Consumption Taxes and Corporate Tax Planning - Evidence from European Service Firms

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Abstract:

Consumption taxes are a primary source of tax revenue in many jurisdictions. Exploiting a unique setting in Europe with 28 staggered and plausibly exogenous value-added tax rate changes, this study examines the effect of consumption taxes on corporate tax planning. We find that service firms report 0.5 percent less in sales if consumption taxes increase by one percentage point. Consistent with incentives for tax planning and economic theory, the effect is stronger for firms with greater discretion over where to pay value-added taxes and firms bearing a greater part of the tax burden. We then show that the extent and the channels of profit shifting depend on firms' responsiveness to consumption taxes, suggesting that consumption taxes place a constraint on corporate income tax planning.

Keywords: Consumption Taxes, Tax Planning, Profit Shifting

JEL Classification: H22, H24, H25, H32, M48

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1. Introduction

Consumption taxes are one of the most important tax policy instruments available to governments worldwide. In 2017, they accounted for more than 48 percent of U.S. state tax revenue and more than 50 percent of the European Union's tax revenue.[1] Prior research in accounting has focused on analyzing the effects of corporate income taxes on corporate decisions. However, firms are liable to pay multiple taxes - including consumption taxes that often exceed taxes on business income (Robinson, 2012; Dyreng and Maydew, 2018). Consumption taxes cause substantial cash outflows given that they are levied on gross sales. While governments collect consumption taxes with the intent to tax consumption (by final consumers), firms actually pay and regularly bear part of the tax burden and might therefore have an incentive to minimize these taxes (Poterba, 1996; Fullerton and Metcalf, 2002) or reduce output because of lower expected profits (Jacob et al., 2018). However, consumption taxes are an understudied non-income tax that is likely to affect a wide range of business decisions (Shackelford and Shevlin, 2001; Dyreng and Maydew, 2018). This paper investigates to what extent firms strategically report sales in order to avoid consumption taxes and whether such behavior explains cross-sectional differences in corporate income tax planning.

Understanding the effects of consumption taxes on firms' decision-making, as well as the interplay of consumption and profit taxes, is crucial for evaluating tax policy (Robinson and Slemrod, 2012) and for tax management decisions (Scholes and Wolfson, 1992). If firms bear part of the tax burden, consumption taxes constitute a cost factor and reduce firms' surplus. We study firms' strategic sales reporting behavior in order to minimize this tax burden. Abstracting from illegal tax evasion, firms in Europe may respond to this tax burden in principally two ways. First, multinational enterprises (MNEs) with firms in different countries can strategically report a higher share of sales in countries with lower VAT rates if the location of incorporation - and not the location of the customer - determines the applicable VAT rate (as is the case for B2C service transactions) (Fox et al., 2014). Second, firms might decrease their output and capital demand due to a lower expected surplus (Jacob et al., 2018). Motivated by the notion that avoidance comprises "*all transactions that have any effect on the firm's tax liability*" (Hanlon and Heitzman, 2010), we identify firms' responses to consumption taxes and link it to subsequent income tax-motivated profit shifting.

We study the European setting where individual firms are obliged to remit value-added taxes (VAT) as a percentage of sales at every step of the value chain on behalf of their customers. In contrast to

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[1] U.S. data are available at https://www.census.gov/data/tables/2016/econ/stc/2016-annual.html. Tax revenue of the European Union excludes social security contributions, see http://ec.europa.eu/eurostat/statistics-explained/index.php/Tax_revenue_statistics#Main_tables.

U.S. sales taxes, VAT are also due on business-to-business (B2B) transactions and transactions between affiliated companies. At the same time, firms receive a credit for the VAT on inputs acquired from other businesses. Firms can deduct this credit from VAT remitted such that only the value-added is taxed. The VAT is then effectively a consumption tax because final consumers (individuals) cannot claim an input tax credit. In contrast to the simple notion that final consumers bear the consumption tax, economic theory and empirical evidence suggest that the tax burden may partially fall on firms (Poterba, 1996; Christensen et al., 2001; Kenkel, 2005; Kosonen, 2015; Jacob et al., 2018).

A major empirical challenge for identifying causal effects of consumption taxes on firm behavior is that policymakers intentionally change tax rates depending on economic conditions (Vegh and Vuletin, 2015; Jacob et al., 2018). Thus, a negative association between consumption taxes and firms' reported sales might not reflect consumption tax planning behavior but unobserved associations between macroeconomic developments and firms' reporting choices and potential levels of output. We address this challenge by exploiting 28 plausibly exogenous VAT rate changes in both directions in several countries in the sample period of 2007-2015. In order to rule out that endogeneity of tax policy is driving our results, we employ several stringent fixed effects structures that account for the correlation between tax rates and economic conditions. We further show that VAT tax policy is not systematically correlated with economic conditions and does not generally coincide with income tax rate reforms. We also confirm the validity of the common trends assumption and provide evidence that firms did not anticipate VAT rate changes. We thereby construct a favorable setting for identification where the staggered tax rate changes can be exploited in a generalized difference-in-differences research design (Heider and Ljungqvist, 2015; Jacob et al., 2018).

We use a large panel of unconsolidated firm-level financial data from the Amadeus database provided by Bureau van Dijk. Our focus on service providers in the European market offers a unique ground for investigating the effects of direct (income) and indirect (consumption) taxation on MNEs' tax planning decisions for several reasons.[2] First, economic policy is largely harmonized in the European market. Thus, other policy factors should not confound the analysis. Second, the European market is characterized by open borders in particular with regards to services. As a result, service providers can freely locate employees and assets as well as generate cross-border sales within the EU. Third, consumption taxes play a more significant role in the service sector due to proximity to final consumers (Robinson, 2012). Fourth, there is substantial variation in EU countries' tax policy despite the EU's efforts to

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[2] For the remainder of this paper, we use the terms income and direct taxation and consumption and indirect taxation interchangeably. In Europe, consumption taxation takes on the form of a value-added tax (VAT). The *indirect* nature of the tax refers to the mechanism that firms are liable to pay the tax although consumers are subject to the tax.

ensure a minimum standard of tax harmonization. In our sample, CIT rates varied from 10% in Bulgaria to 38.93% in France in 2015. VAT rates ranged from 17% in Luxembourg to 27% in Hungary.

We begin our analysis by documenting that firms' output decreases when VAT rates increase. We test the relationship between VAT and firms' reported output while controlling for unobserved, time-invariant firm characteristics such as firm-specific productivity attributes, the general level of consumer price elasticity a firm faces, or its propensity towards tax planning. We also control for time-variant consumer price levels and inflation in order to isolate the response attributable to consumption tax planning from consumer market and macroeconomic effects that might be correlated with tax policy. On average, firms' output, measured by reported sales, decreases by 0.5 percent if VAT rates increase by one percentage point.

In cross-sectional tests, we provide evidence for the two potential drivers of this negative relationship. In these tests, we control for unobserved variation over time at the country-level such as economic shocks and other policy changes. First, MNEs that have discretion over where to pay VAT can report sales where VAT rates are relatively low to maximize after-tax cash flows. Such VAT planning opportunities are available to firms offering B2C and especially digital B2C services. These firms' services sales are taxed in the country of their incorporation (origin principle) and not where consumers are located, which is the general rule (destination principle). Consistently, firms offering digital services react particularly strongly to VAT changes. This finding suggests that these firms indeed exploit a competitive advantage (through higher after-tax sales) over non-digital businesses that cannot engage in such consumption tax planning (OECD, 2017a, p. 13). We also find that the overall sum of sales of a group of firms that also offer digital services is less affected by VAT increases if the group is multinational. This result indicates that firms strategically shift sales across countries between affiliated firms to exploit low VAT rates.

Second, firms might reduce output if they expect a lower marginal profit due to the additional tax burden following a VAT increase. We find that the reaction to VAT rates is present for B2C firms, which are always liable to the VAT in their country of incorporation and possibly face more elastic demand due to their proximity to end customers. There is no effect for B2B and intra-group service firms, whose business customers always receive an input tax credit and thus should not be demand elastic with respect to VAT changes. We further show that firms' consumption tax responsiveness varies with a firm's relative size in the industry, a proxy for its market share that is typically associated with a lower elasticity of demand. These findings are in line with economic theory that firms facing a

greater effective tax burden due to higher levels of consumption tax incidence should react stronger to VAT rate changes.

Our second research question leverages that MNEs also have incentives to engage in income tax-motivated profit shifting, i.e., to report higher (lower) pre-tax profits at the firm level in countries with lower (higher) CIT rates (e.g., Huizinga and Leaven, 2008; De Simone, 2016). Given that sales are one key determinant of pre-tax profits, strategically reporting sales in response to consumption taxes influences the extent to which pre-tax profits can be shifted in order to minimize overall corporate income taxes. Thus, firms' consumption tax planning behavior might be one explanation for the heterogeneity in corporate income tax planning. Tax managers indeed state that VAT considerations affect transfer pricing decisions, which drive effective profit shifting strategies (Ernst & Young, 2013).[3] In general, consumption taxes exhibit a more substantial cash outflow than income taxes given that VAT are charged on a gross basis (on revenue) at rates between 17 and 27 percent in our sample countries in 2015. Also, consumption taxes are relevant even if a firm is not profitable and thus does not pay income taxes. Therefore, firms might forgo income shifting opportunities if the consumption tax burden can be minimized instead.

We therefore test whether firms alter their profit shifting behavior if they strategically report sales in response to consumption taxes. The negative relationship between corporate income taxes and MNE firms' reported profits is well-documented.[4] However, only a few studies examine whether firms aim to minimize both income and non-income taxes (Robinson, 2012) or whether they alter their profit shifting behavior if conflicting incentives between income tax rates and customs duties arise (Swenson, 2001; Blouin et al., 2018). Since taxable corporate profits are the difference between sales and costs of goods sold, manipulating sales as the value-added tax base might constrain the flexibility to react to income tax incentives. We thus hypothesize that there is a trade-off between firms' consumption tax and corporate income tax planning objectives.

We first replicate established profit shifting models (in particular Huizinga and Laeven, 2008, see also De Simone et al., 2017) and document profit shifting behavior of our sample firms in the range of prior estimates. We then construct a measure of the firm-specific VAT sensitivity with respect to reporting sales and include this measure as an interaction term with the income tax incentive in the analysis of profit shifting. Consistent with our hypothesis, results indicate that profit shifting behavior is reduced

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[3] In the setting of our study, for instance, regulations for both types of taxes overlap such as Articles 72 and 80 of the European VAT directive referring to the arm's length principle for determining tax bases just as the existing international transfer pricing regulation does (OECD, 2017b).

[4] See, e.g., Hines and Rice (1994); Huizinga and Laeven (2008); Dharmapala (2014); De Simone et al. (2017). See Heckemeyer and Overesch (2017) for an overview.

to an insignificant level if firms' reported sales are negatively associated with VAT rates. We document that firms' ability to shift income in order to optimize income taxes seems to be constrained if they strategically report sales in response to consumption taxes. We show that only firms that do not report lower sales in response to higher VAT rates appear to engage in income tax-motivated profit shifting suggesting that consumption tax planning places a constraint on profit shifting opportunities. At the same time, firms facing such constraint appear to exploit interest expenses as a profit shifting mechanism more extensively. This finding suggests that firms forgo profit shifting opportunities due to consumption tax considerations. It also suggests that firms compensate lost tax savings via more excessive intra-group debt financing, which is one explanation for firms' choice between profit shifting channels and the strategic use of debt identified in prior literature (Desai et al., 2004; Huizinga et al., 2008; Heckemeyer and Overesch, 2017).

Our study offers several contributions. First, we extend prior research that mostly investigates the effects of direct and indirect taxation on corporate behavior separately. To the best of our knowledge, we are the first to investigate whether and to what extent consumption taxes influence firms' reported output.[5] We identify two mechanisms underlying this behavior. First, firms exploit consumption tax planning opportunities. Second, firms may bear part of the consumption tax incidence, which causes them to decrease output (Jacob et al., 2018). The relative magnitude of firms' average output response to consumption taxes is similar to that of firms' profit response to income taxes as extensively documented in prior work. However, the absolute effects are economically much more significant as VAT are levied on gross sales. Since we provide novel evidence on the interplay of profit and consumption taxes and firms' respective planning behavior, we answer the call to study the interaction of a tax system's different features and their effect on corporate decision-making comprehensively (Robinson and Slemrod, 2012; Dyreng and Maydew, 2018). Our findings thus add to the ongoing policy debate on the design of tax systems building on consumption versus income taxation.[6]

Second, we go beyond existing approaches in the profit shifting literature and integrate consumption taxes in our analysis because they are one crucial tax-related cost factor to MNEs (Robinson, 2012; Dyreng and Maydew, 2018). In the vein of De Simone (2016), De Simone et al. (2017), Beuselinck

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[5] While Jacob et al. (2018) find that firms' reduced profitability is one mechanism underlying firms' investment response to consumption taxes, we examine this mechanism and potential drivers directly by looking at firms' reported output.

[6] For instance, a cash-flow tax in the form of an international consumption tax was heatedly debated as an alternative to corporate income taxation in the U.S. (Auerbach et al., 2017). Furthermore, there is an ongoing discussion about whether introducing a value-added tax would increase the competitiveness of the U.S. tax system while serving as a stable source of tax revenue (e.g., Graetz, 2016). See also Hubbard (1997) for a discussion of differences between income and consumption taxes.

and Pierk (2018), and Blouin et al. (2018), we provide a more nuanced view on profit shifting incentives and constraints. Prior studies focus either on tariffs, customs duties, or on indirect taxes in general (Swenson, 2001; Blouin et al., 2018; Robinson, 2012). We study the specific effect of value-added taxes that apply to nearly every single output-related transaction of a firm. We conclude that firms consider both income and consumption taxes in their tax planning strategies and that there is a trade-off when aiming to minimize the respective tax burdens. Overall, our results indicate that firms' responsiveness to consumption taxes might explain why some firms appear not to engage in income tax-motivated profit shifting (Hanlon and Heitzman, 2010; Dharmapala, 2014).

Our insights have direct policy implications. We deliver evidence that digital service firms make use of a competitive advantage stemming from consumption tax planning, potentially adding to the European Commission's estimated annual loss in VAT of € 147 billion that only captures tax fraud (European Commission, 2017a, 2018b). We note that digitalization is not necessarily associated with more aggressive profit shifting behavior but might be of greater relevance for minimizing consumption taxes. We thereby inform the debate on whether aggressive tax planning is *exacerbated* in the digital economy (OECD, 2015). Further, our results suggest that consumption-oriented tax systems, which leading economists promote as being neutral (e.g., Auerbach et al., 2017), are not the solution to all problems attributed to tax planning behavior under profit taxation.

Finally, the insights of this study are relevant to corporate decision-makers and financial managers for at least two reasons. First, our results suggest that both consumption taxes and income taxes affect corporate reporting choices at the (affiliated) firm level. Both types of taxes thus seem to influence earnings management across unconsolidated financial accounts of business groups (Beuselinck et al., 2018). Since the respective, tax-motivated financial outcome measures are often used internally by managers, they might affect performance evaluation and real decision-making (Sansing, 2014; De Simone et al., 2018). Second, strategically reporting sales at the firm level to maximize tax benefits can be one channel through which an MNE's corporate and financial complexity increase and transparency problems become more severe (Balakrishnan et al., 2018).

The remainder of the paper is organized as follows. In section two, we elaborate on the institutional background and derive our hypotheses. Further, we revisit prior literature on consumption taxes and income tax-motivated profit shifting. In section three, we describe our research design and the data. In section four, we present the results of our empirical tests. Section five concludes.

2. Institutional Background, Related Literature, and Hypotheses

2.1 Value-added Taxation of Service Providers in Europe

For a vast number of countries, consumption taxes are the most relevant type of tax and the principal instrument of raising tax revenue. In the European Union as the setting of our study, VAT account for € 1,044 billion in tax revenue compared to taxes on corporate income of € 391 billion in 2016 (Eurostat, 2018a). Value-added taxation is largely harmonized in the EU. Legislation on EU level defines the place of supply of goods and services (i.e., where firms have to remit the tax) and other features of the system, such as the debtor of the tax and the mechanism of remittance. Member states, however, are free to choose the applicable VAT rate with a minimum threshold of 15 percent. As of 2015, our last sample year, VAT rates in the EU varied considerably between 17 and 27 percent. VAT are due on every sale of a company. The vendor firm has to remit the tax independently of the nature of the transaction and the legal form of the buyer such that value-added taxes are collected on every stage of the value chain. In the case of business-to-business (B2B) transactions, the buyer as a business itself is granted a credit equal to the VAT due on the purchase of inputs and can deduct this credit from future tax remittances in connection with sales (input tax credit). In the case of business-to-consumer (B2C) transactions, the VAT becomes final at the stage of the consumer who is supposed to bear the ultimate burden of this type of consumption tax.[7]

Technically, the place of supply of services determines the tax liability and, thus, which country's VAT rate applies to the sale. Different place of supply rules apply depending on the type of goods or services sold and the legal status of the customer. In the EU VAT system, the place of supply generally follows the destination principle. According to this principle, VAT are due in the country where the final consumer is located and enforcement is comparable to sales taxes in a U.S. cross-state context (Fox et al., 2014). Consequently, exports are zero-rated and imports are taxed at the importing country's rate. Many B2C services including digital services, however, are taxed where the supplier is established (origin principle).[8] In such cases, firms are liable to pay VAT in the country where they are incorporated which creates a tax planning opportunity for MNEs with several affiliated firms. We exploit this differential treatment in our cross-sectional tests.

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[7] Figure OA. 1 in the Online Appendix illustrates the VAT collection and remittance process. The mechanism of collection and remittance presents the main difference between the EU VAT and U.S. sales tax system (Slemrod, 2008).

[8] For B2B services, the place of supply used to follow the origin principle until 2009, (Article 44 of Directive 2008/8/EC). The destination principle applies to B2C services such as advertising services, services of consultants and lawyers, financial services, telecommunications services, broadcasting services and electronically supplied services provided to customers established in a non-EU country (Article 59 of Directive 2008/8/EC). For the full list of exceptions, see Articles 46-50 and 53-57 of Directive 2006/112/EC.

2.2 Consumption Taxes, Corporate Decisions, and Tax Planning

Consumption taxes drive a wedge between the price consumers pay and the price producers receive. The incidence of consumption taxes, i.e., the extent to which firms or consumers carry the burden of this wedge, depends on the relative elasticity of supply and demand (Fullerton and Metcalf, 2002). A full pass-through of the consumption tax burden to the final consumer only occurs when demand is fully inelastic. In contrast, if consumers are perfectly elastic,[9] the firm bears the full burden of the tax and its net-of-tax output will be lower than in a world without consumption taxes. Several empirical studies focus on specific product markets and show that firms partially bear the consumption tax burden which is attributed to consumers' price elasticities not being fully inelastic or supply not being fully elastic (Poterba, 1996; Besley and Rosen, 1999; Kenkel, 2005).

While consumption taxes do not directly affect net income, they affect profitability indirectly via their impact on the consumer demand curve. If a firm bears part of the tax burden, the VAT constitutes a cost to the business. The consequence is a lower surplus for firms to the extent of the unshifted tax burden and the incentive to avoid consumption taxes (Christensen et al., 2001; Fox et al., 2014). When firms expect a lower return, output should be negatively associated with consumption taxes already in a setting without any tax planning opportunities. Firms might report lower output when facing higher VAT rates given the return decreases since net prices must be adjusted downwards if the consumption tax burden is not entirely shifted to consumers (Jacob et al., 2018).

The example in Figure 1 illustrates the impact of a firm's VAT incidence. Assuming that company B sells a good at a net price of 200 and is located in a country with a VAT rate of initially 20% and the rate now increases to 30%, the company can increase the price proportional to the VAT increase. The gross price would then be 260 (net price 200 plus 60 VAT) if consumers were fully inelastic. In this case, the consumer bears the full burden of the VAT increase, and company B's net of VAT-profit is 100 (=260-60 less an input price of assuming 130 plus the input tax credit of 30). If, however, consumer demand was perfectly elastic, company B would not be able to increase the price after the VAT increase and will still only charge a gross price of 240 which includes VAT of 55.38 (=(240/1.3)*30%). B then realizes a net profit of only 84.62 (=240-55.38-130+30). As a result, company B expects lower profits after the VAT increase and might adjust output accordingly.

In a cross-border context, where tax planning incentives arise from cross-border differences in VAT rates, MNEs can manipulate reported output in order to minimize consumption taxes. The different

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[9] Studies on consumers' purchasing behavior document that consumers are sensitive to consumption taxation (Goolsbee, 2000; Einav et al., 2014; Ellison and Ellison, 2009; Anderson et al., 2010; and Baugh et al., 2018).

place of supply rules result in different tax consequences for the respective service companies. When the origin principle is applied, i.e., when firms are liable to VAT in the country of their incorporation, consumption tax planning opportunities exist. If an MNE has firms in different countries and has flexibility at which firm to realize and report sales, as it is, for instance, the case for digital B2C services, it can exploit a financial advantage from reporting sales in countries with lower VAT rates.[10]

In principle, sales reported in financial statements are assumed to be relatively non-manipulable since the location of (final) consumers is fixed (Dyreng and Markle, 2016). Given an MNE has an affiliated firm in a specific market country, sales should thus be reported in the same country where the consumers are located. However, an MNE may report cross-border service sales at any affiliated firm located in a country other than the consumer's location and be taxed at the applicable VAT rate in that other country if the origin principle applies. The firm reporting those sales only has to be the contracting partner of the consumer (in terms of invoicing). Especially firms offering B2C services of digital nature (services delivered electronically or online) can make use of their flexible business models and report sales from remote transactions in low VAT jurisdictions. Regulators have acknowledged this tax planning channel and therefore opted to enforce the destination principle for digital B2C services in 2015.[11]

There is anecdotal evidence that especially multinational digital service providers report sales primarily at the level of their European affiliated firms in low VAT rate countries in order to sell their services in the European market at more competitive prices. Amazon used to channel the majority of its internet transactions through its European sales branch Amazon EU SARL, incorporated in Luxembourg providing VAT rates of 3% on electronic books and 15% on other services.[12] The literature on the U.S. sales tax setting suggests that U.S. electronic retailers (e-tailers), in contrast to brick-and-mortar businesses, avoid a taxable nexus when consumption taxes rise (Bruce et al., 2015) and thus generate financial benefits (Hoopes et al., 2016).

Overall, the evidence on the incidence of consumption taxes partially falling on firms and the tax planning incentives arising in the European VAT setting leads to our first hypothesis.

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[10] Even firms that should be taxed according to the destination principle might benefit from this tax planning channel since enforcement of the destination rule is considered problematic for both digital B2C services (in force since 2015) and B2B supplies (OECD, 2017a, p. 13; Hellerstein, 2016; Lamensch, 2016; Agrawal and Fox, 2017).

[11] Article 58 of Directive 2008/8/EC. Digital services provided by service providers established in a third country (non-EU) to private consumers have been taxed according to the destination principle since 2003 (Article 58 of Directive 2008/8/EC).

[12] The Court of Justice of the EU repealed the excessively low rate in March 2015 forcing an increase in Luxembourg's VAT rate on all revenue from digital services to 15%. See the media coverage of Amazon and its sale of ebooks through Luxembourg (The Guardian (online) 23 May 2015).

H1: The reporting of sales by MNEs' affiliates in the service sector is negatively associated with the value-added tax rate in the respective jurisdiction.

2.3 Tax-motivated Income Shifting

International taxation of corporate profits follows the separate entity principle which makes taxable profits of an MNE's affiliate in a given country dependent on transfer prices for intercompany transactions. These transfer prices must conform to the arm's length principle (De Simone, 2016; OECD, 2017b). Since income tax rates differ widely across countries, MNEs have an incentive to employ transfer pricing strategies within the range of the arm's length principle such that pre-tax profits of an MNE's group of affiliates are primarily reported in low tax countries. Starting from the results in Huizinga and Leaven (2008), the European setting has been used to study MNEs' income shifting behavior. Some recent studies in the accounting literature explicitly examine different incentives for profit shifting behavior across firms. De Simone (2016) finds that the adoption of IFRS is associated with stronger tax-motivated profit shifting possibly because a broader set of benchmark prices is available to defend transfer prices in tax audits. De Simone et al. (2017) specifically focus on loss-making affiliates. They provide evidence that MNEs manipulate transfer prices to shift operating profits from profitable firms to unprofitable firms located in other countries to make use of a tax shield from netting profits with losses within the same MNE.

Inferring from the extant literature on income tax-motivated profit shifting that documents a negative association of MNEs' reported profits and corporate income taxes, we conjecture that MNEs active in the service industry are also sensitive to corporate income tax rates. Given that prices at arm's length are often difficult to observe for services and intangible assets (OECD, 2017b; De Simone et al., 2017), we expect that service suppliers have leeway to shift profits across locations and we expect to confirm results of prior empirical investigations (see Heckemeyer and Overesch (2017) for a consensus estimate).

Evidence on the cross-sectional differences such as constraints in MNEs' income shifting opportunities is limited. We specifically study whether income tax-motivated profit shifting behavior depends on firms' sensitivity towards consumption taxes. Research on tax planning behavior of firms facing opportunities to optimize multiple types of taxes payable is scarce. Swenson (2001) is the first to document that firms aim to reduce non-income taxes (specifically tariffs), which in turn alters their transfer pricing strategies used to minimize direct taxes. Robinson (2012) examines non-income taxes (including consumption taxes), their determinants, and the relation to income tax planning and tax compliance. She conjectures that firms who engage in income tax avoidance may also be prone to avoiding

non-income taxes. She documents a positive empirical association between income tax planning activities and non-income taxes paid.

In a recent study, Blouin et al. (2018) investigate U.S. MNEs' cross-border transfer pricing strategies and model that transfer prices determine not only the corporate income tax base but also the tax base for import duties. Optimizing the MNE group's income tax liability would require charging a high transfer price from the U.S. to the importing country if the importing country's tax rate is high. At the same time, this strategy might be adverse if the importing country charges high import duties. For firms facing such a constraint, Blouin et al. (2018) document less tax aggressive transfer prices. This finding is consistent with a substantial fraction of firms (21 percent) surveyed by Ernst & Young indicating that they consider customs issues in their transfer pricing strategy. Even more firms (27 percent) state that VAT considerations affect their transfer pricing decisions (Ernst & Young, 2013).

Similar to Blouin et al. (2018), we argue that income tax-motivated profit shifting is less pronounced when firms integrate the incentive to minimize consumption taxes. The intuition is that an MNE's affiliate might have generated and reported sales in order to manage VAT (active tax avoidance in the international setting) or in response to an increased tax burden (tax incidence). The level of sales is the single most important precursor of pre-tax profits. As consumption tax considerations might drive the decision to report sales, this reporting choice might not be optimal from a transfer pricing perspective. As a result, the opportunities to shift profits out of high CIT rate or into low CIT rate countries are smaller. Profit shifting becomes more costly (and requires more aggressiveness) under consumption tax planning since all remaining profit shifting activity rests on the cost side of internal trade. We therefore hypothesize the following.

H2: The negative association between reported pre-tax profits and income tax rates is attenuated for firms with a higher consumption tax rate sensitivity w.r.t. reporting sales.

3. Research Design and Data

3.1 Sales Reporting and Consumption Taxes

We begin our empirical investigation with affiliates' sales reporting behavior in response to VAT. We draw on the industrial economics literature, which examines the input productivity of labor and capital assets to create value added (measured as reported sales) (see Cardona et al. (2013) for an overview). The function relates output (measured by sales) to input in the form of labor, capital assets and country-specific economic conditions (GDP, indexed consumer price level, and inflation rate) in the form of a transformed Cobb-Douglas production function. In the vein of Brynjolffson and Hitt (2003), who add computer capital stock as an input variable next to common capital stock and labor, we augment this

empirical specification by including the value-added tax rate (*VAT*) as a potential explanatory variable of sales in equation (1).

(1) $LogSales_{it} =$

$\alpha_0 + \alpha_1 VAT_{it} + \alpha_2 CIT_{it} + \alpha_3 Multi_i * VAT_{it} + \alpha_4 Multi_i * CIT_{it} + \alpha_5 Ttc\_c_{it} + \alpha_6 LogPexp_{it} + \alpha_7 LogAssets_{it} + \alpha_8 LogGDP_{it} + \alpha_9 LogConsPrice_{it} + \alpha_{10} Inflation_{it} + FE + \varepsilon$

All variables are defined in Table 1. We analyze reported sales, measured as the natural logarithm of sales, *LogSales*, on the affiliate level. Our tax measures as the variables of interest are the country-year value-added tax rate, *VAT,* and the country-year corporate income tax rate, *CIT*. The other independent variables reflect firm and country characteristics. Our proxy for labor is the natural logarithm of personnel expenditure, *LogPexp*. To proxy for capital, we use the natural logarithm of total assets, *LogAssets*. We measure the gross domestic product (GDP) as the natural logarithm of GDP per capita in current prices, *LogGDP,* provided by the Worldbank. *LogConsPrice* refers to the natural logarithm of comparative (indexed) consumer price levels for the total service sector at the country level and *Inflation* refers to the country-specific rate of inflation, both available from Eurostat. Since compliance is considered a significant burden of the consumption tax system (European Commission, 2016), we also include a proxy for the compliance cost, measured as the time to comply in hours per year, Ttc_c_t, provided by the Worldbank and PwC.

We employ firm fixed effects to account for unobserved firm-specific characteristics that are constant over time such as firm-specific productivity attributes, the consumer price elasticity a firm faces, or its propensity towards tax planning. We further use year fixed effects to control for time trends causing differences in the level of reported sales. This fixed effects strategy leads to an identification of firms' response to consumption taxes in a generalized difference-in-differences setting through tax rate changes over time (Heider and Ljungqvist, 2015). We also include the CIT rate (*CIT*) to control for any income tax-motivated sales reporting behavior. We cluster standard errors at the affiliate level. Our main coefficient of interest in equation (1) is α_1, which accounts for the response of firms' output to changes in the value-added tax rate. We expect a negative sign of the coefficient since we conjecture that a firm's output negatively reacts to VAT rate increases.

Our research design relies on the identifying assumption that a change in the level of an affiliate's reported sales is caused by the VAT rate change in a given country and not by other confounding factors that might be associated with this change in tax policy. A primary concern could be that the conjectured negative association is driven by unobserved variation in economic conditions that are likely to affect tax policy rendering the variation in VAT rates endogenous (Vegh and Vuletin, 2015;

Jacob et al., 2018). To mitigate this concern, we exploit 28 changes in VAT rates in opposite directions, at different points in time, and across different countries. This setting of staggered tax policy changes provides for treated and untreated countries throughout the sample period. Since we focus on affiliates in the European Union only, we are confident to observe changes in reported sales caused by VAT rate changes since the group of untreated affiliates in countries without tax rate changes serve as counterfactuals facing similar economic conditions as we control for a country's GDP (see, e.g., Heider and Ljungqvist, 2015).

We conduct a battery of tests confirming the validity of the parallel trends assumption and suggesting that macroeconomic conditions do not systematically influence VAT policy. We discuss the respective results in the robustness section. Further, our events of interest (VAT policy changes) are not contaminated by contemporaneous income tax policy changes.[13] We include indexed consumer price levels as a control variable to mitigate the concern of omitted, time-varying characteristics of consumer markets and to disentangle the changes in reported sales attributable to firms' response to VAT from consumer market effects. Another concern would be that an MNE's affiliate location choice is endogenous, leading to a sample selection bias. We assume a firm's group structure and affiliate locations are fixed in our setting in which firms exploit tax changes via managing tax bases since firm-group boundaries change slowly and can be considered exogenous in the short term (Khanna and Yafeh, 2005).

To further substantiate any effect of consumption taxes on firms' output, we employ a more stringent model in subsequent analyses including country-year fixed effects. This strategy accounts for any time-varying shocks that might be heterogeneous across countries and affect tax policy and firm output simultaneously. It further rules out potentially correlated omitted variables that are related to other within-country tax planning opportunities (Beuselinck and Pierk, 2018). Since this type of fixed effects absorbs year-by-year VAT changes, we cannot identify a baseline effect of VAT on sales. Instead, we interact the VAT rate with the cross-sectional indicators to validate our baseline result. Any significant difference should be the result of cross-sectional differences in VAT incidence or tax planning behavior.

3.2 Profit Shifting in the Presence of Consumption Taxes

To test our second hypothesis, we empirically examine whether income tax avoidance via profit shifting is affected by a firm's sensitivity to VAT with respect to reporting sales. We address this question by first analyzing a firm's sales reporting behavior, which ultimately affects the level of pre-tax profits

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[13] See Table OA. 4 as well as Table OA. 4 and Table OA. 5 in the Online Appendix.

reported from a financial accounting perspective. We construct a VAT sensitivity measure that captures the firm-specific association between VAT and reported sales. We derive this measure by running a regression based on equation (1) (excluding interaction terms) with VAT interacted with the firm-level fixed effects vector.[14] The firm-specific VAT sensitivity is then the point estimate for a firm's fixed effect interacted with VAT. The result is multiplied by -1 and labeled *S* (for *sensitivity*). Given our estimation procedure, we assume *S* to be constant throughout our sample period. A positive value for *S* thus indicates a negative relationship between VAT rates and firms' reported sales. This measure operationalizes our notion of a firm-level consumption tax sensitivity.

We then augment established profit shifting models in the tax and accounting literature by including the firm-specific VAT sensitivity (*S*) as an explanatory variable and interact it with the CIT rate. In particular, we adopt the model developed by Hines and Rice (1994) and Huizinga and Laeven (2008)[15] to estimate the effect of the CIT rate on affiliates' reported profits. We analyze reported pre-tax profits by earnings before interest and taxes (EBIT, pre-tax income), measured as the natural logarithm of EBIT, *LogEbit*, at the affiliate level. In additional tests, we use other outcome variables to examine different profit shifting channels (debt and transfer pricing). Our specification includes year and firm fixed effects. We employ firm fixed effects to control for unobserved variation at the affiliate level that might influence tax responses and financial reporting choices.[16] Thus, we cannot report an estimate on the baseline effect of *S*. We further include year fixed effects to control for unobserved variation over time that affects all affiliates in the sample equally. Our coefficient of interest in equation (2) is β_3, which accounts for the differential effect of *CIT* on *LogEebit* depending on the level of the firm-specific VAT sensitivity with regards to sales reporting. We expect a positive sign of the estimate since we conjecture that profit shifting behavior is attenuated when firms are sensitive to VAT when reporting sales ($\beta_3 > 0$).

(2) $LogEbit_{it} =$

$\beta_0 + \beta_1 CIT_{it} + \beta_2 VAT_{it} + \beta_3 S_i * CIT_{it} + \beta_4 S_i * VAT_{it} + \beta_5 LogPexp_{it} + \beta_6 LogAssets_{it} + \beta_7 LogGDP_{it}$
$+ FE + \varepsilon$

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[14] This fixed effects regression including interaction is implemented in Stata using the high-dimensional fixed effects regression (*reghdfe*) estimator by Correia (2016).

[15] Similar empirical specifications providing evidence consistent with income tax-motivated profit shifting are also used by De Simone (2016) and Blouin et al. (2018). We use the CIT rate at face value in contrast to the tax incentive variable put forward by Huizinga and Leaven (2008) since we do not include non-service affiliates of the MNE groups in our sample and we investigate the VAT-motivated sales reporting behavior separately. Calculating the Huizinga and Leaven (2008) tax incentive variable, however, would require including reported sales which we show to be driven by VAT rates.

[16] Our preferred specification deviates from other traditional models such as the one of De Simone (2016) and Blouin et al. (2018) in that we replace industry by firm fixed effects to ensure profit shifting responses to CIT changes are not driven by any omitted, time-invariant firm characteristics that are not absorbed by industry-specific factors.

3.3 Data, Sample Selection, and Variable Definitions

We use financial information on the affiliate level of MNEs over the period 2007 to 2015 from the Amadeus database provided by Bureau van Dijk to empirically test our hypotheses.[17] The database provides unconsolidated financial statement and ownership information for independent and affiliated European firms as well as a detailed industry classification (4-digit NACE Codes).

Our sample consists of active subsidiaries (affiliated firms of a group of companies) in the service industry. We categorize service affiliates according to the respective NACE Rev. 2 codes.[18] We download financial information from Amadeus for affiliates in the service sector with unconsolidated financial accounts, ultimately owned by a global parent, and with information on reported sales and total assets in at least one of the years from 2013 to 2016. We further limit the sample to firms with available information on sales and personnel expenses or the number of employees for the year 2015. To cover only firms with at least some tax planning opportunities, we drop observations with less than € 500,000 in sales and at least € 10,000 in total assets and personnel expense. We further drop observations for which total shareholder funds are negative in all years (this eliminates especially small firms), which have a missing or above 1 leverage ratio (insolvent firms), with EBIT over sales margins of greater 1 or smaller -1, and which have an effective tax rate of greater than 100 percent or smaller than -100 percent (implausible observations). Since we complement our tests of consumption taxes on firms' output with an analysis on the MNE-group level, the regressions use observations on affiliates which we can link to an MNE-group based on its global ultimate owner (GUO). Further limiting the sample to affiliates in EU member states and with positive values for EBIT yields 316,900 affiliate-year observations on 78,954 unique affiliates with 63,958 unique GUOs.

4. Empirical Results

4.1 Descriptive Statistics

Table 2 reports summary statistics of the regression analyses. Our sample of 316,900 affiliate-year observations has average sales of € 20.92 million and EBIT of € 1.85 million over the period 2007-2015. The sample firms report average personnel expenditures of € 4.36 million and total assets of € 28.99 million. In Table 3, we provide a correlation matrix that includes all relevant variables. The correlation between *VAT* and *Sales* is negative (-0.031), suggesting that *VAT* is negatively associated

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[17] Coverage for 2016 is low due to the time lag of including available financial data in the Amadeus database.

[18] We include firms operating in the services industry with their main activities in one of the following classifications based on NACE Rev. 2 codes: 454, 461, 479, 49, 50, 51, 52, 53, 58, 59, 60, 61, 62, 63, 69, 70, 71, 73, 74, 77, 78, 79, 80, 81, 82, 8559, 90, 91, 92, 93, 95, 96. For a detailed description of industry segments, see European Communities (2008). We therefore require industry classification (NACE) code to be available in the data.

with output and thus providing some preliminary support of our first hypothesis. The correlation between *CIT* and *Ebit* is negative (-0.008), indicating that firms report lower pre-tax profits in countries with higher corporate income tax rates.

The average CIT rate amounts to 31.01% and the average VAT rate across country-years is 20.60%. Table OA. 4 in the Online Appendix shows the CIT and VAT rate changes in percentage points over the period 2007 to 2015 for our 24 sample countries. In total, we observe 72 staggered tax rate changes providing a favorable setting for identification. However, we exploit only 65 tax rate changes in our empirical analysis due to limited data availability in the panel data.[19] We document 4 cuts and 24 increases of the VAT rate and 31 cuts and 6 increases of the CIT rate. Changes in the VAT and CIT rate occur in different years, in different countries and in opposite directions. Hence, the tax rate changes are staggered in time across countries.

We are confident to capture the majority of service providers generating sales to external parties in Europe when comparing the total sales of affiliates classified as offering information and communications services (NACE 58-63) in our sample to the consolidated statistics for this segment provided by Eurostat (2018). Table OA. 2 in the Online Appendix shows that our dataset captures a larger amount of sales than the consolidated statistics of Eurostat that, for instance, has no information on services sales in Ireland. We thus believe our sample to be representative of the European service sector. However, the larger amount of aggregated sales in the sample might also be driven by us capturing intra-company sales (sales from services offered to other firms of the same group).

4.2 Sales Reporting and Consumption Taxes

Baseline Results

Table 4 reports the results of estimating service firms' sales reporting response to VAT rate changes (equation (1)). All specifications in Table 4 include firm and year fixed effects. Column (1) in Table 4 first reports results of estimating a standard production function. Intuitively, the coefficients on *LogPexp*, *LogAssets*, and *LogGDP* are all positive and significant. The negative and significant coefficient on *LogConsPrice* suggests that reported sales decrease in consumer price levels (elasticity of around 0.23) hinting at a moderately elastic consumer demand. In other words, higher consumer prices translate into lower output (firms' sales) if they face non-zero demand elasticity. Changes in consumer

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[19] See the notes to Table OA. 4 in the Online Appendix for more details.

prices should capture consumer-market effects of VAT rate changes. Any direct effect of *VAT* on reported sales should thus be attributable to firms' consumption tax response. The positive and significant coefficient on *Inflation* suggests that an increase in overall price levels also inflates sales.

Consistent with our first hypothesis, we find a statistically significant and negative association of service affiliates' reported sales and value-added tax rates across all specifications. In our preferred specification (column (3)), we also control for the CIT rate and the coefficient estimate of the VAT rate is significant at the 1% level. The result indicates that a one percentage point increase in the VAT rate is associated with a reduction in affiliates' reported sales of 0.52 percent. Recent evidence on investments and consumption taxes suggests that multinationals bear less of local taxes (Jacob et al., 2018). In line with this evidence, we find that firms' sales response to *VAT* is attenuated for firms with a foreign parent when including the interaction of *VAT* (and *CIT*, respectively) and an indicator variable *Multi* that takes on the value of one if a firm is owned by a foreign parent (column (4)).[20] Interestingly, the significantly negative effect of the CIT rate on reported sales is driven by foreign-owned firms, which suggests that these MNEs anticipate a higher income tax burden (or a higher cost of shifting profits out of the affiliate) when reporting higher sales.[21]

Mechanisms of Consumption Tax Planning: Cross-sectional Tests

The institutional background in the EU provided firms with the opportunity to engage in consumption tax planning through reporting sales in locations with lower VAT rates when firms provide services in the B2C sector including digital services.[22] One important characteristic of digital service providers is the flexibility of their business models and how they distribute their services, which is enabled by technology and digital platforms (Amit and Zott, 2001; Barrett et al., 2015). Digital service firms (e.g., online gambling or streaming platforms) are particularly flexible in their way of accessing markets via the internet without having a physical presence in each country (Agrawal and Fox, 2017; European Commission, 2017b) and should thus be capable of exploiting opportunities for VAT planning. With digital services being taxable in the origin country, digital service providers can realize higher after-VAT sales and profits when reporting sales in jurisdictions with a lower VAT rate as illustrated in Figure OA. 2 in the Online Appendix (see also Lamensch, 2017). Firms in the digital service industry

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[20] The coefficients are jointly significant (p<0.01), while the sum of the coefficients is not significantly different from zero at conventional levels (p=0.101).

[21] The coefficients are jointly significant (p<0.01) and the sum of the coefficients (-0.3096) is significant (p<0.01).

[22] Especially in the globalized and increasingly digitalized economy, both direct and indirect taxation are a pressing concern of policymakers but empirical evidence on the associated tax challenges is very scarce (European Commission, 2014, 2018a; OECD, 2015, 2018). See also Olbert and Spengel (2017) for an overview.

should thus react particularly strongly to VAT changes when reporting sales to make use of this competitive advantage.[23]

We use an indicator variable *Digital* equal to one if the affiliate is active in one of the digital service industry segments. We focus on industries in which non-physical, electronic service activities are likely to be provided in the B2C sector. Digital B2C services include online publishing services such as e-books, online games, online gambling, web portals and music and video streaming or other content downloads. We focus on NACE codes within information and communications services (NACE 58-63), renting of videos and tapes (NACE 7722), gambling and betting activities (9200) and other services that are likely to be provided via the internet (see Table OA. 3 in the Online Appendix).[24]

Column (5) of Table 4 reports results of our first test exploring the mechanisms of the effect of *VAT* on output of digital firms. We find a significantly stronger effect for the subset of digital service providers.[25] Given a statistically significant coefficient of around -1.23 on the interaction term, the negative association between reported sales and *VAT* more than doubles for affiliates providing digital services. A one percentage point increase in VAT rates is associated with a decrease in service affiliates' reported sales of around 1.66 percent. These findings are consistent with the expectation that affiliates of digital service providers have a strong incentive to report sales in low VAT rate countries by exploiting the planning opportunities stemming from differentials in consumption taxation.[26]

Next, we further investigate the heterogeneity in the consumption tax response depending on the nature of sales that drives consumption tax planning incentives. We use indicator variables that split the sample based on industry classifications. In these tests, we resort to country-year fixed effects to control for unobserved variation in economic conditions or policies at the country-level that may be correlated with VAT changes. Using this econometric approach, we can only estimate the coefficient on the interaction between cross-sectional industry indicators and the *VAT* rate. Applying the firm fixed effects

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[23] Although the VAT is an item in transit and, thus, does not appear on a firm's financial statement, the competitive advantage of VAT planning through sales reporting in low VAT countries is twofold. On the one hand, firms can charge lower gross consumer prices while still generating the same net revenue. On the other hand, charging equal gross prices generates higher net sales (Christensen et al., 2001; Hoopes et al., 2016). See Figure OA. 2 in the Online Appendix for a simple calculation of the competitive advantage of cross-border digital over domestic digital service providers.

[24] Manual screening of this sample revealed that we cover prominent affiliates of MNEs that offer digital services such as video streaming, gaming, and online gambling or running online platforms such as search engines and marketplaces. According to our industry classification, approximately 9 percent of the service provider affiliates in our sample offer digital services and thus generate sales through online channels.

[25] The coefficients are jointly significant (p<0.01) and the sum of the coefficients (-1.6622) is significant (p<0.01).

[26] The findings relate to the analysis of newspaper articles on U.S. firms by Agrawal and Fox (2017) finding that digital firms have reduced both VAT and CIT liabilities by reporting tax bases in low tax countries. Fox et al. (2014) document that companies in the online sector actively avoid consumption taxes in the U.S. market.

structure as in equation (1), however, yields comparable results suggesting that our baseline specification successfully controls for unobserved variation in economic conditions and regulatory policies across countries.

We report results in Table 5. As a baseline, we report the average effect excluding industry interactions in column (1) of Table 5. First, we corroborate the finding that firms active in the digital services sector are more responsive to VAT (column (2)). Second, we classify affiliates in the non-digital B2C services sector that are presumably highly exposed to end-consumers and could face a substantial part of the VAT burden falling on them in case end-consumers are price-sensitive. For example, Jacob et al. (2018) find that firms with a lower distance to consumers in the value chain reduce investment more strongly after consumption tax increases. Further, those affiliates are always liable to VAT in the country of their incorporation (origin principle) which provides another reason why they should be more sensitive to VAT changes in their country. We denote those B2C affiliates by *B2C_non-digital*. Results are reported in column (3) and show that B2C firms react more negatively to VAT rate increases, consistent with our expectation for these firms to face higher levels of consumption tax incidence. Theoretically, the application of the origin principle offers them leeway to engage also in consumption tax planning. However, given the less flexible business model and the necessity to be closer to customers (as firms can rarely deliver physical services remotely), VAT planning is probably not the underlying mechanism driving the results for non-digital B2C service providers.

We then create a proxy for affiliates providing services primarily in the B2B sector and argue that these firms should respond less to consumption taxes. We expect no VAT effect on output for B2B service providers since any VAT payment is always refunded at the service-receiving firm level and, thus, does not translate into an ultimate financial burden making it worthwhile to engage in consumption tax planning. Technically, any consumer of a B2B service receives a VAT input credit and the VAT payment on that sale, both to external B2B consumers or to another firm of the same MNE, does not translate into an ultimate financial burden. Yet, the liability to remit VAT by the vendor constitutes an adverse cash effect as it is a significant cash outflow. However, Rozema (2018) argues that firms along the B2B supply chain bear some of the consumption tax incidence and that market power among the agents along the supply chain determines the relative magnitude of this burden. We apply this reasoning to our example of company B in Figure 1. Carrying part of the VAT burden means that company B is less profitable and consequently will either reduce output or try to reduce its input costs. Reducing the input costs may be possible either by changing production factors or by further passing on the VAT burden. That is, company B could demand a lower price for its input materials it receives from company A, which depends on the relative market power compared to company A. Ultimately,

the burden would be passed on to the B2B retailer company A. We therefore consider the reaction of B2B service firms an empirical question. We classify B2B service affiliates based on their industry classification including agents of sale, wholesale, transportation of freight and storage, among other (NACE segments 46, 49, 50, 52, 77 (except 7722), 78, 81, and 82), and denote them *B2B*. Results are reported in column (4) of Table 5 and show that for B2B service affiliates in our sample, VAT increases are not associated with a negative response in firms' reported sales given that the coefficient estimate on the interaction of *B2B* and *VAT* is significantly positive.

We then conduct a cross-sectional test based on an indicator variable that identifies firms that most likely offer a high share of services intra-group. If our sample firms offer intra-group services to another affiliate of the same MNE, they should have no incentive to engage in consumption tax planning for two reasons. First, such a transaction constitutes a B2B transaction through which the buyer receives an input tax deduction for the VAT remitted by the seller. Second, a group of companies can apply for joint filing in many countries, which allows firms to only remit VAT on sales to external parties. We derive a proxy for intra-group service sales using information on the parent firm. We assume affiliates provide intra-group services if the parent firm is a manufacturing firm. We make this assumption whenever the ultimate parent firm does not have an industry classification as a service provider itself nor as a holding company. We denote these affiliates by *Intra-group*.[27] Consistent with VAT on these services being refunded within the same MNE group, column (5) of Table 5 finds a positive coefficient on the interaction between *Intra-group* and *VAT*.

Collectively, the results from the cross-sectional analyses support our hypothesis on firms' output being negatively affected by consumption taxes and the mechanisms underlying this behavior (that is, tax incidence and consumption tax planning). Our baseline result of a VAT semi-elasticity of around 0.5 might be the lower bound of the true effect for service firms for two reasons. First, the baseline results capture B2B and intra-group sales that, in isolation, do not exhibit a negative response to VAT changes. Second, in case B2C services are free-of-charge and sales are generated by other B2B transactions such as advertisements (i.e., like in the Google business model), we again would include B2B sales in our estimations for which VAT is not an ultimate financial disadvantage. Thus, these concerns should bias against finding significant results regarding the association between VAT and reported sales based on the baseline specification.

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[27] Examples of affiliates providing intra-group services include e.g., Mercedes-Benz G GMBH (AT), whose parent is classified as a manufacturer of motor vehicles (NACE 2910) and Newell Rubbermaid UK LIMITED (GB), whose parent is classified as a manufacturer of plastic products (NACE 2229).

In additional tests, we consider economic theory suggesting that consumption tax incidence depends on the relative elasticity of supply and demand. The consumption tax responsiveness should thus vary across firms facing different levels of demand elasticity. To test this phenomenon, we rerun our cross-sectional tests based on the industry interactions and include a proxy for demand elasticity. Similar to Jacob et al. (2018), we argue that a firm's share of total assets can be a proxy for its market share and thereby for the size of a firm's output market and its market power. Firms with a higher market share may act as price setters and face less elastic demand. We find that the negative effect of consumption taxes on firms' reported sales is attenuated for firms with a relatively high market share consistent with those firms facing less elastic demand. In contrast to the overall effect of the average sample firm, we find that digital service firms and B2C firms are more responsive to VAT if they have a high market share (significant and negative coefficient on the triple interaction). We interpret this result as evidence for more opportunities to gain a competitive advantage from engaging in consumption tax planning through sales reporting given their bigger size (and thus, sales). These firms have more opportunities to exploit the origin principle, i.e., to report sales at affiliates that face relatively lower VAT rates. Empirical results are reported Table OA. 9 in the Online Appendix.

Additional Tests: Group-level Analysis

We employ a separate test to corroborate that our findings are driven by MNE firms' consumption tax planning considerations regarding the origin principle (digital and B2C firms) and the incidence of the tax burden (all firms). If firms respond to changing incentives from VAT, they might shift reported sales from one country to another country if they have this arbitrage opportunity. Two forces can drive such behavior. First, selling to customers in a different country becomes relatively more profitable if the VAT rate increases in a given country where the affiliate selling to local customers bears part of an increased VAT rate. Second, digital and B2C firms might exploit the origin principle in response to a VAT rate change in a given country and sell to the same customers from a different location with a more attractive VAT rate. In both cases, we would expect the sum of all affiliated firms' sales to remain constant if these international consumption tax opportunities exist. Domestic service groups, however, are affected by the changes in VAT rate with no (short-term) reporting strategies other than adjusting output in the opposite direction of the VAT change.

We replace the dependent variable of the firm-level analysis by the aggregate, group-wide sales. *Log-Groupsales* is the sum of reported sales of all affiliates in the sample that belong to the same group of firms in a given year. For this analysis, we restrict the sample to firm-year observations for which we observe at least two affiliates belonging to the same MNE. The indicator variable *Intl* distinguishes

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between domestic groups and MNEs within the sample that are incorporated in different countries. We use *LogGroupsales* as the dependent variable and augment equation (1) by interacting *VAT* with *Intl*. The baseline results (column (1) of Table 6) confirm our main results and show that the group-wide sales are negatively associated with VAT rates for domestic groups. The highly significant and positive coefficient on the interaction term of *VAT* and *Intl* is consistent with our expectation that service MNEs engage in consumption tax planning through shifting reported sales. This result also suggests that multinationals bear local taxes to a lesser extent (consistent with the finding in column (4) of Table 4). The positive sum of the baseline coefficient on *VAT* and the interaction term of *VAT* and *Intl* suggests that MNEs increase output in locations with relatively lower VAT rates to a greater extent than they decrease output in locations where VAT rates increase.

We again extend this analysis and account for a differential behavior of firms within the four industries (*Digital*, *B2C_non-digital*, *B2B*, and *Intra-group*) and employ a more conservative estimation approach using country-year fixed effects. Column (2) confirms our result for the baseline effect that aggregated sales of international groups do not change or even overcompensate in response to VAT rate changes. Columns (3) to (6) report the cross-sectional results. We can only document a differential behavior for the group of digital service firms,[28] which corroborates the finding that digital firms shift reported sales to a firm located in another country when the VAT rate in the market location increases.

4.3 Profit Shifting in the Presence of Consumption Taxes

Profit Shifting and Consumption Tax Planning

In a preliminary test of whether consumption tax planning and corporate income tax-motivated profit shifting behavior are interrelated, we investigate whether firms anticipate the effect that consumption tax planning has on the corporate income tax base. Sophisticated corporate tax planners might be aware of the fact that consumption tax planning places a constraint on exploiting profit shifting opportunities given that reported sales directly map into pre-tax profits. In particular, they might evaluate the benefits of responding to value-added taxes via reporting sales against the potential costs of subsequent income taxation driven by the applicable CIT rate.[29] If this is the case, an increase in the VAT rate should not invoke a negative sales response if the level of (subsequent) income taxation is relatively low. Accordingly, firms might be particularly active in consumption tax planning if the associated effect on pre-tax income is congruent with the goal of income tax minimization resulting in overall after-tax profit

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[28] The strong negative reaction of digital service firms' sales to VAT rate changes is still present but attenuated given a significant and positive coefficient on the triple-interaction term.

[29] Figure OA. 3 in the Online Appendix provides for an overview of the variation in the design of our sample countries' multidimensional tax systems ranging from high VAT/low CIT to low VAT/high CIT designs.

maximization (Scholes et al., 2015). We test and find that firms' sales reporting response to VAT increases is attenuated when the CIT rates are low suggesting that sales are not optimized downwards when the income tax regime provides an incentive to report higher pre-tax profits. We elaborate on the estimation approach and report results in Table OA. 10 in the Online Appendix.

After finding that firms' reported sales are sensitive to consumption taxes and assuming sophisticated tax planners take different types of taxes into account, we now integrate firms' propensity to respond to consumption taxes in the analysis of income tax-motivated profit shifting. Table 7 reports the results of estimating the income-tax motivated profit shifting models (equation (2)). All specifications include firm and year fixed effects. We first replicate the baseline model established in prior literature (column (1)). In general, the magnitude of profit shifting across all specifications is consistent with earlier findings implying that profit shifting behavior in the service sector is similar to that of firms in other industries.[30] For service providers, a one percentage point increase in CIT rates is associated with a decline in pre-tax profits of around 0.47 percent on average. When we also control for the VAT rate, we find a significant and negative association of pre-tax profits and the value-added tax rate (column (2)) suggesting that planning for consumption taxes affects reported pre-tax profits, which is unsurprising as sales are highly correlated with reported pre-tax profits.

The results of our analysis so far suggest that firms react to VAT rate changes in their sales reporting behavior and that firms consider income tax-related costs when planning on consumption taxes. Exploiting a VAT rate cut through reporting higher sales, however, could result in a cost due to a higher income tax burden or a higher cost of profit shifting. If, for example, a country's tax system implies a low VAT and a high CIT rate, reporting higher sales in response to the low VAT rate requires profit shifting to be employed more aggressively on the cost side of an intra-group transaction in order to minimize pre-tax profits in the same country. We investigate the dependence of profit shifting on the level of consumption tax responsiveness by including our measure of firm-specific VAT sensitivity with regards to sales reporting and test whether the respective variation across firms explains differences in profit shifting behavior.

The variable S gauges the firm-specific intensity of consumption tax planning with positive and increasing values indicating a stronger consumption tax response. Columns (3) and (4) of Table 7 report results of our main tests of our second hypothesis (equation (2)). We report a significant positive coefficient on the interaction term of S and *CIT* in both specifications suggesting that profit shifting is

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[30] Huizinga and Laeven (2008) estimate a coefficient of -0.595 in a similar specification, analogously Blouin et al. (2018) estimate -0.542. Consistently, coefficients on *LogPexp*, *LogAssets* and *LogGDP* are all positive and significant.

attenuated when firms respond to the VAT rate. We plot the marginal effects of the CIT rate on reported pre-tax profits in Figure 2 to allow for a direct interpretation depending on the level of *S*. We find that only firms that do not negatively react to consumption taxes (negative values for *S*) engage in profit shifting (i.e., negative and statistically significant effect of CIT). When a firm is, however, sensitive to consumption taxes (positive values for *S*), its profit shifting response to the CIT rate becomes insignificant or positive. To validate our measure of VAT sensitivity, we also include the interaction between *S* and *VAT* in column (4). The coefficient on *VAT* in the profit shifting regression reported in column (2) is negative. The significantly positive coefficient on the interaction term suggests that for the subgroup of firms with higher values of *S*, the negative effect of *VAT* on pre-tax profits is already captured in the sense that the sales response to VAT changes is negative and thus, also affects EBIT negatively.

Overall, these results are novel to the profit shifting literature and suggest that a firm's consumption tax responsiveness can explain differential profit shifting behavior. These findings imply that managing the possible consumption tax burden in the first place constrains profit shifting. Our findings on the relationship between consumption tax planning and income shifting are consistent with those of Blouin et al. (2018) who use confidential survey data from the Bureau of Economic Analysis to show that U.S. MNEs engage less aggressively in profit shifting when they cannot jointly minimize customs duties and income taxes via transfer pricing. However, consumption taxes in the form of a VAT affect a broader set of tax planning decisions than customs duties since firms have to remit VAT on all products and services at every stage of the value chain. Our findings thus suggest that consumption taxes play an important role in tax management and financial reporting decisions.

In supplementary tests with results reported in Table OA. 11, we test for differential profit shifting responses contingent on the VAT sensitivity again using the respective industry indicators (*Digital*, *B2C_non-digital*, *B2B*, and *Intra-group*). In contrast to the assertions in the recent public debate and the anecdotal evidence (OECD, 2015; European Commission, 2014)[31], we do not find evidence for a significantly different effect of the CIT rate on reported profits in case of digital service providers. We can, however, show that the attenuation effect of the VAT sensitivity is somewhat stronger for digital service firms suggesting that these firms engage more heavily in consumption tax planning and forgo

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[31] See, e.g., Netflix paying little corporation tax in the UK (The Guardian (online) 13 October 2016, available at https://www.theguardian.com/business/2016/oct/13/netflix-uk-corporation-tax). The finance ministers of several European Union (EU) countries recently claim that the current tax system is flawed, arguing MNEs pay little tax in countries where they exploit consumer markets and rely on the local infrastructure (The Wall Street Journal (online) 21 September 2017, available at https://www.wsj.com/articles/eu-preps-tax-crackdown-on-silicon-valley-1505988538). Potential solutions to address the issue include mechanisms to tax MNEs based on the location of consumption rather than on book profits (EU, 2017a, 2017b).

more profit shifting opportunities. Future research could address whether firms in the digital economy exploit other income tax planning channels that we cannot measure with the approach of estimating a standard production function. We also document that profit shifting behavior of B2C service firms is comparable to that of digital service firms: the attenuation effect of the firm's VAT sensitivity on the income response to *CIT* is strong for these firms. For B2B service affiliates, in contrast, we find that profit shifting behavior is not attenuated if firms are VAT sensitive. Overall, these cross-sectional results are consistent with the industry-specific findings on consumption tax planning. They indicate that firms providing intra-group and B2B services have sufficient leeway in engaging in profit shifting even if they are sensitive to VAT changes. Their sensitivity to VAT changes as reported in Table 5, however, is much lower and thus their behavior towards consumption taxes is less restrictive for engaging in profit shifting. In sum, the results in Table 7 and Table OA. 11 support our hypothesis that the negative association between reported pre-tax profits and income tax rates is attenuated for firms with a higher consumption tax rate sensitivity.

Profit Shifting via Debt Shifting and Consumption Tax Planning

The results in our study so far suggest that firms face a trade-off between consumption tax planning and income-tax motivated transfer pricing of intra-group trade (goods and services transactions) since EBIT (or *LogEbit*) as the dependent variable captures such transfer pricing manipulations facilitating profit shifting (Heckemeyer and Overesch, 2017; De Simone et al., 2018). Yet, MNEs can also use intra-group debt financing as another profit shifting channel. Heckemeyer and Overesch (2017) find that this financing channel accounts for around one-third of income tax-motivated pre-tax profit shifting. If a firm's transfer pricing opportunities are constrained because the firm has reported sales in response to consumption taxes, the firm might increase intra-group debt financing in order to optimize its income tax position.

We test whether firms resort to this profit shifting channel and operationalize this mechanism by estimating equation (2) with two different dependent variables. First, we use return on assets (*ROA*), measured as earnings before interest and taxes over total assets, as an alternative dependent variable. Second, we compare these results to an estimation of equation (2) using interest expense scaled by total assets (*IntExp/Assets*) as the dependent variable. *IntExp/Assets* is our measure to gauge the debt financing behavior of firms. We expect a positive coefficient on *CIT* since interest expenses should increase in response to CIT rate increases in order to shift pre-tax profits out of the respective jurisdiction (Desai et al., 2004). Using *ROA* instead of *LogEbit* as the dependent variable in these tests facilitates the comparison between the effects on both transfer pricing and debt financing.

We report results in Table 8. The coefficient on the baseline effect of the CIT rate on *ROA* is statistically significant and negative and the interaction term of the *CIT* and *S* is significant and positive confirming our main finding on the relation of profit shifting and consumption tax sensitivity (column (1)). When examining *IntExp/Assets* as the dependent variable, we find results consistent with our expectation (column (2)). The baseline effect of *CIT* suggests that firms increase interest expenses when CIT rates increase. Given the positive and significant coefficient on the interaction term between *CIT* and *S*, we find that this relationship is more pronounced when firms are more sensitive to VAT. This result indicates that firms engage in profit shifting behavior via debt financing to a greater extent when the other channel of profit shifting, transfer pricing manipulation of intra-group trade, is constrained by consumption tax considerations. These results are robust to including country-year fixed effects (columns (3) and (4)). We conclude that firms substitute income-tax motivated transfer pricing with debt shifting strategies in order to recapture income tax savings that cannot be generated otherwise given a firm has already optimized its consumption tax burden. Overall, our evidence is consistent with tax planners considering multiple taxes and aiming for after-tax profit maximization (Scholes et al., 2015; Dyreng and Maydew, 2018).

4.4 Robustness Tests

Our primary research design relies on the assumption that the difference in reported sales between treated firms affected by a VAT rate change relative to firms in countries with no VAT change in the respective year would have evolved similarly absent the VAT policy changes. This assumption might be violated if policymakers introduce higher (lower) consumption tax rates if the economy experiences a boom (a downturn) (Vegh and Vuletin, 2015; Jacob et al., 2018). We address concerns about the validity of our identifying assumption in several tests. We show that VAT rate changes are not systematically related to different macroeconomic characteristics at the country level of the current or previous year. We only find some significant positive associations between VAT rate increases and the level of consumer prices (*LogConsPrice*) and inflation at the country level. Table OA. 6 reports the respective regression results. To further mitigate concerns that contemporaneous macroeconomic conditions drive the negative association between VAT rates and reported sales, we employ a more stringent fixed effects structure that alters the composition of the control groups in our panel regression. Similar to the additional tests in Jacob et al. (2018), we create clusters based on quartiles that assign firms to groups of similar annual GDP growth and inflation rates. We then include the corresponding cluster-industry-year fixed effects in our specification (1). This test design compares changes in firms' reported sales between firms experiencing a VAT rate change and unaffected firms of the same industry that experiences the same unobserved economic development given they belong to the

same cluster. This strategy effectively limits the counterfactual group to arguably comparable firms and, at least to a large extent, rules out that our main finding just reflects unobserved variation in economic conditions. As reported in Table OA. 7 in the Online Appendix, our main results continue to hold. Any potentially remaining confounding factors would necessarily need to be orthogonal to these control factors (Heider and Ljungqvist, 2015).

We also confirm that affected firms did not anticipate VAT changes by reporting sales systematically differently before the policy changes. We provide evidence that our findings are driven by reported sales responses in the year of the change and two years after the change. Figure 3 plots the estimated coefficients on the respective lead and lagged values of *VAT Change*. Table OA. 8, Panel A in the Online Appendix reports the results of the underlying regressions. We further validate the common trends assumption in Figure 4. We plot the development of average sales of treated firms relative to the year of a VAT increase and the corresponding development of average sales of firms in countries that never increase the VAT rate throughout the sample period. Overall, the results of these tests support the claim that the staggered VAT rate changes are plausibly exogenous and that this variation allows us to establish causal relationships between consumption tax policy and firms' sales reporting behavior.

We further conduct several untabulated robustness tests to validate our results. We run a firm-fixed effects and random effects model clustering standard errors on the country level for the sales reporting and profit shifting analyses and results remain robust. A p-value of below 0.0000 in the Hausman test suggests the fixed effects model is appropriate. We also find very similar results when running a robust regression suggesting that outliers in our sample do not drive the results (De Simone, 2016).

Results across all analyses are robust to controlling for a different production function of digital service affiliates when we run a fully interacted model (*Digital* interacted with other explanatory variables in the production function). In further robustness checks, we exclude observations from single countries for which observations are heavily weighted due to superior data coverage (France and Spain) and obtain robust results. We also conduct a further cross-sectional test and limit the sample to affiliates that belong to multinational groups with at least three affiliated companies.[32] Consistent with this sub-sample of firms having greater tax planning opportunities, we find slightly larger effects of the CIT rate on reported pre-tax profits. Further, results are not driven by outliers as they continue to hold when replacing personnel expenses by the number of employees and winsorizing financial firm data at the 1

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[32] This analysis is contingent on data availability and accuracy provided by the Amadeus database at the point of time of data extraction.

and 99 percent level. Last, our results across all analyses are robust to including GDP-growth to account for market potential. We argue that GDP-growth accounts for potential changes in demand that might be correlated with VAT rate changes and firms' output (sales). These results suggest that simultaneous changes in demand do not drive the response of reported sales to VAT rates and corroborates our findings in addition to including consumer price levels and inflation rates and the conservative empirical approach employing country-year fixed effects.

5. Conclusion

This paper examines the effect of consumption taxes on firms' reported output. In a second step, we investigate whether reporting sales in response to consumption taxes explains cross-sectional variation in income tax-motivated profit shifting. We use firm-level data on service firms who have the opportunity to respond to consumption and income taxes via managing the respective tax bases. We exploit the European setting with plausibly exogenous changes in value-added and corporate income tax rates. We find an economically significant negative effect of VAT rate changes on reported sales. We estimate that firms, on average, reduce reported sales by 0.5 percent if VAT rates increase by one percentage point. We control for country-specific contemporaneous trends that might explain tax policy and output levels and our main finding is robust to various stringent fixed effects models. Additional tests on parallel trends, the determinants of tax policy, and alternative control groups support a causal interpretation of this relationship. We then provide evidence on two channels of consumption tax planning in cross-sectional tests. First, consistent with economic theory, firms that potentially bear a greater part of the tax burden (tax incidence) reduce output due to lower expected after-tax profits. Second, firms with leeway over where to report sales for VAT purposes shift sales in response to the relative attractiveness of a country's VAT rate. Consistent with theory on tax incidence and the recent evidence provided by Jacob et al. (2018), the magnitude of the effects is negatively related to firms' relative size as a proxy for its ability to set prices.

We then integrate a measure of firm-specific VAT sensitivity and show that consumption tax considerations are associated with the extent and the channels of income shifting. Our empirical results suggest that, on average, firms do not engage in income tax-motivated profit shifting if they exhibit a negative relationship between reported sales and VAT consistent with consumption tax planning placing a constraint on manipulating transfer prices to reduce the global income tax burden. However, these firms more actively use debt financing to reduce pre-tax income in response to income tax rate increases.

Our findings contribute to the literature on the effect of taxes on corporate decisions, reporting choices, and on corporate tax planning behavior in general in several ways. First, we add to the scant evidence on the effect of consumption taxes on businesses. We complement Jacob et al. (2018) by directly showing that firms' output responds to consumption taxes suggesting that consumption taxes, against the common intuition, are considered as a cost to the business. Second, we offer a novel explanation why some firms employ more aggressive profit shifting strategies than others. We thereby add to the income tax avoidance literature by showing that the extent and the channels of profit shifting are contingent on firms' responses to consumption tax incentives. This finding is novel and provides a first answer to the call for more research on economically relevant non-income taxes (Dyreng and Maydew, 2018). To the best of our knowledge, we are the first to study how consumption and corporate income taxes interrelate. We conclude that corporate tax planners consider multiple taxes to achieve after-tax profit maximization and substitute different tax savings strategies such as debt shifting and transfer pricing.

Our results have several implications for tax policy design since understanding the interplay of direct and indirect taxes is necessary to evaluate potential reforms. Consumption taxes, in particular, are a predominant source of tax revenue, an essential element in competition among jurisdictions to attract foreign firms in the digital sector, and can lead to inefficiencies in corporate decisions. Our findings strongly suggest that consumption taxes affect corporate behavior. That is, firms reduce their reported output in response to VAT rate increases. We also provide evidence that firms operating in the digital economy indeed exploit tax planning opportunities. However, we highlight that circumventing consumption tax burdens seems to dominate income tax-motivated profit shifting in the digital service sector. Our results further question the effectiveness of source-based value-added taxation of services and the ability of purely consumption-based tax systems to mitigate tax avoidance and economic distortions in a globalized and digital economy. Finally, policymakers could use our results to carefully evaluate whether to follow the current trend of decreasing CIT rates and increasing VAT rates when assessing the impact on corporate decisions and tax revenue.

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Table 1: Definition of Variables

Variable	Description
VAT	Value-added tax rate applicable in the respective country (in decimals).
CIT	Corporate income tax rate applicable in the respective country (in decimals).
VATminus	Indicator variable for VAT rate decrease: 1 if observed affiliate-year VAT rate is lower than in the previously observed affiliate-year.
VATplus	Indicator variable for VAT rate increase: 1 if observed affiliate-year VAT rate is higher than in the previous observed affiliate-year.
VAT Change	Absolute change in VAT rates between t and t-1.
LowCIT	Indicator variable equal to 1 if CIT at or below median compared to sample firms (or lower than 21%), 0 otherwise.
S	Firm-level VAT sensitivity w.r.t. sales reporting; the measure is calculated based on the respective coefficients from the regression on sales reporting.
LogSales	Natural logarithm of affiliate's sales.
LogEbit	Natural logarithm of affiliate's earnings before interest and tax (EBIT).
LogPexp	Natural logarithm of affiliate's personnel expenditure.
LogAssets	Natural logarithm of affiliate's total assets.
LogGroupsales	Natural logarithm of aggregate sales of all affiliated firms of the same group.
ROA	Return on assets measured as affiliate's EBIT scaled by total assets.
IntExp/Assets	Interest expense over assets, measured as affiliate's interest expense (difference between EBIT and EBT) scaled by total assets.
Highassetshare	Indicator variable equal to 1 if affiliate's share of total assets to total assets of the industry segment is in the highest quartile of industry total assets sorted by country and year in t-1, 0 otherwise.
Digital	Indicator variable equal to 1 for digital service provider affiliates: 1 if NACE Rev 2 classification (NACE1 in Amadeus) belongs to the potential group of digital services, 0 otherwise (see Table OA. 3).
B2C_non-digital	Indicator variable equal to 1 for service provider affiliates selling non-digital services in the B2C segment, 0 otherwise.
B2B	Indicator variable equal to 1 for service provider affiliates active in the B2B segment, 0 otherwise.
Intra-group	Indicator variable equal to 1 for service provider affiliates selling services potentially intra-group, i.e., when the parent firm is not a service provider itself nor a holding company (GUO is industrial firm), 0 otherwise.
Multi	Indicator variable equal to 1 if country of parent differs from country of affiliate (i.e., foreign), 0 otherwise.
Intl	Indicator variable equal to 1 affiliate belongs to an MNE group for which we observe affiliates in at least two countries in the sample, 0 otherwise.
LogGDP	Natural logarithm of country's gross domestic product per capita.
LogConsPrice	Natural logarithm of indexed consumer price levels for the total services sector. Country-specific price levels are indexed, based on price level differences across countries (100 being the EU-28 average), and measured in purchasing parity power.
Inflation	Country-specific rate of inflation (in decimals).
Ttc_c	Time to comply regarding consumption taxes, measured in hours.

Sources: VAT rates are taken from KPMG; CIT rates are based on effective tax rates in European Commission/ZEW (2016) and KPMG. GDP data is from the Worldbank's World Development Indicators database. Consumer price levels and inflation rates data is from Eurostat. *Ttc_c* is from World Bank Group/PwC.

Figure 1: Tax Incidence under VAT increase from 20% to 30%

- Company A's net of VAT-profit: 100=130-30
- Company B's net of VAT-profit:
  100=260-60-130+30
- Consumer: pays 260
- Total VAT revenue: 60=60-30+30

- Company A's net of VAT-profit: 100=130-30
- Company B's net of VAT-profit:
  84.62=240-55.33-130+30
- Consumer: pays 240
- Total VAT revenue: 55.38=55.38-30+30
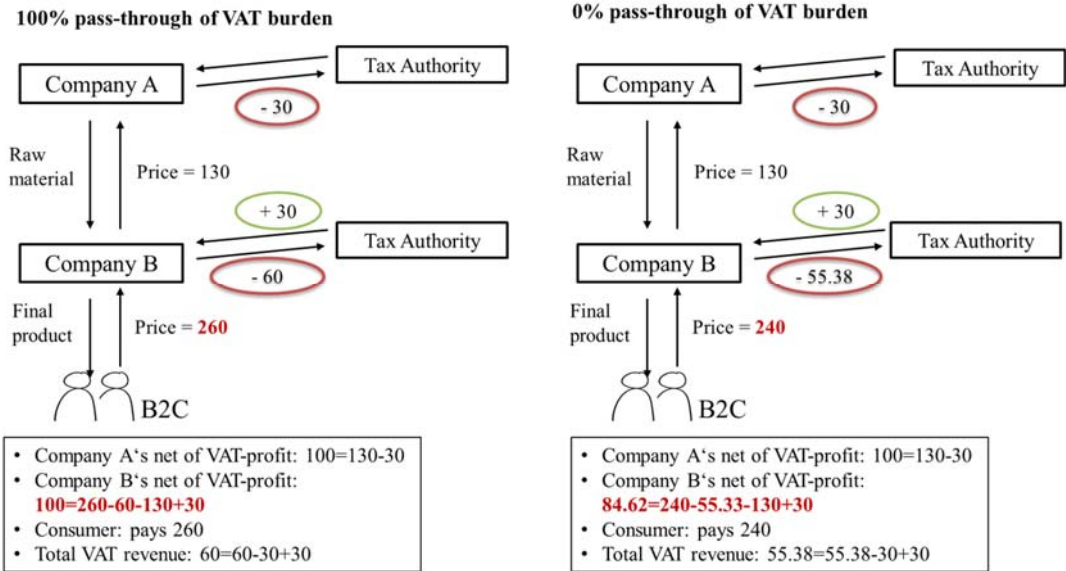
This figure illustrates the tax incidence falling partly on firms for the example of a VAT rate increase from 20% to 30%. Before the tax increase, Company B used to charge a final price of 240 when the VAT was 20%. It may now be able to increase the final price by the same proportional amount as the VAT rate increase and charge a final price of 260 (left-hand side of the figure). This would mean the pass-through of the VAT increase is 100% and the consumer bears the full burden of the tax increase. Company B will again realize a net-of VAT profit of 100. If the consumer, however, is price sensitive and not willing to pay more, company B cannot increase the final price and will still charge 240 from the consumer (right-hand side of the figure). This would mean the pass-through of the VAT increase is 0% and the consumers bear none of the tax increase, but the firm bears all of it. Company B's net-of VAT profit then looks different and is reduced to 84.62. The final price of 240 includes VAT at a rate of 30%, i.e., 55.38, that company B has to remit to the tax authority.

Table 2: Summary Statistics for Regressions

Variable	Unit	Mean	SD	Min	Max
VAT	-	0.21	0.02	0.15	0.27
CIT	-	0.31	0.06	0.10	0.39
S	-	-0.37	3.47	-14.09	12.69
Sales	EUR ,000	20,923.62	256,566.75	500.00	44,436,615.00
Ebit	EUR ,000	1,854.87	31,544.38	1.00	4,356,366.00
Pexp	EUR ,000	4,363.12	42,072.40	1.00	6,707,383.00
Assets	EUR ,000	28,985.98	427,909.67	9.00	79,242,530.00
Groupsales	EUR ,000	343,615.8	2,478,527.41	500.00	47,450,932.00
ROA	-	.10	0.10	0.00	0.77
IntExp/Assets	-	.01	0.02	-0.10	0.10
GDP	EUR/capita	39,162.54	16,228.24	5,932.90	119,172.74
ConsPrice	Normalized (100)	105.22	24.84	27.70	187.00
Inflation	-	0.02	0.01	-0.02	0.15
Ttc_c	Hours	57.53	55.17	16.00	360.00

The sample used in the main empirical tests consists of 316,900 affiliate-year observations from 78,954 unique affiliates of 63,958 global ultimate owners located in 24 European countries between 2007 and 2015. This table reports summary statistics for the constructed variable S, which measures the firm-specific VAT sensitivity w.r.t. reporting sales. The measure is derived by running a regression based on equation (1) (excluding the interaction of VAT and foreign-owned firms) with VAT interacted with the firm fixed effects vector. The point estimate for this interaction term is then multiplied by -1 and labeled S.

Table 3: Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) VAT	1.000						
(2) CIT	-0.420	1.000					
(3) S	0.047	-0.031	1.000				
(4) Sales	-0.031	-0.011	-0.032	1.000			
(5) Ebit	-0.025	-0.008	-0.017	0.511	1.000		
(6) Pexp	-0.037	-0.007	-0.021	0.473	0.378	1.000	
(7) Assets	-0.021	-0.015	-0.014	0.497	0.544	0.466	1.000
(8) Groupsales	-0.046	0.025	-0.020	0.208	0.146	0.176	0.155
(9) ROA	0.081	-0.111	0.015	-0.006	0.035	-0.010	-0.021
(10) IntExp/Assets	0.066	-0.098	0.025	-0.032	-0.017	-0.035	-0.020
(11) GDP	0.456	-0.053	0.043	0.007	0.002	0.010	0.003
(12) ConsPrice	0.354	0.054	0.036	0.019	0.012	0.027	0.013
(13) Inflation	-0.203	-0.071	-0.003	0.010	0.008	0.011	0.005
(14) Ttc_c	-0.359	-0.034	0.019	-0.015	-0.004	-0.021	-0.010

Variable	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(8) Groupsales	1.000						
(9) ROA	0.009	1.000					
(10) IntExp/Assets	-0.051	-0.010	1.000				
(11) GDP	-0.001	0.142	-0.006	1.000			
(12) ConsPrice	0.013	0.108	-0.051	0.917	1.000		
(13) Inflation	0.003	0.039	0.038	0.063	-0.006	1.000	
(14) Ttc_c	-0.020	0.017	0.062	-0.276	-0.415	0.203	1.000

This table presents the Pearson correlations between our main control variables and variables of interest.

Table 4: Sales Reporting and Consumption Taxes

Specification:	(1) Prod. Fctn.	(2) VAT	(3) VAT, CIT	(4) Foreign Parent	(5) Digital
			LogSales		
VAT		-0.4341***	-0.5201***	-0.7592***	-0.4318***
		(0.0820)	(0.0835)	(0.0950)	(0.0850)
*Multi*VAT*				0.5582***	
				(0.1340)	
*Digital*VAT*					-1.2304***
					(0.2298)
CIT			-0.1451***	-0.0505	-0.1469***
			(0.0413)	(0.0514)	(0.0418)
*Multi*CIT*				-0.2591***	
				(0.0786)	
*Digital*CIT*					0.0517
					(0.1825)
Ttc_c		0.0002***	0.0002***	0.0002***	0.0002***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
LogPexp	0.3497***	0.3488***	0.3487***	0.3485***	0.3487***
	(0.0054)	(0.0054)	(0.0054)	(0.0054)	(0.0054)
LogAssets	0.4189***	0.4184***	0.4183***	0.4181***	0.4187***
	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)
LogGDP	0.5865***	0.4389***	0.4420***	0.4224***	0.4411***
	(0.0213)	(0.0235)	(0.0235)	(0.0236)	(0.0235)
LogConsPrice	-0.2290***	-0.1468***	-0.1694***	-0.1606***	-0.1689***
	(0.0225)	(0.0235)	(0.0237)	(0.0237)	(0.0237)
Inflation	1.5632***	1.1138***	1.1208***	1.1031***	1.1204***
	(0.0844)	(0.0854)	(0.0854)	(0.0856)	(0.0854)
Constant	-2.5844***	-1.3276***	-1.1906***	-1.0123***	-1.1899***
	(0.1621)	(0.1837)	(0.1853)	(0.1871)	(0.1851)
Observations	316,900	316,900	316,900	316,900	316,900
Adj. R-sq.	0.5367	0.5374	0.5374	0.5376	0.5378
Firm FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

This table reports coefficient estimates from linear panel regressions on the affiliate level, using a fixed effects model and robust standard errors. The sample consists of 316,900 affiliate-year observations from affiliates located in 24 European countries between 2007 and 2015 with sufficient data from Amadeus for the regressions. The dependent variable is the natural logarithm of the affiliate's operating revenue (sales). Column (1) reports results for a parsimonious model of the typical productivity estimation using the full sample. Column (2) includes the VAT rate as the variable of interest to examine the sales reporting behavior of service affiliates. Column (3) also includes the CIT rate to control for other features of the tax system. Column (4) includes the indicator variable *Multi* for foreign global ultimate owners and the interaction with the VAT rate. Column (5) includes the indicator variable *Digital* and the interaction with the VAT rate. Tests of joint significance yield a p-value smaller than 0.01 for each case of interactions. Robust standard errors, clustered on affiliate level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Cross-sectional Tests: Industries

	LogSales				
	(1)	(2)	(3)	(4)	(5)
Industry:	Baseline	Digital	B2C non-digital	B2B	Intra-group
VAT	-0.5201***				
	(0.0835)				
Industry*VAT		-1.2417***	-0.9286***	0.8445***	1.0806***
		(0.2318)	(0.1230)	-0.1235	(0.3454)
Observations	316,900	299,900	299,900	299,900	119,984
Adj. R-sq.	0.5374	0.4840	0.4842	0.4841	0.4861
Firm controls	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	NO
Country-Year FE	NO	YES	YES	YES	YES

This table reports coefficient estimates from linear panel regressions on the affiliate level, using a fixed effects model and robust standard errors. The dependent variable is the natural logarithm of the affiliate's operating revenue (sales). Column (1) reports results of our main specification (Table 4 column (3)). The constant term is not reported here. Columns (2) to (5) include the VAT rate interacted with an indicator variable for the respective industry segments *Industry*VAT* (where *Industry* is *Digital, B2C_non-digital, B2B, and Intra-group,* respectively). The R-sq. refers to the adjusted R-sq. in column (1), whereas for columns (2) to (5), we report the adjusted within-R-sq. Robust standard errors, clustered on affiliate level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Group-level Analysis: Total Sales and Consumption Taxes

Specification / Interaction	LogGroupsales					
	(1) Baseline	(2) Intl	(3) Digital	(4) B2C non-digital	(5) B2B	(6) Intra-group
VAT	-2.4552***					
	(0.2227)					
Intl*VAT	3.5482***	3.4382***	3.3073***	3.3628***	3.5309***	3.3240***
	(0.3270)	(0.3417)	(0.3613)	(0.4079)	(0.3643)	-0.4635
Industry*VAT			-4.5920***	0.1605	0.7668*	-0.1358
			(0.6069)	(0.3927)	(0.4309)	-0.6919
Industry* Intl*VAT			2.0463**	0.2398	-0.3089	0.2356
			(0.8943)	(0.6918)	(0.8189)	-1.0075
Observations	91,582	85,284	85,284	85,284	85,284	57,176
Adj. R-sq.	0.3024	0.1064	0.1094	0.1064	0.1065	0.0987
Firm controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	NO	NO
Country-Year FE	NO	YES	YES	YES	YES	YES

This table reports coefficient estimates from linear panel regressions on the affiliate level, using a fixed effects model and robust standard errors. The sample consists of all affiliate-year observations aggregated at the individual group-level (same global ultimate owner). These estimations are therefore based on a smaller sample since we require multinational groups to have domestic groups as counterfactuals. Other firm-year observations of our base sample belong to groups (see the sample selection process) but other group firms are not part of the sample. The dependent variable is the natural logarithm of group-wide sales. Column (1) reports results of estimating equation (1) with *LogGroupsales* as the dependent variable and augmented by an interaction term of *Intl*VAT*. Column (2) reports results of the similar regression using country-year fixed effects. Columns (3) to (6) include the interaction term of *Intl*VAT,* the VAT rate interacted with an indicator variable for the respective industry segments *Industry*VAT* and the triple interaction term for *Industry*Intl*VAT*. The R-sq. refers to the adjusted R-sq. in column (1), whereas for columns (2) to (6), we report the adjusted within-R-sq. Robust standard errors, clustered on affiliate level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Profit Shifting and Consumption Taxes

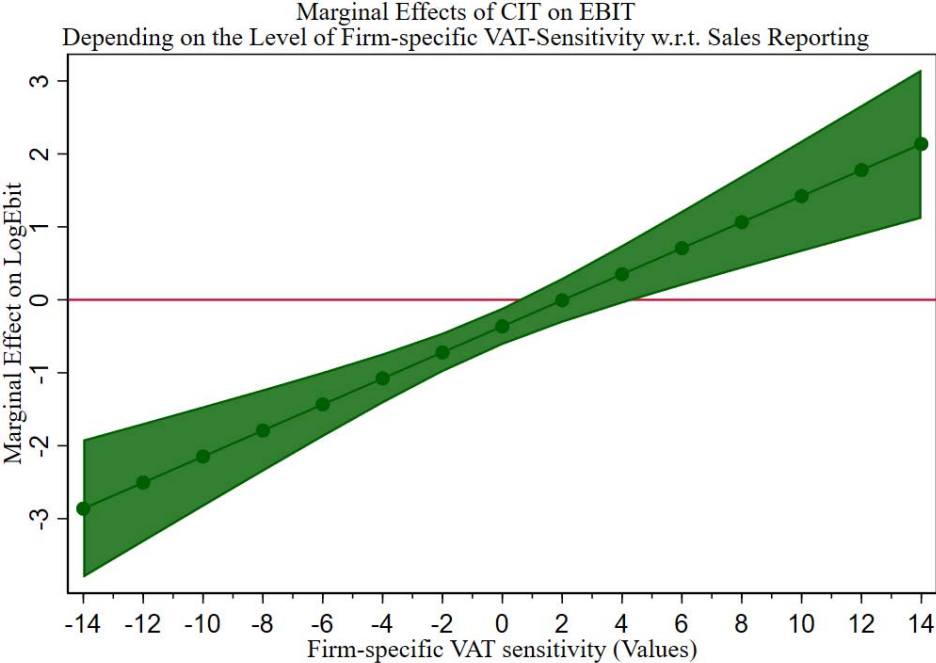|	LogEbit			
	(1)	(2)	(3)	(4)
Specification:	Baseline	VAT	S	S
				Full Int.
CIT	-0.4737***	-0.6028***	-0.3634***	-0.4937***
	(0.1285)	(0.1334)	(0.1297)	(0.1346)
S*CIT			0.1785***	0.1790***
			(0.0347)	(0.0347)
VAT		-0.7232***		-0.7320***
		(0.2620)		(0.2623)
S*VAT				4.2952***
				(0.0950)
LogPexp	0.1108***	0.1102***	0.1094***	0.1013***
	(0.0067)	(0.0067)	(0.0068)	(0.0065)
LogAssets	0.7517***	0.7517***	0.7508***	0.7269***
	(0.0088)	(0.0088)	(0.0088)	(0.0085)
LogGDP	0.3296***	0.2606***	0.3365***	0.2849***
	(0.0413)	(0.0449)	(0.0413)	(0.0444)
Constant	-4.6891***	-3.7764***	-4.7603***	-3.6346***
	(0.4379)	(0.5057)	(0.4383)	(0.4995)
Observations	316,900	316,900	299,901	299,901
Adj. R-sq.	0.0958	0.0958	0.0960	0.1117
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

This table reports coefficient estimates from linear panel regressions on the affiliate level, using a fixed effects model and robust standard errors. The sample consists of 316,900 affiliate-year observations from affiliates located in 24 European countries between 2007 and 2015 with sufficient data from Amadeus for the regressions (299,901 observations when the *S* measure is included respectively). The dependent variable is the natural logarithm of the affiliate's EBIT. Column (1) reports results for the benchmark profit shifting regression including the CIT rate as the variable of interest. Column (2) extends the baseline regression by including the VAT rate. Column (3) extends the baseline regression by including the interaction of S, the constructed measure of firm-specific VAT sensitivity w.r.t reporting sales, and the CIT. Column (4) presents regression results of this extended model when S is also interacted with the VAT rate. The VAT sensitivity S is winsorized at 1 and 99 percent. We rely on the Stata-command reghdfe to compute S (Correia 2016). The command drops singleton groups, i.e., in our case firm fixed effects with only one observation in the sample period, to avoid overstating statistical significance. Dropping singletons results in a slightly smaller sample of 299,901 affiliate-years. Table OA. 12 in the Online Appendix reports results of using this estimation approach with and without interacting the VAT rate with firm fixed effects. We find that estimates are generally in line with our fixed effects regression using the standard approach (Table 4).Tests of joint significance yield a p-value smaller than 0.01 for each case of interactions in columns (3) and (4). Robust standard errors, clustered on MNE-group level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure 2: Profit Shifting and Consumption Taxes - Marginal Effects (*S*)

This figure illustrates the marginal effects including the 95% confidence interval of a change in CIT rates on reported pre-tax profits (*LogEbit*), i.e., the measure of profit shifting, at the different values of firm-specific VAT sensitivity w.r.t. reporting sales (*S*). Marginal effects are based on the regression output as depicted in Column (3) of the preceding table. The red horizontal line marks the threshold for significant income-tax motivated profit shifting activity.

Table 8: Profit Shifting Channels and Consumption Taxes

	ROA	IntExp/Assets	ROA	IntExp/Assets
	(1)	(2)	(3)	(4)
CIT	-0.0526***	0.0047*		
	(0.0106)	(0.0026)		
S*CIT	0.0176***	0.0019***	0.0158***	0.0021***
	(0.0028)	(0.0007)	(0.0029)	(0.0007)
LogPexp	0.0052***	0.0011***	0.0055***	0.0013***
	(0.0006)	(0.0001)	(0.0006)	(0.0001)
LogAssets	-0.0243***	-0.0030***	-0.0248***	-0.0030***
	(0.0009)	(0.0002)	(0.0009)	(0.0002)
LogGDP	0.0165***	-0.0045***		
	(0.0038)	(0.0009)		
Observations	299,901	299,901	299,900	299,900
Adj. R-sq.	0.0269	0.0140	0.0105	0.0028
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	NO	NO
Country-Year FE	NO	NO	YES	YES

This table reports coefficient estimates from linear panel regressions on the affiliate level, using a fixed effects model and robust standard errors. The sample consists of 299,901 affiliate-year observations since we include the S measure. The dependent variable is the affiliate's Return on Assets (*ROA*) in columns (1) and (3), and the affiliate's ratio of interest expense to total assets (*IntExp/Assets*) in columns (2) and (4). Column (1) reports results of estimating equation (2) with *ROA* as the dependent variable including the interaction of the CIT rate and the S measure. Column (2) reports results of estimating equation (2) with *IntExp/Assets* as the dependent variable including the interaction of the CIT rate and the S measure. Columns (3) and (4) repeat these tests including country-year fixed effects. The R-sq. in columns (1) and (2) refers to the adjusted R-sq., whereas for columns (3) and (4), we report the adjusted within-R-sq. Tests of joint significance yield a p-value smaller than 0.01 for each case of interactions. Robust standard errors, clustered on MNE-group level, are presented in parentheses. *, ** and *** and represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure 3: Robustness: Anticipation and Lagged Effects of VAT Rate Changes

Regression Results on Leads and Lags of VAT Change
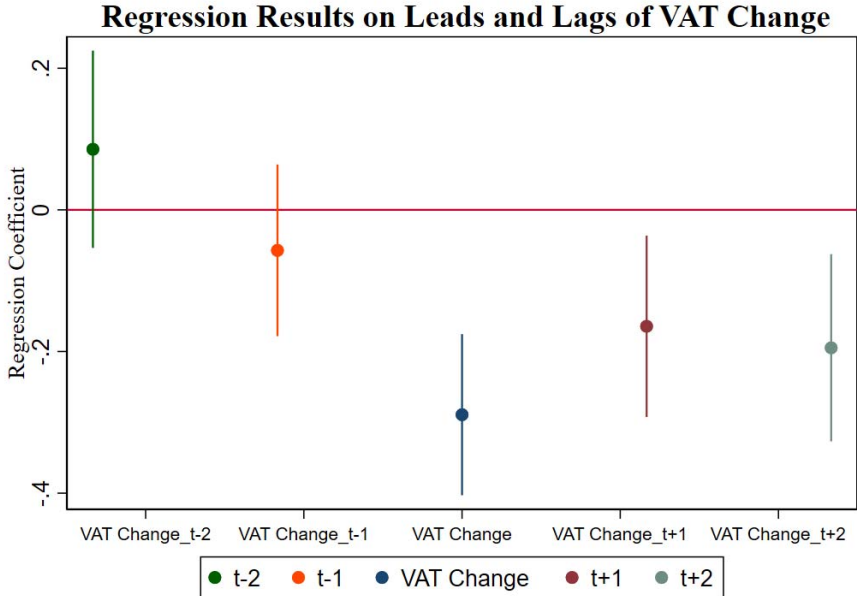
This figure plots the regression coefficients including the 95% confidence intervals on *VAT Change* and on two-year lead and lagged values of *VAT Change*. The coefficients are from results reported in Panel A of Table OA. 8 in the Online Appendix.

Figure 4: Robustness: Parallel Trends in Sales prior to VAT Rate Increases

VAT Increases and Common Trends: LogSales
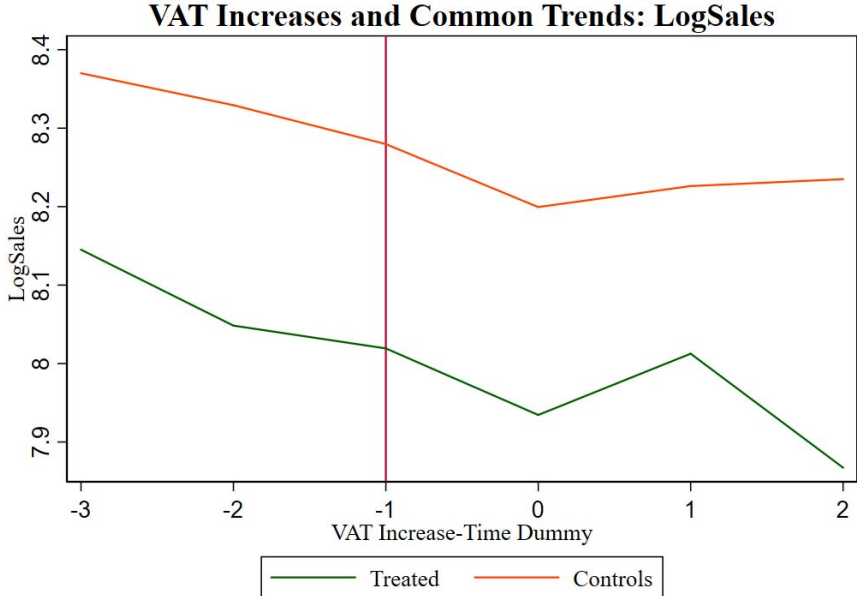
This figure plots the average values of *LogSales* for firms which experience a VAT increase (Treated) and firms in the regression sample that are located in countries that never increase their VAT rate throughout the sample period (Control). The values for treated firms are shown for each year in the three years before, in the year of, and in the two years after the VAT increase and the values for control firms refer to the same sample period year, respectively.

Consumption Taxes and Corporate Tax Planning -
Evidence from European Service Firms

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Online Appendix

Data Description

Table OA. 1: Sample Composition (Affiliate-year Observations by Country and Year)

Country	2007		2008		2009		2010		2011		2012		2013		2014		2015		Total	
	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%
BE	799	2.85	803	2.77	766	2.62	915	2.81	992	2.84	1,005	2.80	1,068	2.75	1,119	2.69	1,225	2.62	8,692	2.74
BG	159	0.57	217	0.75	209	0.71	230	0.71	269	0.77	333	0.93	369	0.95	401	0.96	489	1.04	2,676	0.84
CZ	882	3.14	967	3.34	464	1.59	479	1.47	578	1.66	622	1.73	660	1.70	752	1.81	850	1.82	6,254	1.97
DE	578	2.06	581	2.01	619	2.12	741	2.27	792	2.27	785	2.19	874	2.25	939	2.26	990	2.11	6,899	2.18
DK	0	0.00	0	0.00	0	0.00	0	0.00	12	0.03	39	0.11	41	0.11	38	0.09	38	0.08	168	0.05
EE	293	1.04	288	0.99	234	0.80	299	0.92	364	1.04	381	1.06	443	1.14	507	1.22	601	1.28	3,410	1.08
ES	7,316	26.08	7,438	25.68	7,426	25.39	8,034	24.66	7,965	22.82	7,892	21.97	8,511	21.91	9,724	23.39	11,152	23.82	75,458	23.81
FI	860	3.07	951	3.28	896	3.06	1,014	3.11	1,173	3.36	1,221	3.40	1,335	3.44	1,450	3.49	1,614	3.45	10,514	3.32
FR	5,651	20.15	5,825	20.11	5,594	19.12	5,914	18.16	6,334	18.15	6,551	18.24	6,817	17.55	6,614	15.91	7,235	15.45	56,535	17.84
GB	1,610	5.74	1,679	5.80	2,104	7.19	2,320	7.12	2,452	7.03	2,641	7.35	2,859	7.36	2,968	7.14	3,044	6.50	21,677	6.84
HR	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	128	0.33	140	0.34	137	0.29	405	0.13
HU	36	0.13	38	0.13	31	0.11	32	0.10	28	0.08	33	0.09	32	0.08	30	0.07	37	0.08	297	0.09
IE	82	0.29	80	0.28	88	0.30	103	0.32	102	0.29	118	0.33	145	0.37	148	0.36	171	0.37	1,037	0.33
IT	4,858	17.32	5,024	17.35	5,337	18.24	6,317	19.39	7,085	20.30	7,263	20.22	7,916	20.38	8,382	20.16	9,777	20.88	61,959	19.55
LU	0	0.00	13	0.04	23	0.08	27	0.08	19	0.05	20	0.06	21	0.05	26	0.06	26	0.06	175	0.06
LV	4	0.01	3	0.01	2	0.01	9	0.03	13	0.04	10	0.03	15	0.04	12	0.03	11	0.02	79	0.02
NL	8	0.03	21	0.07	21	0.07	29	0.09	43	0.12	44	0.12	50	0.13	57	0.14	71	0.15	344	0.11
NO	1,625	5.79	1,520	5.25	1,659	5.67	1,787	5.49	1,972	5.65	2,101	5.85	2,194	5.65	2,404	5.78	2,551	5.45	17,813	5.62
PL	49	0.17	63	0.22	60	0.21	75	0.23	93	0.27	122	0.34	165	0.42	177	0.43	259	0.55	1,063	0.34
PT	1,016	3.62	1,107	3.82	1,238	4.23	1,522	4.67	1,662	4.76	1,674	4.66	1,929	4.97	2,187	5.26	2,554	5.46	14,889	4.70
RO	0	0.00	0	0.00	0	0.00	102	0.31	110	0.32	128	0.36	137	0.35	132	0.32	180	0.38	789	0.25
SE	1,734	6.18	1,809	6.25	1,857	6.35	1,747	5.36	1,831	5.25	1,842	5.13	1,910	4.92	2,001	4.81	2,128	4.55	16,859	5.32
SI	344	1.23	400	1.38	427	1.46	631	1.94	705	2.02	774	2.15	855	2.20	961	2.31	1,147	2.45	6,244	1.97
SK	147	0.52	138	0.48	197	0.67	247	0.76	307	0.88	318	0.89	372	0.96	409	0.98	529	1.13	2,664	0.84
Total	28,051	100.00	28,965	100.00	29,252	100.00	32,574	100.00	34,901	100.00	35,917	100.00	38,846	100.00	41,578	100.00	46,816	100.00	316,900	100.00

The final sample used for our main analyses consists of 316,900 affiliate-year observations from 78,954 unique affiliates located in 24 European countries between 2007 and 2015.

Table OA. 2: Total Sales in the Information and Communications Services Sector (NACE 58-63)

Total sales in:	2012	2013	2014	2015
Eurostat	134,290.6	128,450.9	133,787.2	137,372.1
Dataset	170,000.0	175,000.0	178,000.0	171,000.0
Δ%	+27%	+36%	+33%	+24%

This table compares the coverage of total sales of affiliates in the information and communication services sector in the regression sample (Dataset) with the consolidated statistics of sales in this sector provided by the statistical office of the European Union (Eurostat (online)).

Table OA. 3: Classification of Digital Services (NACE Rev. 2 Codes)

NACE Rev. 2 Code	Description
5821	Publishing of computer games
5829	Other software publishing
5913	Motion picture, video and television programme distribution activities
5920	Sound recording and music publishing activities
6209	Other information technology and computer service activities
6311	Data processing, hosting and related activities
6312	Web portals
6391	News agency activities
6399	Other information service activities n.e.c.
7722	Renting of video tapes and disks
8559	Other education n.e.c.
9200	Gambling and betting activities

The NACE Rev. 2 Codes and descriptions are based on the industry classification published by Eurostat, the Statistical Office of the European Communities. The selection of NACE Rev. 2 Codes covers potential digital services. The complete segmentation of economic activities is available at http://ec.europa.eu/eurostat/docu-ments/3859598/5902521/KS-RA-07-015-EN.PDF. N.e.c. is short for not elsewhere classified.

The European VAT System and Multidimensional Tax Policy

In this section, we provide additional information on the consumption tax system in the European Union (EU) and on how the consumption tax policy relates to corporate income tax policy. The EU consumption tax system is a largely harmonized value-added tax (VAT) system in which, as in other consumption tax regimes like the U.S. sales tax, consumers nominally bear the tax. However, firms (businesses in general) are responsible for remitting the tax. VAT are due on every sale of a company. The seller (i.e., the firm) has to remit the tax independently of the nature of the transaction and the legal form of the buyer such that value-added taxes are collected on every stage of the value chain. In the case of business-to-business (B2B) transactions, the buyer as a business itself is granted a credit equal to the VAT due on the purchase of inputs and can deduct this credit from future tax remittances in connection with sales (input tax credit). In the case of business-to-consumer (B2C) transactions, the VAT becomes final at the stage of the consumer who is supposed to bear the ultimate burden of this type of consumption tax. In contrast, under the U.S. sales tax system, only B2C transactions trigger a seller's tax liability if the seller has a nexus in the consumer's location. Sales to businesses as well as exports are directly exempt. Regarding purchases made outside but used within a state, the customer needs to declare and remit use tax. However, compliance with the use tax is very low. Since sellers only need to collect sales tax if they have a physical presence (nexus) in that state, this regulation ultimately results in an exemption of B2C remote sales. The mechanism of collection and remittance presents the main difference between the EU VAT and the U.S. sales tax system (Slemrod, 2008). illustrates the VAT collection mechanism in the EU. The example assumes the following product (or services) lifecycle: Company A creates value with its workforce by providing a raw material (or otherwise service input) to Company B at a price of 100. A VAT rate of 20 percent applies in the respective country, such that a VAT of 20 is due on this B2B transaction. Company A, therefore, has to charge a gross price of 120 (shown as 100 plus 20 VAT on the invoice) and remits 20 to the tax authorities. Company B uses this input to create value by selling a final product (or service) to the end customer in the same country (i.e., the consumer) at a net price of 200. Given the VAT rate of 20 percent, a VAT of 40 is due on this B2C transaction. Company B, therefore, has to charge a gross price of 240 and remits 40 to the tax authorities. However, Company B is granted an input VAT credit of 20 (as shown on the invoice on his inputs) and effectively only remits VAT of 20 to the tax authorities in the same year. Since the consumer is not granted such an input tax, he nominally bears the full VAT of 40 on the final net price of 200. Whether Company A, Company B, or the end customer bear the VAT burden depends on the relative elasticity of demand and supply as discussed in Section 2.2.

Figure OA. 2 illustrates the differential treatment of firms offering B2C services of electronic or digital nature in the cross-border context. As discussed in Section 2.1 and exploited in the cross-sectional tests in Section 4.2, the place of supply rule for remitting VAT on digital B2C services deviates from the default destination principle. The VAT does not have to be remitted in the country where consumers are located (destination principle) but in the country where the supplying business is incorporated (origin principle). Accordingly, a group of firms (an MNE) that consists of affiliated firms in several countries might exploit the setting and sell (and invoice) services to international customers from firms located in countries with low VAT rates. The example in Figure OA. 2 assumes that Company A is located in country A where a VAT rate of 20 percent applies whereas Company B located in country B faces an applicable VAT rate of 25 percent. Both can serve a customer located in country B who is willing to pay a gross price (including an absolute VAT independent of the applicable rate) of 200.[33] Accordingly, Company B has to remit VAT of 40 (200/1.25 * 25%) to the tax authorities in country B, whereas Company A has to remit VAT of 33.33 (200/1.20 * 20%) to the tax authorities in country A. Accounting for the respective difference in the input tax credit assuming a net input cost of 100, the final cash flow difference between the two companies amounts to 6.67. The relative competitive advantage of Company A, which might be an affiliated firm of an MNE, generated through locating in the country with the 5 percentage points lower tax rate and providing services to the same customer as Company B is more than 10 percent of pre-income tax profits.

Table OA. 4 depicts the value-added tax (Panel A) and corporate income tax (Panel B) rates and corresponding changes throughout the sample period for the countries of our sample firms. This table provides for an overview of the staggered implementation of the tax rate changes and also shows the variation in absolute levels in VAT (17-25 percent) and CIT (10-38.94) rates in 2015. Figure OA. 3 illustrates that different countries adopt different multidimensional tax systems. For example, the tax system in Germany is characterized by a relatively low VAT rate and a high CIT rate whereas a low CIT rate and a high VAT rate prevail in Hungary. In Norway, both rates are relatively high while the UK applies a low-tax policy both for VAT and CIT.

Table OA. 5 illustrates that the tax policy changes that we exploit in our empirical analysis do not confound each other. Only two out of 24 VAT rate increases coincide with two CIT rate increases and three CIT rate cuts, respectively.

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[33] The location of the customer does not matter for this example.

Figure OA. 1: General Collection Process of Value-added Tax in Europe
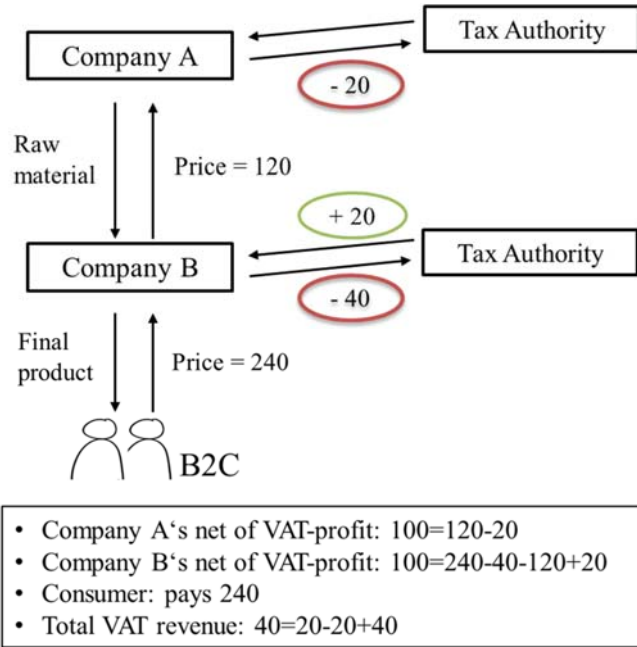
This figure illustrates the mechanism of the value-added tax in Europe. Company B is located in a country with an applicable VAT rate of 20%. The company incurs input costs of 100 (net) plus VAT on its input of 20. Company A, the supplier, receives a gross price of 120 and remits 20 of VAT to the tax authority. Company B is granted an input VAT refund of 20. Company B adds another 100 of value and sells the final product/service to consumers at a gross price of 240. This includes VAT of 40 (20% on a net price of 200), which the company remits (on behalf of the final consumer) to the tax authority. The service provider B realizes a net profit of 100 (=240-40-120+20).

Figure OA. 2: Value-added Taxation of Digital Services in Europe
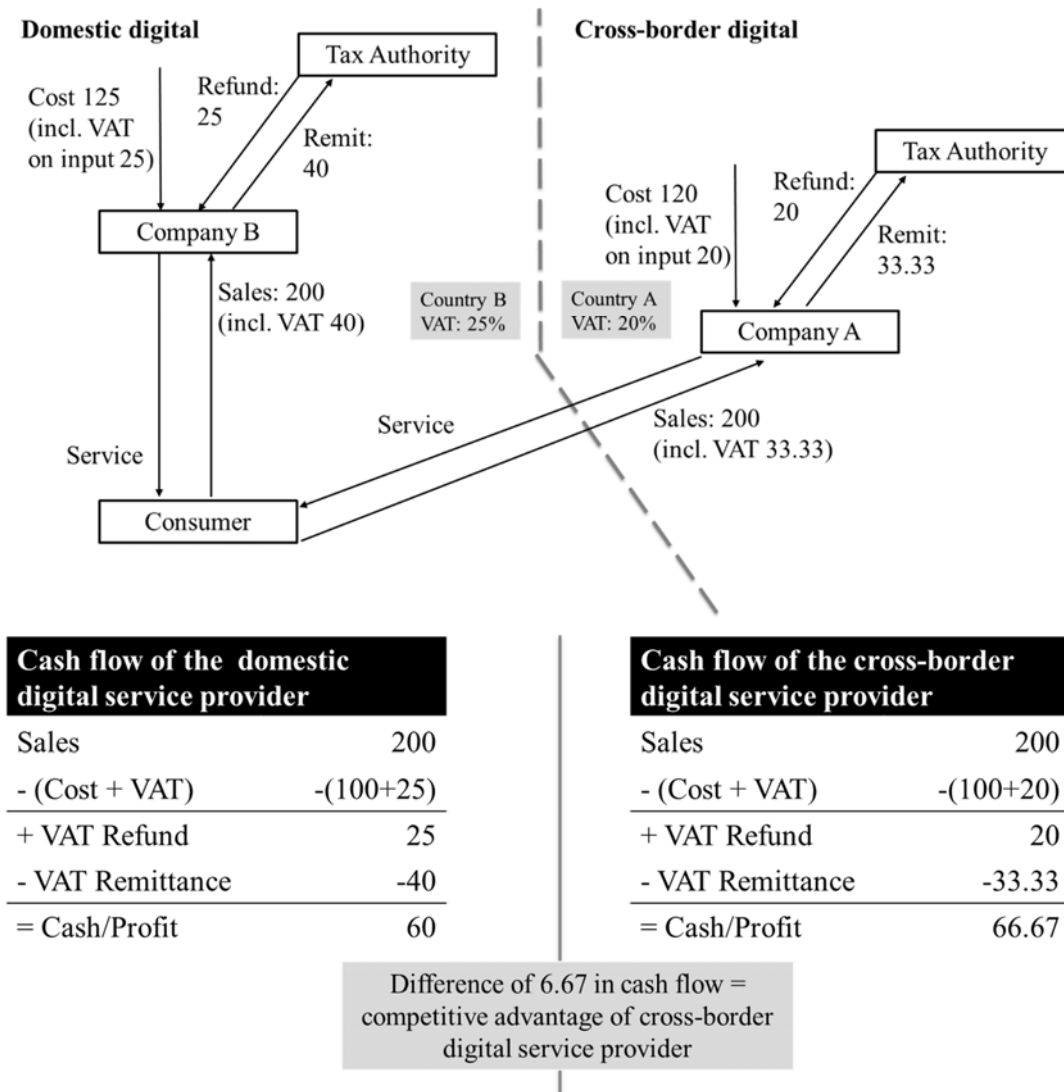
This figure illustrates the value-added taxation of digital service providers delivering to a final customer in Europe. The cross-border digital service provider is established in country A, which charges VAT at a rate of 20%. The domestic digital service provider and the final consumer (non-taxable person for VAT purposes) are established in country B, which charges VAT at a rate of 25%. Both companies incur input costs of 100 (net, plus VAT). The domestic digital service provider, company B, is liable to input VAT of 25 (100*25%) and is later granted an input VAT refund of 25. The digital service is sold to the consumer at a price of 200 (gross). The delivery of this service is taxable at the domestic rate of 25%. The gross price of 200 thus includes VAT of 40 (25% on a net price of 160), which the company remits (on behalf of the final consumer) to the tax authority of country B. The service provider realizes a net profit of 60 (net sales price of 160 less input cost of 100). The delivery of cross-border digital services by company A to the final consumer is taxable in the country of the service provider (origin principle; applicable until 2014) at a rate of 20%. The gross price of 200 includes VAT of 33.33 (20% on a net price of 166.67), which the company remits (on behalf of the final consumer) to the tax authority of country A. The service provider realizes a net profit of 66.67 (net sales price of 166.67 less input cost of 100). Hence, the cross-border digital service provider's profit is 6.67 higher than the domestic service provider's profit.

Table OA. 4: VAT and CIT Rate Changes 2007-2015

Panel A: VAT Rates and Changes for Sample Countries

	2007	Δ2008	Δ2009	Δ2010	Δ2011	Δ2012	Δ2013	Δ2014	Δ2015	2015
BE	21.00	-	-	-	-	-	-	-	-	21.00
BG	20.00	-	-	-	-	-	-	-	-	20.00
CZ	19.00	-	-	1.00	-	-	1.00	-	-	21.00
DE	19.00	-	-	-	-	-	-	-	-	19.00
DK	25.00	-	-	-	-	-	-	-	-	25.00
EE	18.00	-	-	2.00	-	-	-	-	-	20.00
ES	16.00	-	-	2.00	-	3.00	-	-	-	21.00
FI	22.00	-	-	1.00	-	-	1.00	-	-	24.00
FR	19.60	-	-	-	-	-	-	0.40	-	20.00
GB	17.50	-	-2.50	2.50	2.50	-	-	-	-	20.00
HR	22.00	-	-	1.00	-	2.00	-	-	-	25.00
HU	20.00	-	-	5.00	-	2.00	-	-	-	27.00
IE	21.00	-	0.50	-0.50	-	2.00	-	-	-	23.00
IT	20.00	-	-	-	1.00	-	-	1.00	-	22.00
LU	15.00	-	-	-	-	-	-	-	2.00	17.00
LV	18.00	-	3.00	-	1.00	-1.00	-	-	-	21.00
NL	19.00	-	-	-	-	2.00	-	-	-	21.00
NO	25.00	-	-	-	-	-	-	-	-	25.00
PL	22.00	-	-	-	1.00	-	-	-	-	23.00
PT	21.00	-	-1.00	1.00	2.00	-	-	-	-	23.00
RO	19.00	-	-	5.00	-	-	-	-	-	24.00
SE	25.00	-	-	-	-	-	-	-	-	25.00
SI	20.00	-	-	-	-	-	2.00	-	-	22.00
SK	19.00	-	-	-	1.00	-	-	-	-	20.00
Ø	20.13	-	0	2.00	1.42	1.67	1.33	0.70	2.00	22.04

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Panel B: CIT Rates and Changes for Sample Countries

	2007	Δ2008	Δ2009	Δ2010	Δ2011	Δ2012	Δ2013	Δ2014	Δ2015	2015
BE	33.99	-	-	-	-	-	-	-	-	33.99
BG	10.00	-	-	-	-	-	-	-	-	10.00
CZ	24.00	-3.00	-1.00	-1.00	-	-	-	-	-	19.00
DE	39.35	-8.40	-	-	-	-	-	-	-	30.95
DK	25.00	-	-	-	-	-	-	-0.50	-2.50	22.00
EE	22.00	-1.00	-	-	-	-	-	-	-1.00	20.00
ES	38.01	-2.27	-	-	-0.49	-	-	-	-1.85	33.40
FI	26.00	-	-	-	-	-1.50	-	-4.50	-	20.00
FR	34.43	-	-	0.99	-	1.64	-	1.87	-	38.93
GB	30.00	-2.00	-	-	-2.00	-2.00	-1.00	-2.00	-1.00	20.00
HR	20.00	-	-	-	-	-	-	-	-	20.00
HU	20.00	-	-	-	-	-	-	-	-	20.00
IE	12.50	-	-	-	-	-	-	-	-	12.50
IT	37.25	-5.95	-	-	-	-	-	-	-	31.30
LU	29.63	-	-1.04	-	0.21	-	0.42	-	-	29.00
LV	15.00	-	-	-	-	-	-	-	-	15.00
NL	25.50	-	-	-	-0.50	-	-	-	-	25.00
NO	28.00	-	-	-	-	-	-	-1.00	-	27.00
PL	19.00	-	-	-	-	-	-	-	-	19.00
PT	26.50	-	-	2.50	-	2.50	-	-	-2.00	29.50
RO	16.00	-	-	-	-	-	-	-	-	16.00
SE	28.00	-	-2.00	-	-	-	-4.00	-	-	22.00
SI	23.00	-1.00	-1.00	-1.00	-	-2.00	-1.00	-	-	17.00
SK	19.00	-	-	-	-	-	4.00	-1.00	-	22.00
Ø	25.09	-3.37	-1.26	0.37	-0.70	-0.27	-0.32	-1.19	-1.67	23.07

This table presents the VAT rates (Panel A) and CIT rates (Panel B) in the years 2007 and 2015 and corresponding changes over the sample period. We effectively exploit only 65 out of the 72 tax rate changes depicted in this table due to data limitations. For instance, we are not able to generate within-estimations for firms located in Luxemburg in the year of respective tax change since we do not observe financial data of the same firms before and after the tax change. We further do not exploit the tax changes in Croatia before their inclusion in the EU (2013).

Figure OA. 3: Consumption and Corporate Income Tax Rate Policies 2015
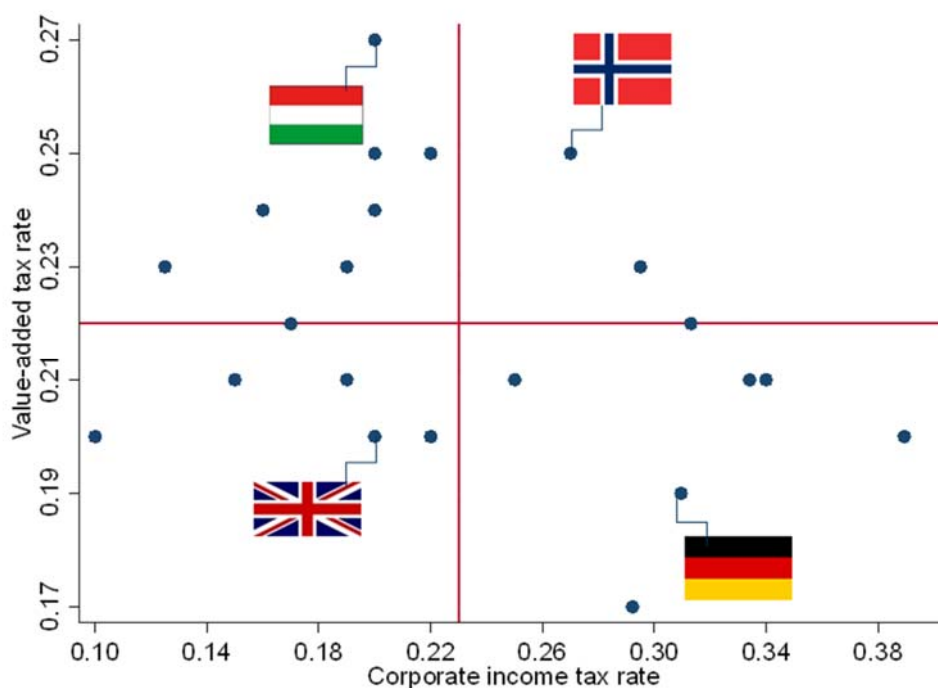
The blue points in this figure indicate the VAT respectively CIT rate applicable in the 24 countries included in our sample for the year 2015. The red lines indicate the mean VAT respectively CIT rate in 2015 across the 24 countries included in our regression analysis.

Table OA. 5: Contemporaneous Consumption and Corporate Income Tax Rate Changes

VAT	No Change		Increase		Cut		CIT Total	
CIT	N	%	N	%	N	%	N	%
No Change	110	64.71	19	11.18	4	2.35	133	78.24
Increase	4	2.35	**2**	**1.18**	**0**	**0**	6	3.53
Cut	28	16.47	**3**	**1.76**	**0**	**0**	31	18.24
VAT Total	142	83.53	24	14.12	4	2.35	170	100

This table reports how often VAT rate increases and cuts coincide with changes in the CIT rate for the countries in our sample for the period 2007-2015.

Addressing Endogeneity of Consumption Tax Changes

This section reports results of tests addressing the concern that VAT rate changes are endogenously determined and might thus lead to bias in our empirical estimates. For instance, VAT rates could be correlated with potential reported sales of affected firms due to policymakers acting in response to current economic developments in their country (Vegh and Vuletin, 2015; Heider and Ljungqvist, 2015; Jacob et al., 2018). Table OA. 6 reports results of regressions of a country's VAT rate policy changes on current and previous year macroeconomic factors. We run a linear probability model in columns (1) and (2) with the dependent variable being an indicator taking on the value of one if a country increases or decreases its VAT rate in a given year. In column (3), we use the absolute change in the VAT rate as the dependent variable. We include country and year fixed effects. We find that time varying macroeconomic factors are largely unrelated to VAT policy for our sample firms in the period 2007-2015. The only variable that appears to be consistently positively associated with the VAT rate is inflation. We find some evidence that the level of consumer prices is positively associated with VAT rate, which is unsurprising given that indexed consumer prices are measured relative to purchasing power parity including any taxes on goods and services (Eurostat, 2018b).

Since we find that inflation rates appear to predict VAT rate changes we conduct a special robustness test and limit the groups of control firms not experiencing a VAT increase to firms facing similar inflation rates. We adopt an approach similar to Jacob et al. (2018) and create clusters by sorting firms into quartiles based on the inflation rate they face. We then replicate our main specification (column (3) of Table 4) and include inflation cluster-industry-year effects. Industry by year fixed effects already rule out that results are driven by time-varying industry shocks to firms' level of outcome variables (Heider and Ljungqvist, 2015). This strategy limits the counterfactuals to the group of firms unaffected by VAT changes that face the same level of inflation and experience the same industry and inflation-cluster specific dynamic year-by-year development (i.e., any unobserved variation in economic conditions). As reported in column (1) of Table OA. 7, we confirm our main results and even find a stronger baseline effect. When we cluster by GDP growth (column (2)), we document quantitatively comparable estimates compared to our main result.

As discussed in the robustness section, we further confirm the validity of our main identifying assumption that the outcome variables of treated (affected by a VAT change) and control firms would have evolved similarly absent any policy change. To this end, we run separate regressions based on our main specification and replace the variable of interest with *VAT Change* using its lead, current, and lagged values from two years before to two years after the actual policy change. We report results in Panel A of Table OA. 8 and document treated and control firms do not show any differential changes

in sales reporting behavior before the treated firms experience a VAT rate change. We find that the strongest effect materializes in the year of the change (point estimate of -0.29 significant at the 1% level) while the negative relationship between VAT rates and reported sales continues to be significant in the two years after the reforms. We plot the point estimates and 95% confidence intervals from these regressions in Figure 3 in the main text. In Panel B, we repeat the analysis and look at VAT rate increases only. The variable of interest is a dummy taking on the value of one in the year of a VAT rate increase. Again, we document that there is no evidence for a violation of the parallel trends assumption as treated and control firms show no significantly different changes in reported sales in the years leading up to the VAT rate changes. When VAT rates increase, however, firms' changes in reported sales seem to take up a year of response time. Results suggest that reported sales decrease by 0.3 percent one year after the VAT rate increases and by 0.5 percent two years after the VAT increase. Overall, these results also provide evidence that firms did not anticipate the VAT reforms, which would pose a threat to a causal interpretation of the findings (Ljungqvist et al., 2017).

Table OA. 6: Determinants of VAT Rate Changes

	VAT Increase	VAT Cut	VAT Change
	(1)	(2)	(3)
LogGDP	7.6699	0.0699	0.2873
	(11.9898)	(5.3842)	(0.3884)
GDP-growth	-10.4690	0.0793	-0.3381
	(12.5805)	(5.6706)	(0.4059)
LogConsPrice	2.5433**	-0.8876	0.0497*
	(1.1889)	(0.7102)	(0.0254)
Inflation	11.1618**	-4.5374*	0.3064**
	(4.3264)	(2.5540)	(0.1324)
Startingbusiness	-0.0136	0.0016	-0.0001
	(0.0123)	(0.0037)	(0.0003)
LogGDP_t-1	-8.0532	-0.0230	-0.3049
	(12.5184)	(6.0157)	(0.4089)
GDP-growth_t-1	-0.7039	-0.4369	-0.0062
	(0.9134)	(0.6295)	(0.0260)
LogConsPrice_t-1	-1.4738	0.4886	-0.0132
	(1.1417)	(0.4682)	(0.0190)
Inflation_t-1	0.9352	-1.3206	0.0996
	(2.8481)	(1.0053)	(0.0749)
Startingbusiness_t-1	0.0238**	-0.0047	0.0005
	(0.0110)	(0.0045)	(0.0004)
Constant	-2.2923	1.9202	-0.0333
	(0.3803)	(0.2376)	(0.0099)
Observations	146	146	146
R-squared	0.3083	0.2706	0.3525
Year FE	YES	YES	YES
Country FE	YES	YES	YES

This table reports coefficient estimates from an OLS regression model on the country level using a country and time fixed effects model and robust standard errors clustered on the country level. Columns (1) and (2) are based on a linear probability model. Column (1) reports results when the indicator variable *VAT Increase* indicates whether a country increases its VAT rate in a given year, column (2) replicates the model of column (1) when using an indicator variable for VAT rate decreases. Column (3) reports results when the absolute value of the VAT rate change is the dependent variable. *Startingbusiness* is the score for starting a business in each economy's largest business city taken from World Bank Group (http://www.doingbusiness.org/). All other variables are defined in Table 1. Robust standard errors, clustered on the country level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table OA. 7: Regressions Based on Alternative Control Groups with Similar Economic Conditions

	LogSales	
	(1)	(2)
VAT	-1.0559***	-0.4702*
	(0.2644)	-0.2447
CIT	-0.6615***	-0.7127***
	(0.1910)	-0.1818
Ttc_c	0.0000	0.0000
	(0.0001)	(-0.0001)
LogPexp	0.3399***	0.3404***
	(0.0293)	-0.0295
LogAssets	0.4112***	0.4114***
	(0.0162)	-0.0161
LogGDP	0.3449***	0.4942***
	(0.0896)	-0.0909
LogConsPrice	-0.1535	-0.2196**
	(0.0969)	-0.0784
Inflation	0.8692	1.3320***
	(0.6418)	-0.273
Constant	0.1473	-1.2316
	(0.7934)	-0.7608
Observations	270,528	270,502
Adj. R-sq. (within)	0.4707	0.4737
Firm FE	YES	YES
GDP growth cluster-Industry-Year FE	NO	YES
Inflation cluster-Industry-Year FE	YES	NO

This table reports coefficient estimates when replicating the main result as in specification (3) reported in Table 4 using different fixed effects structures. In column (1), the model includes, in addition to firm fixed effects, GDP growth cluster-industry-year fixed effects where a GDP growth cluster is defined by GDP growth quartiles by year. In column (2), the model includes inflation cluster-industry-year fixed effects where an inflation cluster is defined by quartiles of levels of inflation rates by year. Robust standard errors, clustered on affiliate level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table OA. 8: Test of the Common Trend Assumption and Dynamic Effects of VAT

Panel A: VAT Changes

	LogSales				
	(1)	(2)	(3)	(4)	(5)
VAT Change_t-2	0.0856				
	(0.0711)				
VAT Change_t-1		-0.0572			
		(0.0618)			
VAT Change			-0.2892***		
			(0.0580)		
VAT Change_t+1				-0.1644**	
				(0.0654)	
VAT Change_t+2					-0.1947***
					(0.0674)
Observations	135433	203682	203682	135433	102759
Adj. R-sq.	0.5190	0.5326	0.5134	0.4846	0.4561
Firm FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES

Panel B: VAT Increases

	LogSales				
	(1)	(2)	(3)	(4)	(5)
VAT Increase_t-2	0.0019				
	(0.0014)				
VAT Increase_t-1		-0.0005			
		(0.0013)			
VAT Increase			0.0015		
			(0.0011)		
VAT Increase_t+1				-0.0030**	
				(0.0013)	
VAT Increase_t+2					-0.0050***
					(0.0015)
Observations	155530	203682	316900	203682	155530
Adj. R-sq.	0.5152	0.5326	0.5373	0.5134	0.4859
Firm FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES

This table reports coefficient estimates from regressions based on the baseline specification reported in column (3) of Table 4. Instead of the value-added tax rate *VAT*, the models in Panel A include the absolute value of the change in the VAT rate between t and t-1 and its lead and lagged values as the variable of interest, respectively. The analysis is repeated in Panel B when the indicator variable *VAT Increase* and its respective lead and lagged values are the variables of interest. Robust standard errors, clustered on affiliate level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Supplementary Tests

Cross-sectional Tests: Tax Incidence and Consumption Tax Planning

We conduct additional tests to provide evidence on the mechanisms of consumption tax planning. As briefly discussed in Section 4.2, we consider economic theory suggesting that consumption tax incidence depends on the relative elasticity of supply and demand. The consumption tax responsiveness should thus vary across firms facing different levels of demand elasticity. To test this phenomenon, we rerun our cross-sectional tests based on the industry interactions and include a proxy for demand elasticity. Similar to Jacob et al. (2018), we argue that a firm's share of total assets can be a proxy for its market share and thereby for the size of a firm's output market and its market power. Firms with a higher market share may act as price setters and face less elastic demand.[34] We construct an indicator variable, *Highassetshare*, equal to one if a firm's share of total assets in total assets of the industry using 2-digit NACE codes is above the highest quartile of the asset share distribution by country and year.

Empirical results are reported in Table OA. 11. We find that the negative effect of consumption taxes on firms' reported sales is attenuated for firms with a relatively high market share consistent with those firms facing less elastic demand (Jacob et al., 2018). The results in columns (2) to (5) suggest that the overall effects for the different industries are comparable to our findings of the industry-cross-sections from Table 5. In contrast to the overall effect of the average sample firm, we find that digital service firms and B2C firms are more responsive to VAT if they have a high market share (significant and negative coefficient on the triple interaction). We interpret this result as evidence for a bigger opportunity to gain a competitive advantage from engaging in consumption tax planning through sales reporting given their bigger size (and thus, sales). These firms have larger opportunities to exploit the origin principle, i.e., report sales at affiliates that face relatively lower VAT rates. The group of intra-group service firms does not show any differential behavior, which is consistent with these firms not being affected by consumption taxes given they are not engaging in external sales. The significant and positive coefficient for B2B firms shows that part of the overall positive response of this industry is driven by those B2B firms with a high market share. This also supports the argument that market power among the agents in the supply chain does matter.

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[34] Previous studies use a firm's profit margin to approximate its position concerning demand elasticity (Lerner, 1934; Aghion et al., 2005; Kubick et al., 2015; Jacob et al., 2018). Since we examine how consumption taxes affect a firm's output, measured by sales, a variable such as profit margin may create concerns of endogeneity, so we refrain from using it in our analyses.

Integrating Consumption and Corporate Income Tax Planning

To provide a first evidence on the assumption that tax managers consider multiple taxes when optimizing a firm's tax position, we investigate whether firms anticipate the effect that consumption tax planning has on the corporate income tax base. Sophisticated corporate tax planners might be aware of the fact that consumption tax planning places a constraint on exploiting profit shifting opportunities given that reported sales directly map into pre-tax profits. In particular, they might evaluate the benefits of responding to value-added taxes via reporting sales against the potential costs of subsequent income taxation driven by the applicable CIT rate. If this is the case, an increase in the VAT rate should not invoke a negative sales response if the level of (subsequent) income taxation is relatively low. Accordingly, firms might be particularly active in consumption tax planning if the associated effect on pre-tax income is congruent with the goal of income tax minimization.

We modify equation (1) and replace the continuous measure VAT by indicator variables for tax rate changes, VATminus (VATplus) taking on the value of one if an affiliate experiences a VAT rate cut (increase) in the respective year and zero otherwise. We then interact these variables separately with an indicator for being located in a country with a low CIT rate, *LowCIT*. The indicator is equal to one if the CIT rate is below the median of the sample or 21%.[35] This approach allows us to analyze whether firms' sales response to VAT cuts and increases is asymmetric and whether it depends on the CIT rate, which determines the (subsequent) level of profit taxation. We exploit substantial variation since our sample consists of countries with both favorable (e.g., Bulgaria and Czech Republic) or unfavorable (e.g., Portugal) CIT and VAT rates relative to the sample mean, and countries with either a relatively high CIT and low VAT rate (e.g., Spain and Germany) or vice versa (e.g., Hungary). Figure OA. 3 further illustrates the variation exemplarily for the year 2015.

We report results in Table OA. 10. In column (1), we interact the indicators for VAT cuts and increases with the indicator for a CIT rate below the median and find a highly significant and positive coefficient on the interaction term of *VATplus* and *LowCIT* suggesting that firms' reaction to VAT increases is attenuated when the CIT rate is sufficiently low. This suggests that affiliates in countries with a CIT rate below the median over the entire sample period (31.4%) do not negatively react to increases of the VAT rate when reporting sales. The coefficient on the interaction of *VATminus* and *LowCIT* cannot be reported in column (1) since VAT rate decreases are rare (only about 2,800 observations) and hardly occur for countries in our sample with a CIT rate below the median. In column (2), we find a similar

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[35] We choose our threshold for low CIT countries at 21% as this corresponds to the average of the effective average tax rate (EATR) for EU countries (European Commission/ZEW, 2018) and equals the newly introduced CIT rate in the US.

attenuation effect (even overcompensation) when *LowCIT* denotes that the CIT is below 21%. We also find that the positive response to VAT cuts is generally stronger and find no differential effect if the CIT rate is low. These results suggest that the sales response to VAT rate increases is contingent on the CIT rate being sufficiently high.

Cross-sectional Tests: Profit Shifting and Consumption Tax Planning

In addition to our baseline analysis on profit shifting reported and discussed in Section 4.3, we conduct cross-sectional analyses of the four specific sub-categories as defined above to also test for a differential profit shifting behavior. For these tests, we augment equation (2) by interacting the respective industry indicators (*Digital*, *B2C_non-digital*, *B2B,* and *Intra-group*) with the *CIT* and the interaction term of the *CIT* and *S*. Similar to our cross-sectional analyses on consumption taxes and firms' output, we employ country-year fixed effects to control for any economic conditions that are unobserved but possibly correlated with tax policy.

Table OA. 11 reports the regression results. First, we examine digital service firms. The recent public debate and anecdotal evidence suggest that firms in the digital economy engage in particularly aggressive profit shifting (OECD, 2015; European Commission, 2014).[36] Empirical studies document that MNEs report lower (higher) profits in high-tax (low-tax) affiliates if they have the opportunity to employ transfer pricing strategies based on the exploitation of intellectual property (e.g., Harris, 1993; Grubert, 2003; Beer and Loeprick, 2015). Primary value drivers of digital business models are the use of internet technologies, self-developed software and human capital-related organizational assets (Brynjolfsson and McAfee, 2014) that are hardly captured by publicly available financial information.[37] Apart from the evidence in Klassen et al. (2014), which is limited to the U.S. e-commerce sector, we do not know whether firms in the digital sector of the economy are particularly active tax planners. We do not find evidence for a significantly different effect of the CIT rate on reported profits in case of digital service providers. We can, however, show that the attenuation effect of the consumption tax sensitivity is somewhat stronger for digital service firms given a significant (10%-level) and positive coefficient on the triple-interaction term suggesting that these firms engage more heavily in consumption tax planning and forgo more profit shifting opportunities. Future research could address

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[36] See, e.g., Netflix paying only little corporation tax in the UK (The Guardian (online) 13 October 2016, available at https://www.theguardian.com/business/2016/oct/13/netflix-uk-corporation-tax). The finance ministers of several European Union (EU) countries recently claim that the current tax system is flawed, arguing MNEs pay only little tax in countries where they exploit consumer markets and rely on the local infrastructure (The Wall Street Journal (online) 21 September 2017, available at https://www.wsj.com/articles/eu-preps-tax-crackdown-on-silicon-valley-1505988538). Potential solutions to address the issue include mechanisms to tax MNEs based on the location of consumption rather than on book profits (EU, 2017a, 2017b).
[37] Forms of intellectual property measured in prior empirical studies are mostly intangible assets, R&D, and patents and hence probably do not account for different forms of value drivers in digital business models.

whether firms in the digital economy exploit other income tax planning channels that we cannot measure with the approach of estimating a standard production function.

We document that profit shifting behavior of B2C service firms is comparable to that of digital service firms: the attenuation effect of the firm's VAT-sensitivity on the income response to CIT is strong for these firms (column (3)). For our sub-group of intra-group service providers, we do not find any differential behavior (column (4)). For B2B service affiliates, in contrast, we find that profit shifting behavior is not attenuated if firms are VAT sensitive. While the coefficient on the interaction term of *CIT* and *S* is significant and positive, this attenuation effect is eliminated for the B2B firms given the significant and negative coefficient on the triple interaction (*B2B*CIT*S)*.

Overall, these cross-sectional results are consistent with the industry-specific findings on consumption tax planning. They provide further support for our second hypothesis that the negative association between reported pre-tax profits and income tax rates is attenuated for firms with a higher consumption tax rate sensitivity.

High Dimensional Linear Fixed Effects Model

Table OA. 12 reports results of the sales regression including high dimensional fixed effects (Correia, 2016) used for estimating the VAT sensitivity (*S*).

Table OA. 9: Cross-sectional Tests: Industries and Market Share (Total Assets, in t-1)

Specification / Industry:	(1) Baseline	(2) Digital	(3) B2C non-digital	(4) B2B	(5) Intra-group
			LogSales		
VAT	-0.8879***				
	(0.1005)				
Highassetshare	-0.1271***	-0.0966***	-0.0560*	-0.1159***	-0.0893*
	(0.0300)	(0.0315)	(0.0323)	(0.0317)	-0.0483
*Industry*VAT*		-0.9042***	-0.7511***	0.7721***	0.8813**
		(0.2694)	(0.1335)	(0.1367)	-0.3517
*Highassetshare*VAT*	0.7101***	0.5597***	0.3774**	0.5812***	0.4564*
	(0.1488)	(0.1569)	(0.1597)	(0.1585)	-0.2411
Industry *Highassetshare*VAT*		-0.3272***	-0.1521***	0.1445***	-0.1089
		(0.0640)	(0.0342)	(0.0317)	-0.0745
Observations	223,779	210,296	210,296	210,296	84,522
Adj. R-sq,	0.5093	0.4494	0.4496	0.4497	0.4438
Firm Controls	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	NO
Country-Year FE	NO	YES	YES	YES	YES

This table reports coefficient estimates from linear panel regressions on the affiliate level, using a fixed effects model and robust standard errors. The dependent variable is the natural logarithm of the affiliate's operating revenue (sales). Column (1) reports results of estimating equation (1) augmented by an interaction term of *Highassetshare*VAT*. The constant term is not reported here. Columns (2) to (5) include the interaction term of *Highassetshare*VAT,* the VAT rate interacted with an indicator variable for the respective industry segments *Industry*VAT* and the triple interaction term for *Industry*Highassetshare*VAT*. The R-sq. refers to the adjusted R-sq. in column (1), whereas for columns (2) to (5), we report the adjusted within-R-sq. Robust standard errors, clustered on affiliate level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table OA. 10: Consumption Tax Planning and Profit Shifting Incentives

	LogSales	
	(1)	(2)
Specification:	CIT Median	CIT < 21%
VATminus	0.0299***	0.0271***
	(0.0047)	(0.0047)
VATplus	-0.0110***	-0.0053***
	(0.0016)	(0.0011)
VATplus*LowCIT	0.0126***	0.0159***
	(0.0022)	(0.0045)
VATminus*LowCIT		0.0048
		(0.0202)
Observations	263,365	263,365
Adj. R-sq,	0.5141	0.5140
Firm Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Country-Year FE	NO	NO

This table reports coefficient estimates from linear panel regressions modifying equation (1) of Table 7 by using indicator variables for VAT rate increases and decreases and including the interaction term of these dummies with an indicator variable for the CIT rate. The dependent variable is the natural logarithm of the affiliate's sales. In column (1), the indicator is equal to one if the CIT rate in the respective country is below the median of the sample.[38] In column (2) the indicator is equal to one if the CIT rate in the respective country is below 21%. Tests of joint significance yield a p-value smaller than 0.01 for each case of interactions. Robust standard errors, clustered on affiliate level, are presented in parentheses. *, ** and *** represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

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[38] The coefficient on the interaction of VATminus and LowCIT cannot be reported in column (1) since VAT rate decreases are rare (only about 2,800 observations) and hardly occur for countries in our sample with a CIT rate below the median.

Table OA. 11: Profit Shifting and Consumption Taxes: Cross-Sectional Tests (Industries)

	LogEbit				
	(1)	(2)	(3)	(4)	(5)
Specification	S	Digital	B2C	B2B	Intra-group
/ Industry:	(Baseline)		non-digital		
CIT	-0.3634***				
	(0.1297)				
*Industry*CIT*		0.1973	-0.1769	0.4954**	0.2481
		(0.4984)	(0.2384)	(0.2438)	-0.5909
*S*CIT*	0.1785***	0.1586***	0.0698	0.2627***	0.2762***
	(0.0347)	(0.0360)	(0.0454)	(0.0419)	-0.0592
*Industry**		0.2661*	0.2398***	-0.2949***	-0.0615
*S*CIT*		(0.1483)	(0.0702)	(0.0747)	-0.1828
Observations	299,901	299,900	299,900	299,900	119,984
Adj. R-sq.	0.0960	0.0787	0.0788	0.0788	0.0777
Firm Controls	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	NO
Country-Year FE	NO	YES	YES	YES	YES

This table reports coefficient estimates from linear panel regressions on the affiliate level, using a fixed effects model and robust standard errors. The sample consists of 299,901 affiliate-year observations since we include the *S* measure. The dependent variable is the natural logarithm of the affiliate's EBIT. Column (1) reports results of estimating equation (2) including the interaction of the CIT rate and the *S* measure. The constant term is not reported here. Columns (2) to (5) include the interaction term of *S*CIT,* the CIT rate interacted with an indicator variable for the respective industry segments *Industry*VAT* and the triple interaction term for *Industry*S*VAT*. The R-sq. refers to the adjusted R-sq. in column (1), whereas for columns (2) to (5), we report the adjusted within-R-sq. Tests of joint significance yield a p-value smaller than 0.01 for each case of interactions. Robust standard errors, clustered on MNE-group level, are presented in parentheses. *, ** and *** and represent two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table OA. 12: Robustness Tests: High Dimensional Fixed Effects Regression to Calculate *S*

| | *LogSales* | |
Specification:	(1) Baseline	(2) VAT*Firm FE
VAT	-0.5201***	
	(0.0694)	
CIT	-0.1451***	0.1478***
	(0.0334)	(0.0433)
Ttc_c	0.0002***	0.0003***
	(0.0000)	(0.0000)
LogPexp	0.3487***	0.3344***
	(0.0041)	(0.0055)
LogAssets	0.4183***	0.3835***
	(0.0033)	(0.0042)
LogGDP	0.4420***	0.1822***
	(0.0186)	(0.0240)
LogConsPrice	-0.1694***	0.0652***
	(0.0188)	(0.0229)
Inflation	1.1208***	0.9381***
	(0.0736)	(0.0778)
Observations	299,901	299,901
Adj. R-sq. (within)	0.5374	0.4911
Firm FE	YES	YES
Year FE	YES	YES

This table reports the regression results when running the regression of reported sales on the explanatory variables as in column (3) of Table 4 using the high-dimensional fixed effects estimator by Correia (2016) (*reghdfe* command in *STATA*). Column (1) reports results replicating column (3) of Table 4 with affiliate fixed effects. Column (2) reports results when the VAT rate is interacted with the affiliate fixed effects. The results of this regression, i.e., the point estimates on the interaction term, are used to construct the variable *S*.

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