus face a dilemma. On the one hand, preserving local tax rate autonomy may cushion against the relocation of real economic activity. However, maintaining tax rate variation requires complementary policies to limit purely paper-based profit shifting by *immobile firms* and to ensure that fiscal equalization mechanisms appropriately compensate municipalities that experience tax base erosion. On the other hand, harmonizing or restricting local tax variation strengthens the effectiveness of international reforms but could increase pressure on highly mobile firms to relocate productive functions altogether.

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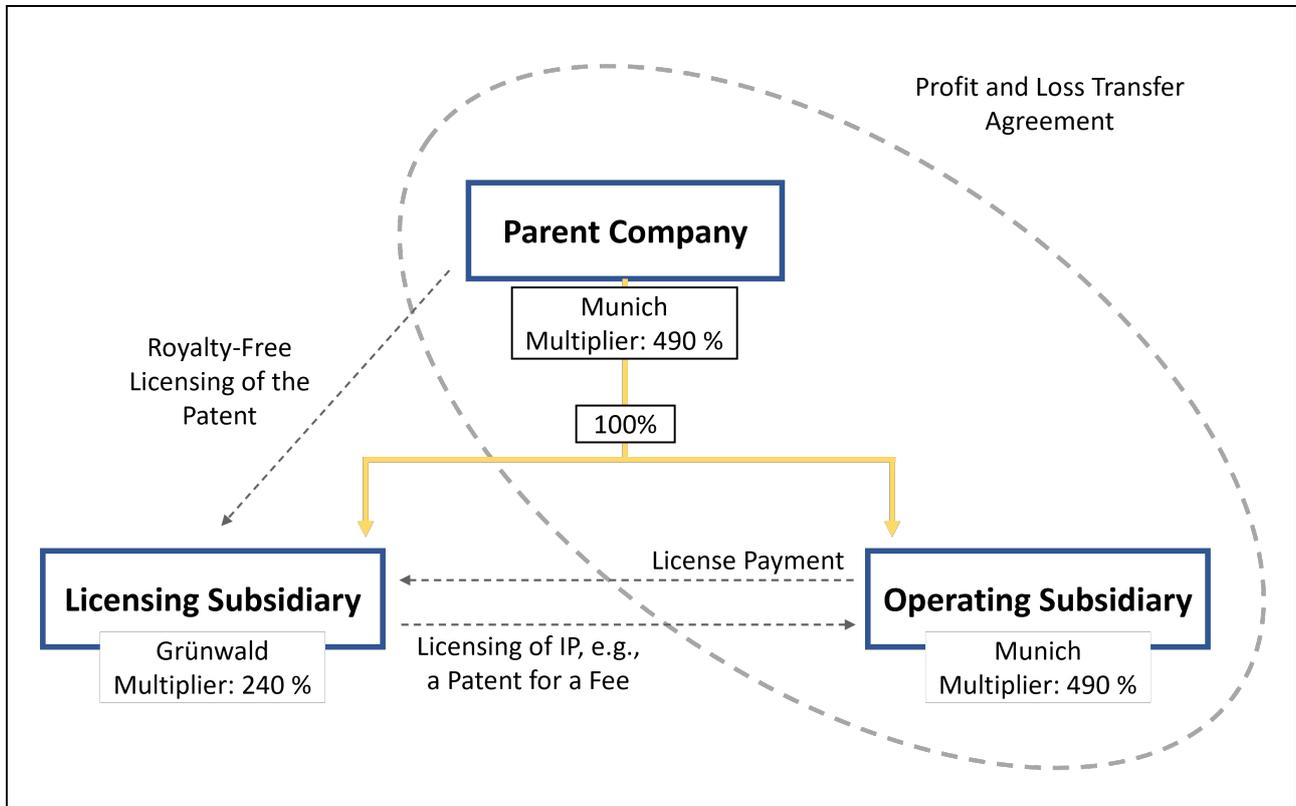
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Appendix

A Sub-National Tax Havens

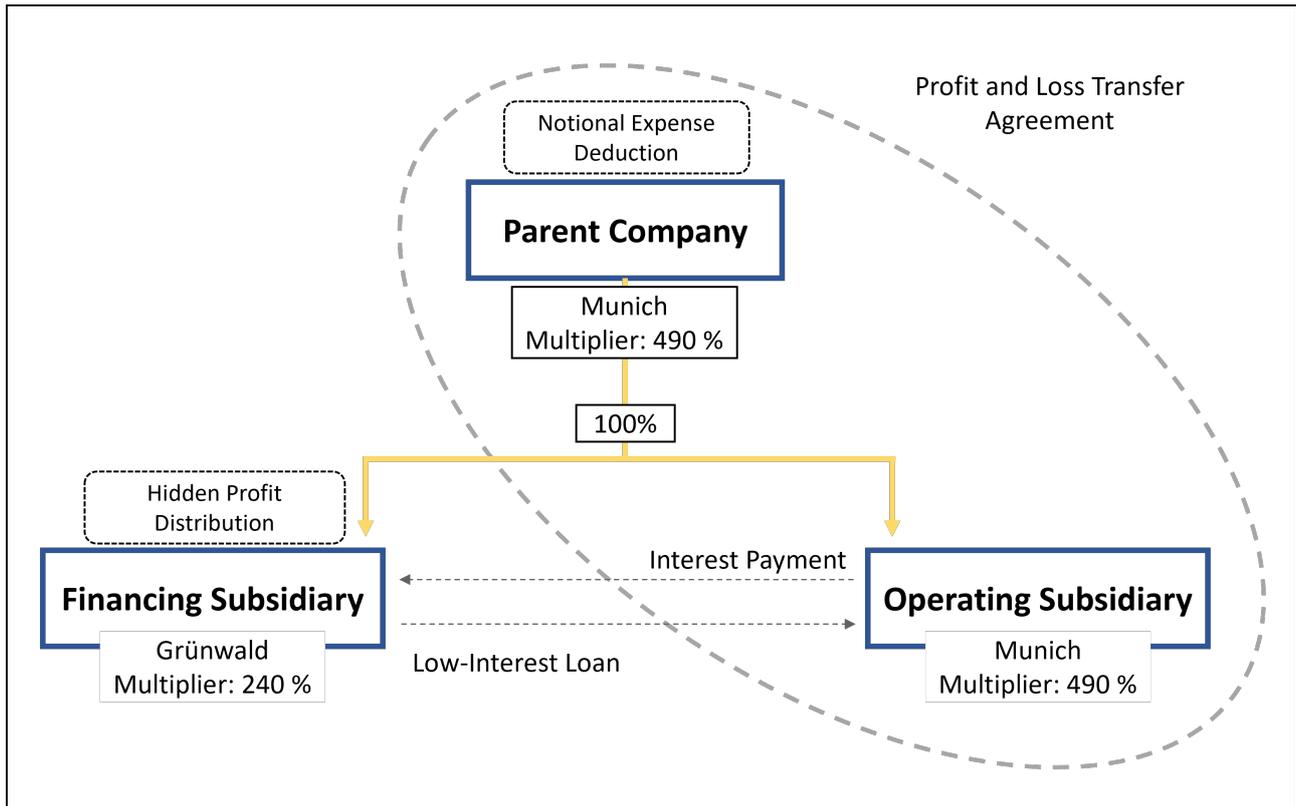
Figure A.1: Licensing Model



Notes: This figure illustrates a sub-national licensing structure in which a corporate group centralizes intellectual property in a subsidiary located in a low-tax municipality. Operating entities in higher-tax municipalities pay licensing fees, shifting taxable profits within the group. The licensing entity performs limited administrative functions and is not included in fiscal unity. See Neugebauer et al. (2020), figure 1.

Observable (from publicly available data) are: a) the entities and their respective location address, b) location characteristics (such as local tax rates), c) ownership links between corporate entities (yellow). Unobservable are: d) within company contracts, e.g., placement of patents and associated payments (dashed-grey lines), e) fiscal unity – as established through selectively including entities in the profit and loss transfer agreement (dashed-grey circle).

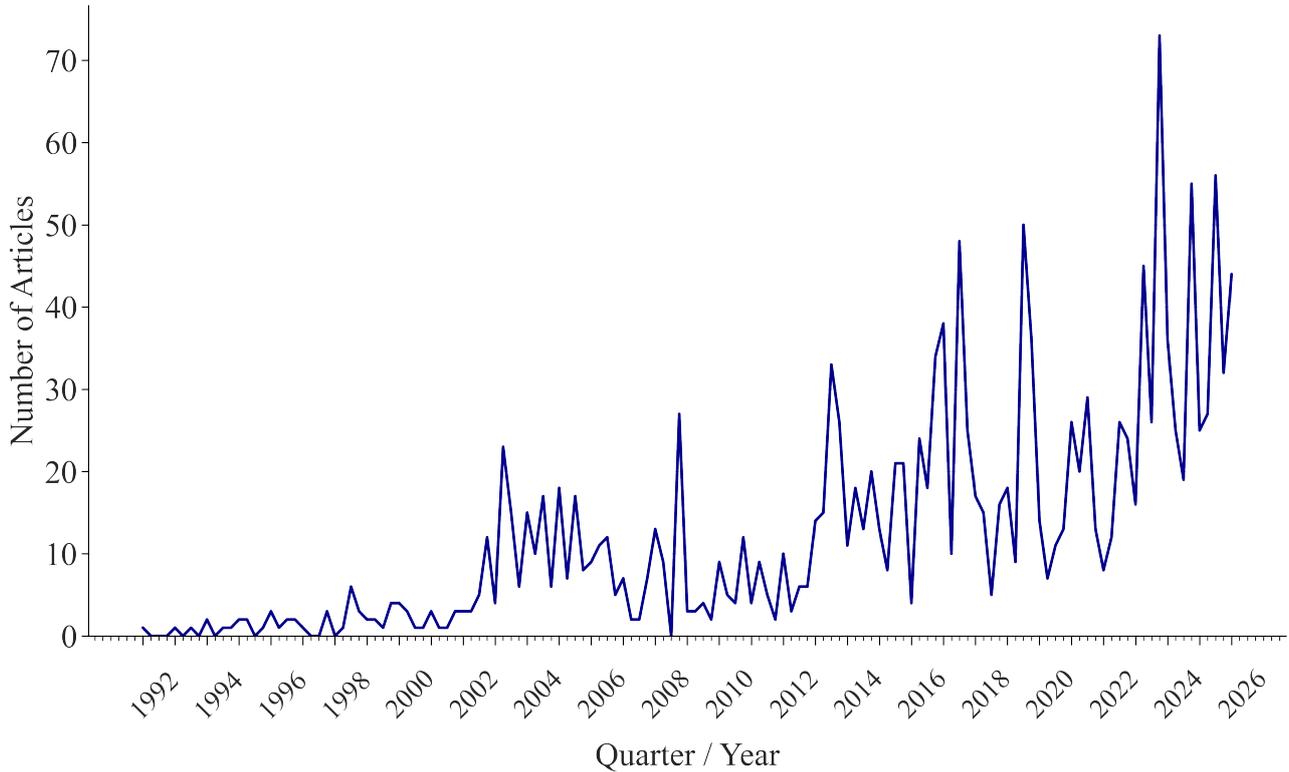
Figure A.2: Financing Model



Notes: This figure illustrates a sub-national financing structure in which a corporate group establishes a financing subsidiary in a low-tax municipality. The financing entity grants a below-market intercompany loan to an operating subsidiary located in a higher-tax municipality. Through the resulting income correction and the notional participation-related deduction at the parent level, profits equal to the market interest are shifted within the group. The financing subsidiary is deliberately excluded from fiscal unity to avoid payroll-based apportionment of financing income. See Kollruss et al. (2013); Neugebauer et al. (2020), figure 2.

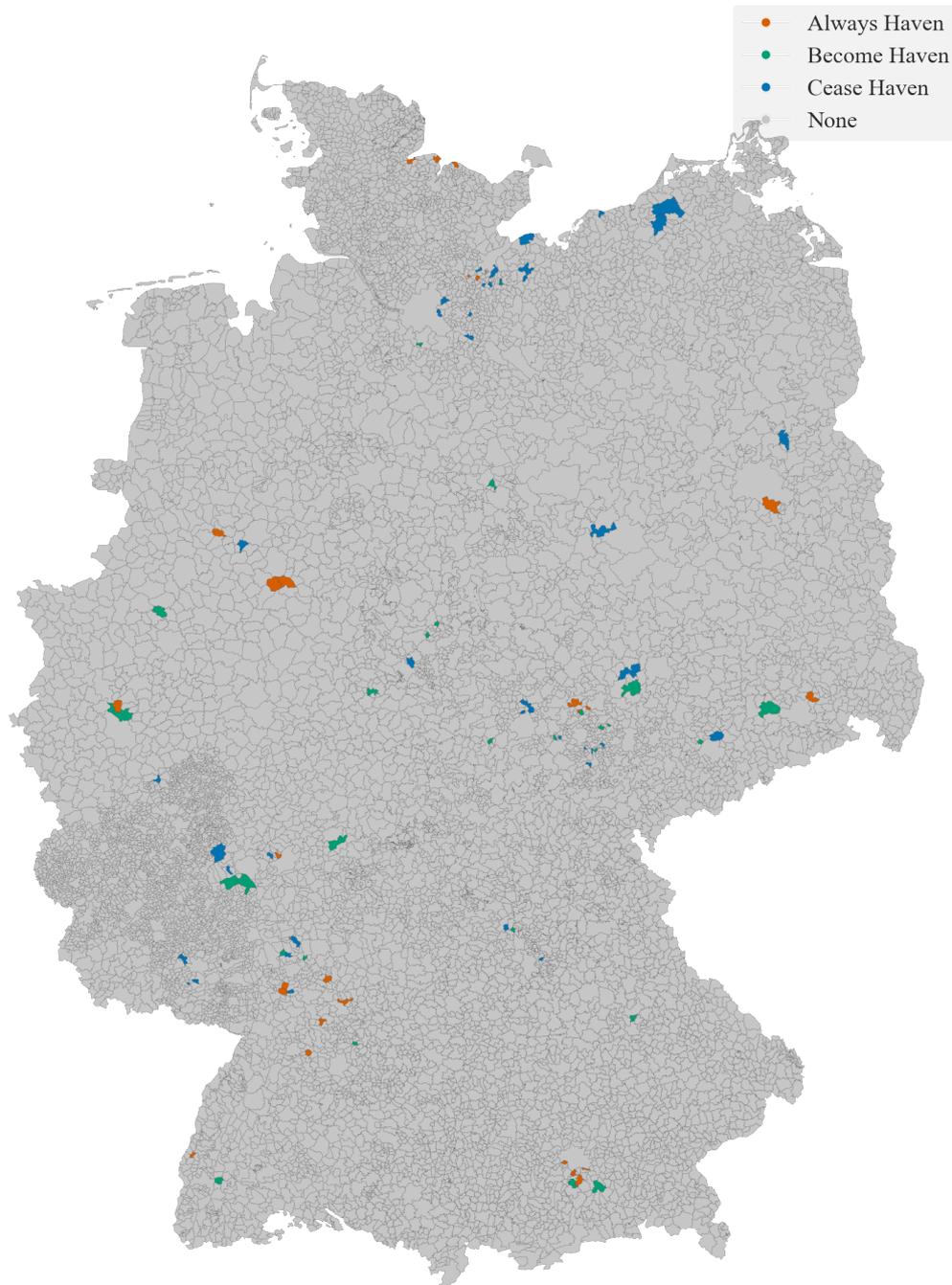
Observable (from publicly available data) are: a) the entities and their respective location address, b) location characteristics (such as local tax rates), c) ownership links between corporate entities (yellow). Unobservable are: d) within company contracts, e.g., financing arrangements (dashed-grey lines), e) fiscal unity – as established through selectively including entities in the profit and loss transfer agreement (dashed-grey circle).

Figure A.3: Media Coverage of Sub-National Tax Havens in Germany



Notes: This figure shows the coverage of German media on sub-national tax havens on the quarter / year level. The keywords included in the search on LexisNexis are: "Gewerbesteuer UND (Steueroase ODER Seuervermeidung ODER Steuerdumping ODER Niedrigsteuer ODER Steuerhinterziehung ODER Briefkasten ODER Kapitalflucht ODER Schlupfloch)" which translates to: "Local business tax AND (tax haven OR tax avoidance OR tax dumping OR low tax OR tax evasion OR mailbox company OR capital flight OR loophole)". The search was conducted in March 2026.

Figure A.4: German "Tax Havens" from 2010 to 2022



Notes: The figure shows the map of German municipalities in the municipal borders of 2022. We thus classify a municipality as a tax haven if it is located within 25 kilometers of a larger urban center and features a "lower" statutory tax rate. We consider statutory tax rates as "low" if they are more than two standard deviations below the average of all municipalities within a 50-kilometer concentric cluster surrounding the municipality in question. Colored in red are all municipalities that qualify as 'always tax havens' throughout 2010 to 2022 (set 1). Colored green (blue) are all municipalities that select into (out of) being tax havens at some point between 2010 and 2022. All other municipalities, as well as municipality-free areas (forests, swamps, and marsh land) are colored in grey. In particular, the sets contain the following municipalities, the administrative identifier is given in parentheses (*cont.*):

Notes (contd.): **Set 1 [N: 27¹⁶] – 'Always havens' (2010-2022):** Altenhof (01058004), Eberstedt (16071015), Eckartsberga, Stadt (15084125), Eschborn, Stadt (06436003), Forchheim (08316013), Großheringen (16071022), Gräfelting (09184120), Grünwald (09184122), Güglingen, Stadt (08125038), Hagen am Teutoburger Wald (03459020), Kastorf (01053061), Langenfeld (Rhld.) (05158020), Mönshheim (08236039), Neckarsulm, Stadt (08125065), Neubiberg (09184146), Oberhaching (09184134), Obrigheim (08225074), Pullach i. Isartal (09184139), Schloß Holte-Stukenbrock (05754036), Schönefeld (12061433), Schürensöhlen (01053114), St. Leon-Rot (08226103), Strande (01058157), Sössen (dissolved in 2011) (15084450), Verl (05754044), Wachau (14625600), Walldorf, Stadt (08226095), Wisch (01057088).

Set 2 [N: 30] – Switch from 'non-haven' to 'haven': Affalterbach (08118001), Aying (09184137), Bilshausen (03159005), Bokensdorf (03151004), Buchfart (16071009), Emleben (16067013), Gründau (06435012), Guxhagen (06634008), Gösen (16074025), Harmstorf (03353017), Hartmannsdorf (14522260), Heddesbach (08226027), Heddesheim (08226028), Ingelheim am Rhein (07339030), Klipphausen (14627100), Leverkusen (05316000), Lützen, Stadt (15084315), Mainz, kfr. St. (07315000), Mechow (01053088), Monheim am Rhein (05158026), Niedertrebra (16071064), Olfen (05558036), Rauschwitz (16074073), Röttenbach (09572149), Stegen (08315109), Straßlach-Dingharting (09184144), Tappenbeck (03151030), Waake (03159035), Waltersdorf (16074107), Zeitlarn (09375213).

Set 3 [N: 44] – Switch from 'haven' to 'non-haven': Bad Soden am Taunus, Stadt (06436001), Biesenthal (12060024), Blankenhagen (13072015), Braak (01062011), Bäk (01053004), Dissen am Teutoburger Wald, Stadt (03459015), Geisenhain (16074022), Gremsdorf (09572126), Grove (01053045), Groß Grönau (01053041), Groß Sarau (01053043), Groß Schenkenberg (01053044), Großrudstedt (16068021), Heidenrod (06439005), Hirschberg an der Bergstraße (08226107), Kalkhorst (13074037), Kiedrich (06439009), Kleinbockedra (16074046), Kulpin (01053078), Lausnitz b. Neustadt an der Orla (16075056), Leuna, Stadt (15088205), Lichtenau (14522330), Liebstedt (16071052), Marlow, Stadt (13073055), Mechelroda (16071055), Mörlenbach (06431017), Mörsdorf (16074059), Möser (15086145), Neu-Eichenberg (06636009), Niendorf bei Berkenthin (01053094), Nirmsdorf (16071066), Nöda (16068037), Oststeinbek (01062053), Rauenberg, Stadt (08226065), Rehna, Stadt (13074065), Sanitz (13072091), Schmalenberg (07340044), Schnakenbek (01053111), Schwaig b. Nürnberg (09574156), Schwedelbach (07335043), Stapelfeld (01062071), Steinalben (07340050), Weilerbach (07335049), Werningshausen (16068059), Windhagen (07138077), Wittenbeck (13072117).

¹⁶This excludes the municipality Sössen (15084450), which was dissolved in 2011.

B Supplementary Analysis

Table B.1: Mean Differences – Municipality Level - Weighted w. Inhabitants

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Tax Rate	Tax Rate	Tax Rate	Tax Rate	Tax Rate	Tax Rate
Haven (β_1)	-3.18***			-3.87***		
	(0.50)			(0.51)		
Post (β_2)	0.35***			0.31***		
	(0.02)			(0.04)		
Interaction (β_3)	-0.30	-0.27	-0.24	-0.26	-0.24	-0.23
	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)
Constant (α)	13.92***	14.14***	14.07***	14.61***	14.79***	14.76***
	(0.11)	(0.00)	(0.00)	(0.13)	(0.00)	(0.00)
Observations	119,891	119,832	119,810	35,759	35,744	35,722
R-squared	0.02	0.96	0.97	0.03	0.96	0.96
Unit FE	No	Yes	Yes	No	Yes	Yes
Year FE	No	Yes	No	No	Yes	No
State-Year FE	No	No	Yes	No	No	Yes

Notes: The table presents estimation results from weighted regressions, regressing tax rates of the local business profit tax on the indicators as given in estimating equation 2. Columns 1-3 compare 'always havens' to all other municipalities in Germany. Columns 4-6 restrict the sample to urban areas and only include municipalities within a 25 km radius of an urban agglomeration with more than 100,000 inhabitants. We estimate with different structures of fixed effects: Columns 1 and 4 are estimated without fixed effects, columns 2 and 5 with municipality and year fixed effects, and columns 3 and 6 with municipality and state×year fixed effects. Standard errors are clustered at the municipal level and are given in parentheses.

Table B.2: Municipality Level Outcomes over Time

	(1)	(2)	(3)	(4)
	Obs.	Mean Dep. Var.	Interaction (β_3)	Standard Error
Tax Revenues				
Prop. Tax A (Agricult.) [kEUR per Inh.]	119,385	0.02	-0.00	(0.00)
Prop. Tax B (Structures) [kEUR per Inh.]	119,699	0.11	-0.01	(0.00)
Gross Business Profit Tax [kEUR per Inh.]	119,810	0.37	0.71	(0.33)
Net Business Profit Tax [kEUR per Inh.]	119,810	0.31	0.72	(0.29)
Tax Rates				
Property Tax A – Agricult. [Multiplier]	119,805	331.81	-16.20	(4.40)
Property Tax B – Structures [Multiplier]	119,805	371.31	-20.77	(7.96)
Business Profit Tax [%]	119,810	12.59	-0.09	(0.11)
Income Taxes – (Will be reallocated)				
Income Tax Payers [N]	86,035	3,557.31	16.02	(58.39)
Sum of Income [kEUR]	86,003	143,470.07	23,622.84	(12,058.75)
Income Tax Collected [kEUR]	85,982	25,382.25	9,536.95	(4,773.14)
Proxy Local Activity				
Traffic Accidents [N]	119,810	32.37	4.06	(1.83)
Traffic Accidents w. Injured [N]	119,810	24.91	1.43	(1.08)
People Injured in Accidents [N]	119,810	31.93	1.89	(1.91)
People Killed in Accidents [N]	119,810	0.28	-0.00	(0.12)

Notes: The table presents coefficients and standard errors for regressing several different municipality-level outcomes on the framework described in equation 2. Column 1 shows the number of observations, column 2 the mean dependent variable over the whole sample, and column 3 the interaction term, i.e., the difference-in-difference between 'always havens' and other German municipalities in a pre- and post-comparison. Column 4 gives standard errors (clustered at the municipal level). The fixed effects structure is as given in equation 2, i.e., we estimate with municipality and state \times year fixed effects. At the time of calculation, data on income taxation is most recently available until 2020 for the municipal level.

Table B.3: DDD Results Balanced Panel B – Corp. with Footprint in Germany in 2015

	Extensive Margin			Intensive Margin		
	(1)	(2)	(3)	(4)	(5)	(6)
	Model 3	Model 4	Model 4	Model 3	Model 4	Model 4
Post (β_1)	0.00 (0.01)	0.05 (0.15)		0.00 (0.17)	0.07 (0.16)	
AboveThresh (β_2)	0.04*** (0.01)	0.96*** (0.17)		2.19*** (0.28)	4.21*** (0.40)	
Int.HavenFootp. (β_3)	0.02*** (0.01)	0.63*** (0.14)		0.46** (0.19)	2.70*** (0.57)	
Interaction 1 (β_4)	0.00 (0.01)	0.02 (0.24)	0.02 (0.27)	-1.37*** (0.40)	-1.02 (0.64)	-1.02*** (0.31)
Interaction 2 (β_5)	-0.00 (0.01)	-0.11 (0.20)	-0.11 (0.24)	-0.20 (0.27)	-0.58 (0.65)	-0.58 (0.54)
Interaction 3 (β_6)	-0.01 (0.01)	-0.51** (0.21)		-2.27*** (0.34)	-4.40*** (0.70)	
DDD (β_7)	0.01 (0.01)	0.15 (0.29)	0.15 (0.33)	1.58*** (0.48)	1.58* (0.92)	1.58** (0.62)
Constant (α)	0.02*** (0.00)	-3.73*** (0.10)	-0.40*** (0.08)	0.03 (0.12)	-3.41*** (0.12)	3.64*** (0.10)
Observations	21,072	21,072	1,836	21,072	21,072	1,836
(Pseudo) R-squared	0.01	0.03	0.12	0.00	0.10	0.79
Unit FE	No	No	Yes	No	No	Yes
Year FE	No	No	Yes	No	No	Yes

Notes: This table gives the results for estimating equations 3 and 4 on a balanced sample of corporate components that have at least one entity located in Germany in 2015. Columns 1-3 give results for the extensive margin; columns 4-6 for the intensive margin. Columns 1 and 4 show results for simple mean comparisons; columns 2 and 5 give results for a Poisson pseudo maximum likelihood model. For these approaches, we do not include any adjustments. Columns 3 and 6 show results from Poisson pseudo maximum likelihood models. Here, we include both unit and time fixed effects and cluster standard errors on the unit (corporation) level.



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