FOR HERE OR TO GO? HOW VAT INDUCES SHIFTING TOWARD PREFERENTIALLY TAXED TAKE-AWAY SALES

Arnt O. Hopland[a,b] and Robert Ullmann[a,c]

[a] Norwegian Center for Taxation (NoCeT)

[b] Department of Business and Management Science, Norwegian School of Economics

[c] Department of Business Taxation, Cluster Finance and Information, University of Augsburg

Abstract

We use rich, genuine tax return data on a micro level for the entire population of SMEs in the German restaurant industry to present empirical evidence that these firms employ misclassification of meal consumption type as a VAT evasion strategy. Specifically, a ceteris paribus increase in the standard rate significantly increases the declared sales volume of take-away consumption (reduced rate) relative to on-site consumption (standard rate)—in spite of gross prices being identical for both consumption types. Based on our findings, we conclude that increasing the efficiency of tax audits is key to addressing the specific VAT evasion scheme or, alternatively, that the VAT code should be altered to dissolve the VAT rate differential.

JEL-Classification: H26, H21, H32

Keywords: value added tax, tax evasion, tax base shifting, restaurant industry

VERY PRELIMINARY DRAFT - PLEASE DO NOT CITE OR DISTRIBUTE

1 Introduction

The public debate on tax avoidance (including tax evasion) focuses on large corporations, with companies such as Apple and Google receiving broad media coverage for their legal, but supposedly unethical, tax avoidance schemes. However, small and medium-sized enterprises (hereafter "SMEs") compose a much larger part of the economy in most developed countries, and their tax avoidance characteristics regarding government revenues are thus at least equally relevant. Nonetheless, research on SME tax avoidance is much less common. Available studies on tax avoidance by SMEs focus mostly on firm owners' possibilities of either fully underreporting income or reclassifying a given income stream such that it is subject to an advantageous income tax regime (e.g., by collecting dividends instead of wages in a sole owner corporation; see, e.g., Harju and Matikka 2016). We contribute to this literature by studying a particular tax evasion scheme in the German restaurant industry, which is structurally dominated by SMEs. Specifically, we provide empirical evidence of evasion in value added taxes (hereafter "VAT") by means of within-country tax base shifting. Despite the widespread application of VAT in many major economies, the academic literature on VAT evasion is scarce (Keen 2007), for both large firms and SMEs.

Institutionally, within the European Union (hereafter "EU"), computation of the VAT base is largely harmonized. Despite this harmonization, each country decides on its VAT rates independently[1]. More important for our research design, countries are also able to set not only one standard rate but also one or two reduced rates, where the latter aim to promote certain goods or services. This ultimately creates a within-country VAT rate differential. Hence, a potential for tax evasion exists in this setting either (i) when the classification of goods and services is ambiguous or (ii) when fiscal authorities are unable to monitor exact classification (see, e.g., Agha and Haughton 1996; EU Commission 2007a[2]). Our tax evasion scheme belongs to the latter group (ii).

---

[1] Value Added Tax Directive 1977, last altered 28/11/2006, Council Directive 2006/112/EC.
[2] The EU Commission also refers to these cases as borderline cases.

For the restaurant industry, many EU countries opt to tax on-site consumption at the standard rate and to tax take-away consumption at a reduced rate[3], facilitating a tax evasion scheme that exploits the VAT rate differential through the misclassification of the consumption type (i.e., misreporting on-site sales as take-away sales). Monitoring by tax authorities is nearly impossible in this case, as actual consumption type can only be observed at the point of sale. These monitoring complications are further amplified by both the low individual value of transactions and the large number of occurrences. Consequently, the efficiency of respective tax audits is low.

We investigate the tax evasion scheme by using a large sample of confidential tax return panel data at a micro level on all firms in the German restaurant industry. Beyond the availability of this unique dataset, Germany has further peculiarities that positively reflect on our research design. First, gross prices in the restaurant industry are customarily identical between take-away consumption and on-site consumption, and hence, the VAT rate differential directly translates into profit margin for firms. Second, by law, end customers must be presented with gross prices on menus. Consequently, end customers are largely unaware of the VAT rate applied by firms. Finally, Germany increased its standard rate from 16% to 19% in 2007, whereas its sole reduced rate remained at 7%, providing us with a well-defined natural experiment.

Our contribution is threefold. First, we focus on a tax evasion scheme that is anecdotally employed mostly by SMEs, which are often neglected in tax evasion research, as discussed before. For the case of the German restaurant industry, the vast majority of firms are independently owned and operated (e.g., by members of one family) rather than being part of a conglomerate. This even holds when a restaurant is associated with a restaurant chain, as franchising agreements are by far the most common mode of operations in this industry. Second, we are the first to provide empirical evidence on the application of a VAT evasion scheme that exploits the VAT rate differential through tax base shifting. Moreover, our study is unique in the analysis of genuine tax return data that are available on the firm level and in panel structure. Third, we generate estimates on the scale of the effects. While the tax evasion scheme presents only one example of

[3] The general rationale is that on-site consumption has notable elements of entertainment, while take-away consumption is largely regarded as a means of providing nutrition.

poor policy design, other tax evasion schemes that exploit VAT rate differentials are recognized and anecdotally discussed in the literature (e.g., Bettendorf and Cnossen 2015). Hence, we provide quantitative arguments for policymakers to use in addressing these issues.

Despite the relatively modest change in VAT rate from 16% to 19%, we find in our difference-in-difference approach that the reform had a considerable impact. First, we observe a shift from on-site sales (standard rate) to take-away sales (reduced rate) at precisely the time of the tax rate change, indicative of increasing tax evasion via the misclassification of meal consumption types on the merits. With regard to magnitude, we report a semi-elasticity of 2.261 in our data, i.e., a 1%-point increase in the standard rate increases sales volume taxed at the reduced rate in the treatment group by 2.261%. This figure compares to the consensus semi-elasticity of 0.8%, which is known from cross-border income-shifting studies that consider generally large multinational enterprises. As a secondary result, we report that the tax evasion scheme may lead to market distortions in the restaurant industry as a whole. Specifically, we observe that total sales of firms with access to the tax evasion scheme increase relative to firms with no or very limited access to the tax evasion scheme. Hence, the effective social costs are not limited to foregone tax revenues, but the design of the VAT code may also have an effect on market composition.

The paper proceeds as follows: In Section 2, we provide an overview of the related literature and describe the institutional setting, including the relevant VAT reform. Empirical strategies are discussed in Section 3. The main results are presented in Section 4, while Section 5 offers a robustness analysis. Finally, concluding remarks are presented in Section 6.

2 Literature Review and Institutional Setting

2.1 Literature Review

To our knowledge, no comparable studies and no directly relevant stream of research exist in the academic literature. However, several streams of research are closely related and shall be discussed here.

The literature on tax avoidance and evasion in SMEs is dominated by studies on how income can be underreported or shifted, for example, from dividends to labor income, depending on which factors are treated most favorably in the tax system. For instance, Joulfaian and Rider (1998) study voluntary tax compliance in the US and find that differences in taxes play an important role in explaining differences among sources of self-employment income. Engström and Holmlund (2009) follow the approach suggested by Pissarides and Weber (1989) and study how food consumption varies across households with and without self-employed members. Based on the 'excess food consumption', they conclude that households with self-employed members underreport income by as much as 30%. Moreover, underreporting of income seems to be more prevalent among the self-employed with unincorporated businesses than among those with incorporated businesses. Alstadsæter and Jacob (2016) find robust evidence of extensive income shifting across tax bases in response to a 2006 dividend tax cut in Sweden. Relative to owners of unincorporated businesses, owner–managers of closely held corporations do not increase total income but rather relabel earned income on the firm level as dividend income. Furthermore, they find that the income shifting effect is stronger for owner–managers with tax incentives and with easier access to income shifting through a high ownership share. Finally, Harju and Matikka (2016) exploit a Finnish dividend tax reform to study how firm owners react to an exogenous change in tax rates; their findings support the existence of highly active income-shifting behavior.

Several studies provide normative evidence that VAT evasion is a serious concern for governments (Ainsworth 2006). Specifically, Keen and Smith (2006) describe the main forms of noncompliance, including misclassification of sales to obtain a favorable tax rate, which is ultimately a strategy that underlies the tax evasion scheme that we study. Hence, our results also add to the general criticism of the VAT system, specifically within the EU, that has emerged over several years. As a most recent example, in describing the Dutch experience, Bettendorf and Cnossen (2015) conclude that the neutrality of the Dutch VAT system and, by extension, the European VAT system can be improved considerably by abolishing the reduced rates and by eliminating or reducing the frequency of other VAT exemptions. The tax evasion scheme discussed here would in fact be impossible if their advice were followed.

Empirical evidence on VAT evasion is still very limited, and available analyses are conducted mostly on the macro level. A few studies use theoretical VAT revenues

derived from national accounts data, input-output tables and proprietary data to investigate the VAT gap (i.e., the difference between the expected tax liability by all firms and the actual revenue collected) and report that this gap is substantial (Nam et al. 2001; Dziadkowski et al. 2002; Gebauer and Parsche 2003). According to Gebauer and Parsche (2003, Table 2), the VAT gap for Germany for the years 1997-2001 varies from 5.9% to 9.5%. A similar, more recent study on behalf of the EU Commission describes a VAT gap of approximately 12% on a country-level average, with several EU member countries, such as Greece, Italy and Slovakia, being above 20% (Reckon 2009). In its most current orientation debate on the 2016 European Semester, dated 24/2/2016, the EU Commission provided estimations that the total VAT gap amounts to EUR 170 billion in 2013 alone. It is also stated that the EU VAT system remains fragmented and creates significant administrative burdens, specifically for SMEs. Moreover, on the macro level, Matthews and Lloyd-Williams (2001) study the ratio of VAT reclaimed (input tax) to VAT paid in four industries in the period 1985-1994, where a higher ratio is considered indicative of higher noncompliance (see also Agha and Haughton 1996). In this regard, Matthews and Lloyd-Williams (2001) find that, over time, the ratio is increasing in the restaurant sector, strongly increasing in the hairdressing sector, flat in the clothing and footwear sector and declining in the furniture and floor-covering sector.

Analyses on the micro level mostly investigate tax incidence and competition aspects of the VAT system, with identification building on VAT rate increases for specific industries. For instance, Harju and Kosonen (2013) study a reduction in VAT for restaurants in Finland and find that while the prices were reduced slightly, the reform had little or no effect on the quantity of services, wages and entries/exits. Kosonen (2013) studies the tax incidence of the VAT by using a Finnish reform that reduced the VAT rate for hairdressers. His results suggest that prices decreased by only half of the full pass through and that the change in equilibrium quantity is negligible. Wagner et al. (2014) investigate a similar reform for the German hotel industry and report that hotels do not significantly decrease, or even significantly increase, prices in response to a substantial VAT rate decrease of 12% (following a reclassification of hotel services from the standard rate to a reduced rate). Correspondingly, the VAT rate decrease in these settings must ultimately be considered an industry-specific subsidy.

2.2 Institutional Setting

Our setting is specifically based on the German VAT system, which essentially applies to all goods delivered and all services rendered within Germany (by firms with minimum total sales of EUR 17,500). Notwithstanding, our research also has policy implications on an international level, as the VAT base is identically computed in all EU member countries and the setting used here is common among those countries. Despite this harmonization, EU member countries set their tax rates independently, and hence, tax rate competition between countries prevails. More important to our specific design, two different types of tax rates are set. The standard rate applies to the majority of transactions, with an EU wide minimum of 15%. In addition, one or two reduced rates can be set, which generally aim to indirectly subsidize certain groups of transactions (e.g., health, cultural and environmental transactions)[4].

From an institutional point of view, structural changes in the EU VAT system are politically difficult, since they require unanimous consent among all EU member countries. Consequently, the European Commission published a green paper where the complexities arising from VAT rate differentials are among the most relevant shortcomings discussed (EU Commission 2010). In addition, the EU Commission shows some preference for a single VAT rate (per country) while also acknowledging the political arguments for allowing reduced rates. In an earlier communication to the EU Council and the EU Parliament, the EU Commission also explicitly recognizes the tax evasion potential and administrative burden arising from the VAT rate differential in cases where definitions of goods or services are ambiguous or where auditing of exact classification is inefficient.

Firms may evade taxes by shifting the VAT base from the standard rate to a reduced rate, much like in cross-border income shifting between countries with different tax rates. Note that computation of the VAT base is exactly the same, regardless of whether a standard rate or a reduced rate is applied; hence, there is no need to distinguish between effective rate and statutory rate, or even marginal rate for that matter. Specific to our research design, most countries of the EU subject food products consumed on-site

[4] For a complete list of goods and services eligible for the reduced rate, refer to Annex III of the Council Directive 2006/112/EC.

in a restaurant to the standard rate, whereas take-away consumption of the exact same food products is taxed at a reduced rate. Germany also follows this distinction. Consequently, an anecdotally acknowledged tax evasion scheme builds on misclassification of meal consumption type as take-away when it factually occurs on-site. This specific tax evasion scheme is most relevant when transactions are not conducted in cash, i.e., when total sales cannot be misreported.

The tax evasion scheme is sustained by the fact that monitoring actual consumption type is nearly impossible. First, during standard tax audits, which are conducted in hindsight and generally for multiple years, information on the actual consumption type is not available, as customers cannot be questioned at the time of an audit. Second, real-time monitoring is vastly inefficient as restaurants conduct a large number of small value transactions. Hence, such an audit would, at best, reveal only a small portion of the total tax evasion at high costs to the audit. Given a consequentially minor amount of documented tax evasion, the expected value of penalties is negligible[5]. Third, end customers must legally be presented with gross prices on menus and have negligible incentives to demand a formal invoice for on-site consumption. Hence, the end customer in most cases is not aware of the tax rate applied; thus, whistleblowing is unlikely. Ultimately, the efficiency of tax audits is low, even though audit authorities pay relatively high attention to the issue[6].

Regarding the effects of VAT on firm profits, we note that, on the input side, a firm can reclaim any VAT that it pays itself (input tax). Hence, the prevailing tax rate does not directly affect costs of production, and consequently, a change in the tax rate also does not have an effect. By contrast, VAT rates affect the output side of the firm. In particular, end customers, i.e., individuals who do not act on behalf of another firm, have no means of reclaiming VAT. Consequently, only gross prices are of relevance when firms in the restaurant industry conduct transactions with end customers. Moreover, gross prices in the German restaurant industry are customarily identical

---

[5] The German criminal code requires penalties that are proportional to the verifiable crime, and potentially resulting tax assessments based on estimated values may not legally include an implicit or explicit penalty element. Applicable interest rates are fixed at 6% p.a. (with no compounding), regardless of market interest rates.

[6] See Circulars of the German Fiscal Authorities dated 20/3/2013 and dated 4/11/2013, Ref. IV D 2 - S 7100/07/10050-06 with reference to Art. 6 of the EU Council Implementation Regulation, Ref. 282/2011.

between on-site and take-away consumption. Consequently, the VAT rate differential directly translates into profit margin for the restaurant if the meal consumption type is misclassified. Finally, in this regard, we note that the VAT rate is initially set based on sales rather than profits. Hence, if a firm is able to evade 1% of the tax on sales, this would translate into an even greater share of income, conditional on its profit-to-sales ratio.

In the period under investigation, Germany applies one reduced rate of 7%, which is kept constant, while the standard rate is set at 16% until the end of 2006 and then raised to 19% starting in 2007 (until today). Consequently, the VAT rate differential is 9% until the end of 2006 and 12% thereafter. Relevant changes in the computation of VAT base did not occur. We utilize this ceteris paribus increase in the VAT rate differential as a natural experiment.

3 Empirical Specification

We hypothesize that an increase in the VAT rate differential induces firms with access to the tax evasion scheme to misclassify on-site consumption as take-away consumption to a greater extent. The main argument is that the increase in the regular rate, ceteris paribus, renders the tax evasion scheme more beneficial.

Our main specification builds on the difference-in-difference estimator:

$$TaxBase_{i,t} = \alpha + \beta_1 Treat_{i,t} + \beta_2 After_{i,t} + \beta_3 After_{i,t} \times Treat_{i,t} + \beta_c Controls_{i,t} + \varepsilon \quad (1)$$

where *TaxBase* is either the VAT base taxed at the standard rate (*StandardSales*), the VAT base taxed at the reduced rate (*ReducedSales*) or the total VAT base (*TotalSales*) of firm i in year t. All measures for *TaxBase* are in net values, i.e., the VAT that is ultimately levied is excluded. We use *TotalSales* to proxy for the general economic development of the firm. *StandardSales* (*ReducedSales*) is used as the natural proxy for meals that are sold as on-site (take-away) consumption. Note that the use of *StandardSales* potentially overestimates the amount of on-site consumption, as any accompanying nonfood products, most notably beverages, are taxed at the standard rate. However, this measurement error only works against our results. *Treat* is a dummy variable with a value of one if the firm prepares meals both for take-away and on-site

consumption. *After* is a dummy variable that equals one from 2007 onward. Our variable of interest is the interaction *AfterXTreat*.

Two alternative scenarios might occur in which our hypothesis must be carved out. First, if *TotalSales* is not affected by the increase in the VAT rate differential, our prior would postulate that *StandardSales* decrease, i.e., β_3 is negative, and that *ReducedSales* increase, i.e., β_3 is positive. The corresponding change in *StandardSales* and *ReducedSales* should also have a similar absolute value, on average across all firms, to be indicative of VAT base shifting. Second, if *TotalSales* are affected by the event, any change in *TotalSales* should—under the Null—be allocated proportionally to *StandardSales* and *ReducedSales* in their respective shares in comparison with *TotalSales* prior to the increase of the standard rate. Any diverging allocation of a change in *TotalSales* that decreases the ratio of *StandardSales* to *TotalSales* (or correspondingly increases the ratio of *ReducedSales* to *TotalSales*) supports our hypothesis.

Finally, the control vector contains relevant firm characteristics. *InputTax* indicates the amount of VAT paid on all goods and services acquired and thus proxies for any nonlabor inputs in the production process. Most input products in the restaurant industry are perishable; therefore, they are acquired relatively shortly before sale. Hence, we use *InputTax* in t rather than t-1 as a control. We also include the number of employees (*Employees*) in year t to proxy for labor. We include different sets of year fixed effects and firm fixed effects.

4 Data and Descriptive Statistics

We obtain genuine tax return data from the German fiscal authorities for the entire population of German firms that are subject to VAT for the period from 2004 to 2009. The dataset originally contains 16,757,767 tax returns (firm-years), of which 909,395 belong to the restaurant industry according to the WZ industry identifier ("food and beverage service activities").[7] To avoid outliers, we exclude from the treatment group firms that have either total sales of more than EUR 38.5 million or more than 250

[7] Equivalent to the NACE industry identifier.

employees in at least one of the years in our period of investigation.[8] This criterion excludes merely 167 firms, confirming our previous claim that the German restaurant industry is largely dominated by SMEs. Of the remaining firms, 72,748 file a tax return in all six years (436,488 firm-years), and we limit our analysis to these firms.[9] The tax return data are merged with data from the German firm registry, which contain annual information on the number of employees per firm. Corresponding information could be merged for 261,366 firm-years.

The treatment group comprises firms classified as "restaurants and mobile food service activities"[10], including, restaurants, cafeterias, fast-food restaurants, ice cream truck vendors and market stalls engaged in food preparation. As a first naïve test of our hypothesis, Figure 1 presents the evolution of the ratio of *ReducedSales* to *TotalSales* over time for the treatment group (with controls for *InputTax* and *Employees*). We find that the ratio of *ReducedSales* to *TotalSales* increases significantly only after the increase in the VAT rate differential in 2007.

[Insert Figure 1 about here]

The control group comprises firms classified as engaging in "beverage-serving activities"[11], including, bars, taverns, discotheques and fruit juice bars. We argue that the treatment group and control group react similarly to macroeconomic developments, as they serve similar types of end customers in similar circumstances. However, misclassification of consumption type is not a viable tax evasion strategy in the control group, since beverage-serving activities are subject to the standard rate regardless of the

---

8 Following the definition of an SME according to German GAAP.

9 The major reason for limiting the analysis as such is that the industry identifier was updated from the 2003 version to the 2008 version during the period of investigation. Using a balanced panel ensures that only firms that belong to the treatment group or the control group according to both versions are included.

10 The following industry codes are included: 55301, 55302, 55303, 55304 and 55305 (WZ industry identifier 2003 available for the years 2004 to 2008) and 56101, 56102, 56103, 56104 and 56105 (WZ industry identifier 2008 available for the year 2009).

11 The following industry codes are included: 55401, 55403, 55405, 55406 and 55407 (WZ industry identifier 2003 available for the years 2004 to 2008) and 56301, 56302, 56303, 56304 and 56309 (WZ industry identifier 2008 available for the year 2009).

consumption type.[12] Note, however, that firms in the control group may still have positive *ReducedSales*, as they may conduct other transactions at the reduced rate (e.g., events in the cultural sector). Moreover, given our data, we cannot fully eliminate the possibility that firms in the control group may also provide meals for on-site or take-away consumption. We nevertheless argue that the volume of these sales should be minimal in light of the overall business model. More important, any effects found in the treatment group should be similarly found in meal sales for the control group, and hence, this measurement error only works against our results. Descriptive statistics for both treatment group and control group are presented in Table 1.

[Insert Table 1 about here]

We observe that firms in the treatment group are, on average, slightly larger than firms in the control group for all variables and that the number of firm-years in the treatment group (311,916) is considerably higher than that in the control group (123,572). Considering the full sample, we observe that firms in our dataset, and hence in the German restaurant industry, are mostly small and not even medium-sized entities according to all common criteria. On a technical note, we observe that all variables that are derived from the tax returns—i.e., all variables other than *Employees*—have perfectly complete data for all firm-year observations, whereas data on *Employees* are available only for 59.9% of the full sample. This percentage of available data is again higher in the treatment group (66.1%) than in the control group (44.4%).

As a final descriptive test to support our difference-in-difference specification, we also use placebo treatment tests for both 2005 and 2006, and the results are not significant at any conventional level for *TotalSales*, *StandardSales* and *ReducedSales* (not tabulated). Along the same line of argument, Figure 2 reports the relative time trend in the ratio of *ReducedSales* to *TotalSales* for both groups.

[12] We note that there are two exceptions to this general rule: Milk or mixed milk drinks (containing at least 75% milk) and tap water (not prepackaged) are taxed at the reduced rate if they are offered for take-away consumption. We argue that the impact of these exceptions on the control group is nil.

[Insert Figure 2 about here]

The graph shows a similar pattern for both groups until 2006, and intergroup differences continue to be small in 2007; however, they noticeably increase in 2008 and 2009. Overall, our data do not speak against a common trend before the increase in the VAT rate differential.

5 Results

Our main results are presented in Table 2.

[Insert Table 2 about here]

We first note for all three models that the sum of coefficients from the OLS for *StandardSales* and *ReducedSales* is almost exactly equal to the coefficients for *TotalSales*, which corresponds to our expectations and confirms the quality of the data. Moreover, we note that, ranging from 0.389 to 0.943, adjusted R^2 is relatively large in all three models with a common sample size of 261,366 firm-years, and hence, our models have high explanatory power.

We note at this point that we decide against including a log specification in light of our specific research design. First, we find a considerable number of observations for the variables *StandardSales* and *ReducedSales* that are exactly zero (i.e., where firms perform sales of only one of the two kinds). This issue could obviously be addressed by adding one to each observation. However, second, our interpretation of the results strongly relies on a comparative interpretation of the columns *TotalSales*, *StandardSales* and *ReducedSales* in Table 2. Such reliance is unusual to some extent, albeit necessary for our specific research question, and including log specifications would considerably hamper such a comparative analysis.

The coefficient on *AfterXTreat* in Model 1 is marginally significantly positive for *TotalSales*, nonsignificant for *StandardSales* and highly significantly positive for *ReducedSales*. Hence, considering our hypothesis, firms in the treatment group increased their ratio of *ReducedSales* to *TotalSales* after the increase in the standard rate in comparison with those in the control group. The incremental effects in absolute values of *ReducedSales* amount to EUR 4,095.50 per year for the average firm in the treatment group. When considering the more detailed analysis in Model 2, we note that respective shifts to *ReducedSales* largely occur in 2008 and 2009, with highly significantly positive coefficients in these years. Moreover, we observe that *YearXTreat* is nonsignificant for *StandardSales* in all years and significant for *TotalSales* only in 2009. Overall, adaption to the increase in the standard rate seems to occur with a delay of about one year, but it is structurally comparable between 2008 and 2009.

Model 3 includes a full set of firm fixed effects and year fixed effects. The data still show a relative increase in the ratio of *ReducedSales* to *TotalSales* for the firms in the treatment group, but the interpretation of this result is slightly more difficult: The coefficients for *AfterXTreat* are positive for all three endogenous variables *TaxBase* but are significantly larger for *ReducedSales* than for *StandardSales* (p-value = 0.000 (0.000) [0.000] for 2007 (2008) [2009]). Recalling from Figure 1 that the initial ratio of *ReducedSales* to *TotalSales* for the firms in the treatment group in 2004 is 22.39%, we can conclude that a higher increase in *ReducedSales* than in *StandardSales* with correspondingly increasing *TotalSales* straightforwardly increases the ratio of *ReducedSales* to *TotalSales* for the treatment group relative to the control group. Hence, we again find empirical support of a misclassification of consumption type.

We note that the coefficients initially appear to be economically modest in all three models. However, we investigate SMEs, which are small in individual volume but large in number. Thus, the overall economic effects are driven by the quantity of firms rather than by the amount of tax evasion of the average firm. Furthermore, we recall that the specific tax evasion scheme is nearly impossible to monitor, and hence, the efficiency of tax audits is arguably low—both before and after the event underlying our difference-in-difference specification. Thus, restaurants may have already shifted all reasonably available sales volume—conditional on prevailing audit intensity and audit efficiency

parameters—to be taxed at the reduced rate, even before the change in the VAT rate differential (for a similar argument, see Dharmapala (2014)[13]). Consequently, when the VAT rate differential changes at the margin, the scope for further tax base shifting is limited. Overall, tax base shifting within our specific tax evasion scheme may be, at the margin, much more dependent on audit efficiency than on the VAT rate differential. Nevertheless, during the period from 2004 to 2009, the ratio of *ReducedSales* to *TotalSales* in the treatment group increases from 22.39% to 23.91% in light of an increase in the standard rate from 16% to 19%, positing a semi-elasticity estimate of 2.261 (i.e., a 1-percentage-point increase in the VAT rate differential increases the *ReducedSales* of restaurants by 2.261%). This figure is about three times the corresponding consensus semi-elasticity estimate of 0.8 that is reported in studies on tax-induced cross-border income shifting by multinational enterprises (Buettner et al. 2012; Desai et al. 2004; Heckemeyer and Overesch 2013; for an overview, see Dharmapala 2014). Our semi-elasticity estimate is relatively smaller than that of Fisman and Wei (2004), who report a semi-elasticity of 3.0 to 4.6 in a setting in which the mislabeling of goods for customs duty purposes results in misclassification into lower tax brackets. Note also that the reported semi-elasticities are based on sales; hence, conditional on the profit-to-sales ratio, the effects on income are systematically larger. Finally, firms in the treatment group also regularly offer drinks, which are always taxed at the standard rate, as a side product to their end customers. Hence, the reported effects are ideally allocated only to the proportion of their *TotalSales* that actually originates from meal consumption (which is unknown to us); thus, our estimates present merely a lower bound of the actual effects.

Finally, we note that we also find an indication of tax-induced distortion in the restaurant industry market, which favors firms with access to the tax evasion scheme under investigation here. More specifically, we observe that the coefficients for *AfterXTreat* in Model 1 and *YearXTreat* in Models 2 and 3 are always positive when

[13] Dharmapala (2014) argues that for the area of cross-border income shifting by multinational enterprises, transfer pricing rules, debt allocation and royalty arrangements—which are also associated with low audit enforcement efficiency owing to inevitable discretion in tax rules—usually enable firms to shift a certain amount of income across borders. Since these are considered mostly "paper transactions", operative costs of income shifting are small. Hence, even relatively minor tax rate differentials between countries would induce almost perfect exploitation of available discretion, whereas any subsequent change in the tax rate differential that is observable for archival research does not induce notable marginal effects.

they are significant. Consequently, relative to firms in the control group, firms in the treatment group have increased their sales—which straightforwardly indicates an increase in market share for firms in the treatment group. Given the specific setting that we investigate here, this result indicates that access to the tax evasion scheme has given firms in the treatment group a competitive advantage within the restaurant industry.

6 Robustness and Caveats

Several robustness tests are performed but are not tabulated: (i) We repeat the analyses only for firms that reported both *StandardSales* and *ReducedSales* at least once before the increase in the VAT rate differential. (ii) We limit the window of analysis to two years before and after the increase in the VAT rate differential. (iii) We use an alternative proxy for *InputTax* that includes import VAT. (iv) We limit the analysis to firms in which data for *Employees* is not missing for all six years. (v) We replace missing values for the control variable *Employees* with zero and additionally include a dummy variable that indicates cases of such replacement. (vi) We estimate the model by using Tobit with the ratio of *ReducedSales* to *TotalSales* as the endogenous variable. The results are structurally unchanged. Most notably, the results for specification (i), which aims to capture the internal margin of using the tax evasion scheme, are considerably stronger than those in the main specification.

Finally, (vii) we repeat the analysis between subsamples of the treatment group. Specifically, we divide the treatment group into firms with high access to the tax evasion scheme of misclassifying consumption types and those with low access.[14] As expected, we find that greater access to the tax evasion scheme is associated with more VAT base shifting in response to an increase in the VAT rate differential.

Our analysis has three caveats. First, we do not have data on potential price changes in either the treatment or control group. Hence, changes in *StandardSales* or *ReducedSales* could alternatively be explained by a constant quantity at changing meal prices. However, we recall that gross prices for take-away and on-site consumption are customarily the same in Germany over the entire data period (until today).

[14] Industry groups within the treatment group are labeled as providing food either "for consumption on-site and take-away" (high access) or "mainly for consumption on-site" (low access).

Consequently, while changes in prices can explain changes in *TotalSales* at constant quantities, they cannot explain changes in the ratio of *ReducedSales* to *TotalSales*. Second, our results could also be explained by an actual change in consumption patterns toward take-away dining, since we use changes in sales composition as our proxy for tax evasion. Although we are ultimately unable to reject this alternative explanation, in light of Figures 1 and 2, we argue that the specific timing of changes in treatment firm behavior provides strong support for our hypotheses. Finally, our analysis exclusively relies on German data which are collected in the specific German setting. We maintain that this caveat trades off against the high quality and large sample size of the genuine tax data available. Moreover, the VAT code in other EU member countries allows for a similar tax evasion scheme, and hence, at a minimum, similar effects on the merits are highly probable.

7 Conclusion

We use genuine micro-level tax return data to study firms in the German restaurant industry. We first find empirical support for the anecdotal claim that this industry is strongly dominated by SMEs, more specifically that the vast majority can even be considered small and very small entities. In fact, only 167 firms in the restaurant industry in our full population sample do not meet the German GAAP criteria of an SME. We further report that firms in the restaurant industry misclassify meal consumption types as a VAT evasion strategy (i.e., through tax base shifting). In this sense, we are the first to provide empirical evidence on a tax evasion scheme that exploits the VAT rate differential by shifting the VAT base from the standard rate to the reduced rate. By contrast, anecdotal evidence suggests that a large number of tax evasion schemes that follow corresponding patterns exist and that tax audits scrutinize these patterns where possible.

We estimate that, at the margin, a 1-percentage-point change in the standard rate increases the share of sales taxed at the reduced rate by 2.261%. In light of the specific characteristics of the tax evasion scheme, which can hardly be monitored by tax authorities while simultaneously constituting the source of extant anecdotal evidence, this result indicates that firms may exploit the majority of available tax evasion potential even at relatively small VAT rate differentials. Our findings support the proposition that

it is not the magnitude of the VAT rate differential but the efficiency of audits that is key to addressing the tax evasion scheme.

Another obvious path of eliminating the discussed tax evasion scheme is to apply a uniform tax rate to both consumption types in the restaurant industry, i.e., to diminish the VAT rate differential on its merits. The uniform tax rate for the restaurant industry could be either the standard rate or the reduced rate, where the European Commission is more in favor of the latter alternative. Overall, the broader implication of our results is that any criteria on which the tax code relies must be well-defined—and must facilitate monitoring—to avoid tax evasion and market distortion. This condition is arguably often not met by the VAT code in its current form.

References

Agha, A., & Haughton, J. (1996). Designing VAT systems: Some efficiency considerations. *Review of Economics and Statistics*, 78(2), 303-308.

Ainsworth, R. T. (2006). Carousel fraud in the EU: A digital VAT solution. *Tax Notes International* 50, 443-488.

Alstadsæter, A., & Jacob, M. (2016). Dividend taxes and income shifting. *Scandinavian Journal of Economics,* forthcoming, doi: 10.1111/sjoe.12148.

Bettendorf, L., & Cnossen, S. (2015). The long shadow of the european VAT, exemplified by the Dutch experience. *Finanzarchiv*, 71(1), 118-139.

Buettner, T., Overesch, M., Schreiber, U., & Wamser, G. (2012). The impact of thin-capitalization rules on the capital structure of multinational firms. *Journal of Public Economics*, 96(11–12), 930-938.

Desai, M. A., Foley, C. F., & Hines, J. R. (2004). A multinational perspective on capital structure choice and internal capital markets. *Journal of Finance*, 59(6), 2451-2487.

Dharmapala, D. (2014). What do we know about base erosion and profit shifting? A review of the empirical literature. *CESInfo Working Paper*, No. 4612.

Dziadkowski, D., Gebauer, A., Lohse, W. C., Nam, C. W., & Parsche, R. (2002). 'Entwicklung des Umsatzsteueraufkommens und finanzielle Auswirkungen neuerer Modelle bei der Umsatzbesteuerung. *ifo Forschungsberichte*, No. 13, München.

Engström, P., & Holmlund, B. (2009). Tax evasion and self-employment in a high-tax country: evidence from Sweden. *Applied Economics*, 41(19), 2419-2430.

European Union Commission (2010). Green paper on the future of VAT - towards a simpler, more robust and efficient VAT system, http://ec.europa.eu/taxation_customs/resources/documents/common/consultations/tax/future_vat/com(2010)695_en.pdf .

Fisman, R., & Wei, S. (2004). Tax rates and tax evasion: Evidence from "missing imports" in China. *Journal of Political Economy*, 112(2), 471-496.

Gebauer, A., & Parsche, R. (2003). Evasion of value-added taxes in Europe: IFO approach to estimating the evasion of value-added taxes on the basis of national accounts data (NAD). *CESifo DICE Report*, No. 2, 40-44.

Harju, J., & Kosonen, T. (2013). Restaurant VAT cut: Cheaper meal and more service? *Government Institute for Economic Research Working Paper Series*, No. 52.

Harju, J., & Matikka, T. (2016). Business owners and income-shifting: evidence from Finland. *Small Business Economics*, 46(1), 115-136.

Heckemeyer, J., & Overesch, M. (2013). 'Multinationals' profit response to tax differentials: Effect size and shifting channels, *ZEW Discussion Paper*, No. 13-045.

Joulfaian, D., & Rider, M. (1998). Differential taxation and tax evasion by small business. *National Tax Journal*, 51, 676-687.

Keen, M. (2007). VAT attacks! *International Tax and Public Finance*, 14(4), 365-381.

Keen, M., & Smith, S. (2006). VAT fraud and evasion: What do we know and what can be done? *National Tax Journal*, 59(4), 861-887.

Kosonen, T. (2013). More haircut after VAT cut? On the efficiency of service sector consumption taxes. *Government Institute for Economic Research Working Paper Series*, No. 49.

Matthews, K., & Lloyd-Williams, J. (2001). The VAT-evading firm and VAT evasion: An empirical analysis. *International Journal of the Economics of Business*, 8(1), 39-49.

Nam, C. W., Parsche, R., & Schaden, B. (2001). Measurement of value added tax evasion in selected EU countries on the basis of national accounts data. *IFO Studien*, No. 2, 127-144.

Pissarides, C. A., & Weber, G. (1989). An expenditure-based estimate of Britain's black economy. *Journal of Public Economics*, 39(1), 17–32.

Reckon, L. L. P. (2009). Study to quantify and analyse the VAT gap in the EU-25 Member States (on behalf of the EU Commission). http://ec.europa.eu/taxation_customs/resources/documents/taxation/tax_cooperation/combating_tax_fraud/reckon_report_sep2009.pdf. Accessed 21 September 2009.

Wagner, F., Weber, S., & Gegenwarth, L. (2014). Wird die Umsatzsteuer überwälzt? Eine empirische studie der Preispolitik im Deutschen Hotelgewerbe. *Arqus Discussion Paper*, No. 179.

Tables and Figures

				Quartiles		
Variable	**N**	**Mean**	**Std-Dev**	**25%**	**50%**	**75%**
Treatment Group						
TotalSales	311,916	252,585.3	569,664.1	74,059.5	132,498.0	245,970.0
StandardSales	311,916	197,367.6	428,609.2	46,208.0	96,742.0	200,921.0
ReducedSales	311,916	55,134.1	224,422.1	1,291.0	10,013.0	49,958.5
InputTax	311,916	19,878.8	49,687.3	5,636.5	10,153.0	18,811.0
Employees	206,091	4.173	9.342	1.000	2.000	4.000
After	311,916	0.500	0.500	0.000	0.500	1.000
Control Group						
TotalSales	124,572	171,535.3	308,627.1	50,853.5	93,146.0	181,346.0
StandardSales	124,572	158,960.8	294,779.5	45,802.5	84,389.0	166,017.5
ReducedSales	124,572	12,461.4	50,105.9	0.0	1,213.0	5,781.0
InputTax	124,572	15,730.4	30,708.0	4,489.0	8,200.5	16,023.5
Employees	55,275	3.128	8.788	1.000	1.000	3.000
After	124,572	0.500	0.500	0.000	0.500	1.000
Full Sample						
TotalSales	436,488	229,453.9	510,318.3	65,898.5	120,530.5	227,760.5
StandardSales	436,488	186,406.4	395,445.2	46,057.5	92,674.0	190,300.5
ReducedSales	436,488	42,955.5	192,559.3	752.0	4,272.0	36,789.0
InputTax	436,488	18,694.9	45,131.6	5,265.0	9,589.0	18,062.0
Employees	261,366	3.952	9.238	1.000	2.000	4.000
After	436,488	0.500	0.500	0.000	0.500	1.000
Treat	436,488	0.715	0.452	0.000	1.000	1.000
AfterXTreat	436,488	0.357	0.479	0.000	0.000	1.000

Table 1: Descriptive Statistics

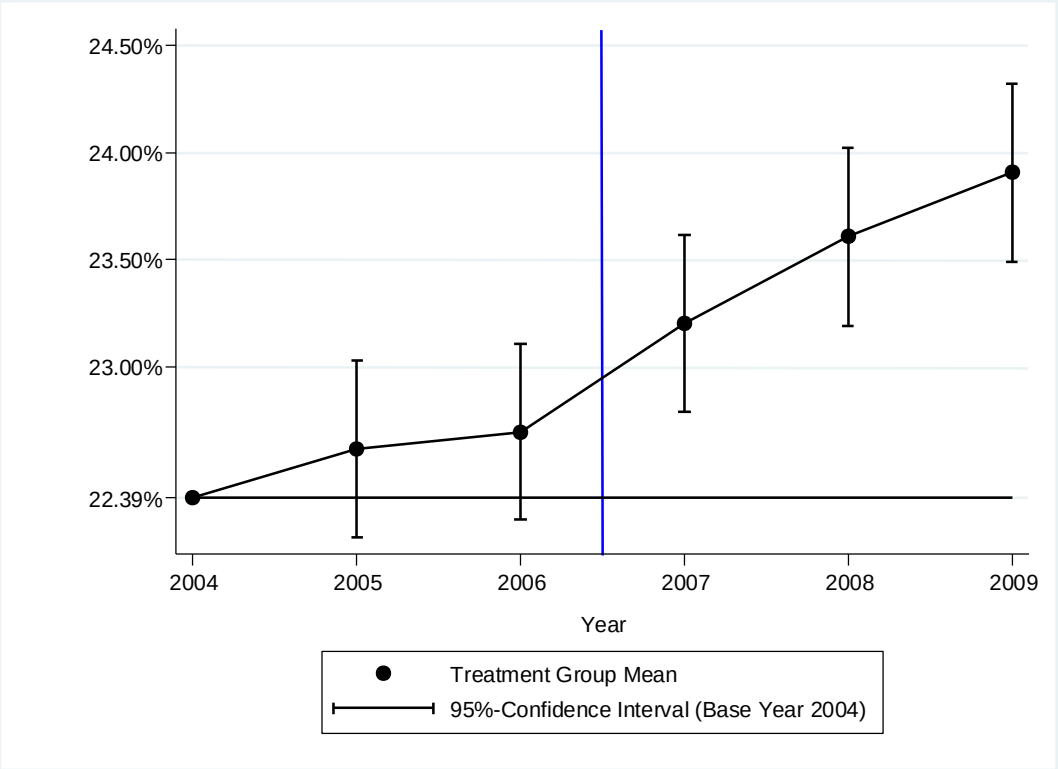

Figure 1: Development of the Ratio of *ReducedSales* to *TotalSales* over Time

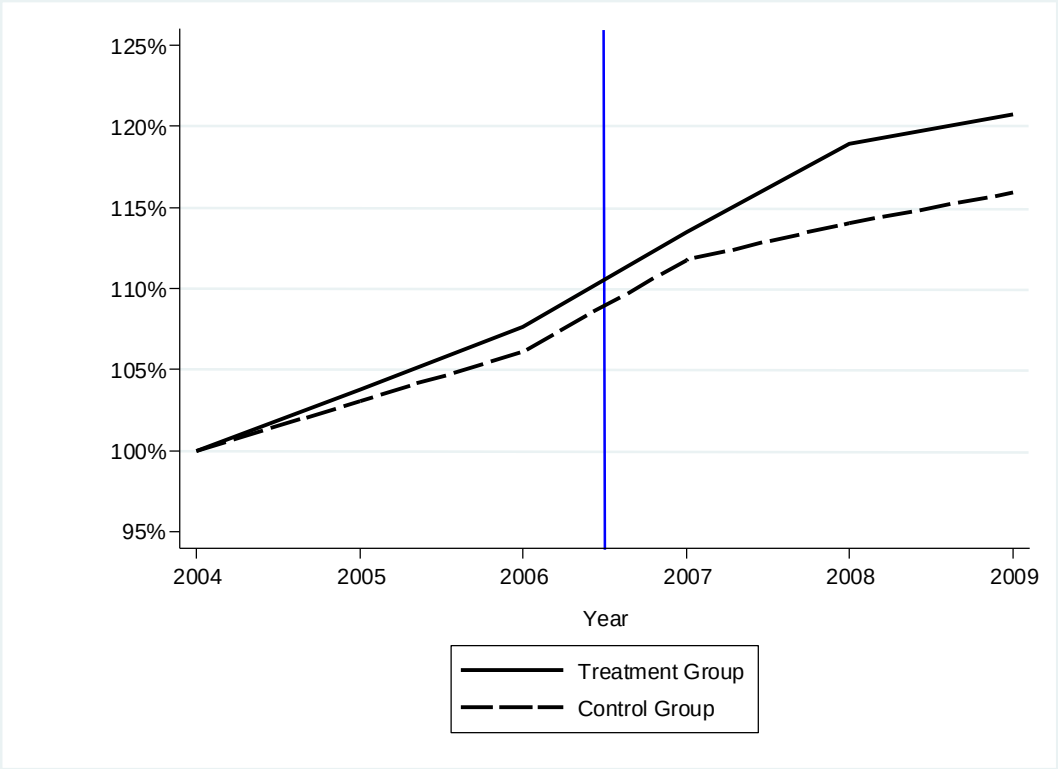

Figure 2: Graphical Assessment of the Common Trend Assumption

Table 2: Results

	Model 1			Model 2			Model 3		
Variable	**TotalSales**	**StandardSales**	**ReducedSales**	**TotalSales**	**StandardSales**	**ReducedSales**	**TotalSales**	**StandardSales**	**ReducedSales**
Treat	27557.3 ***	-13393.8 ***	40931.3 ***	27558.5 ***	-13393.3 ***	40932.1 ***	firm FE	firm FE	firm FE
	(18.60)	(-10.11)	(38.98)	(18.60)	(-10.11)	(38.98)			
After	-33277.9 ***	-24586.8 ***	-8840.9 ***	-33278.3 ***	-24587 ***	-8841.1 ***	year FE	year FE	year FE
	(-22.21)	(-16.55)	(-7.52)	(-22.21)	(-16.55)	(-7.52)			
AfterXTreat	2505.2 *	-1508.7	4095.5 ***						
	(1.68)	(-0.92)	(3.20)						
Y2007XTreat				-360.2	-2120.2	1665.1	3494.3 ***	1498.1	2100.3 ***
				(-0.22)	(-1.11)	(1.10)	(3.11)	(1.49)	(3.90)
Y2008XTreat				1544.7	-2407.5	4136.5 ***	7863.2 ***	2959.6 ***	4985.0 ***
				(0.95)	(-1.26)	(2.67)	(6.79)	(2.62)	(8.41)
Y2009XTreat				6370.8 ***	14.63	6512.8 ***	8139.6 ***	2644.6 **	5517.9 ***
				(3.85)	(0.01)	(4.17)	(5.99)	(1.96)	(7.87)
InputTax	9.597 ***	7.166 ***	2.431 ***	9.597 ***	7.166 ***	2.432 ***	6.217 ***	4.291 ***	1.932 ***
	(59.57)	(53.55)	(15.92)	(59.57)	(53.55)	(15.92)	(15.46)	(17.30)	(7.36)
Employees	10764.5 ***	5963.2 ***	4800.0 ***	10763.1 ***	5962.6 ***	4799.1 ***	12661.5 ***	9049.9 ***	3601.6 ***
	(10.04)	(8.47)	(6.69)	(10.04)	(8.47)	(6.69)	(8.82)	(9.97)	(4.13)
N	261366	261366	261366	261366	261366	261366	261366	261366	261366
adjusted R2	0.943	0.828	0.502	0.943	0.828	0.502	0.672	0.572	0.389
F-statistic	8568.4	2190.8	1552.6	6194.1	1565.4	1109.1	473.9	215.1	95.81

T-statistics are shown in parentheses, robust to heteroskedasticity. A constant term is included (not reported).

* p<0.1 ** p<0.05 *** p<0.01