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# Profit Shifting by Multinationals and the Ownership Share: Evidence from European Micro Data

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# Profit Shifting by Multinationals and the Ownership Share: Evidence from European Micro Data

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**Abstract**

We provide indirect empirical evidence of profit shifting behavior by multinational enterprises (MNEs) employing a panel study for the years 1995 to 2005, while controlling for unobservable fixed firm effects. We use a large micro database of European MNEs which includes detailed accounting and ownership information. Our results show a strongly negative relationship between an affiliated company's statutory corporate tax rate difference to its foreign parent firm and the affiliate's gross profits. Quantitatively, a 10 percentage points decrease in the tax rate of the affiliate (relative to the parent) increases its pre–tax profitability by 7%, other things being equal. Various robustness checks support this profit shifting inference. Furthermore, we provide evidence that a higher parent's ownership share of its subsidiary leads to intensified shifting activities between these two affiliates.

**JEL classification:** H25, H26, F23, C33

**Keywords:** corporate taxation, multinational enterprise, profit shifting, share ownership ratio, micro level data

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# 1 Introduction

The current corporate tax principle in the European single market is characterized by a separate taxation of profits of each foreign subsidiary (*separate accounting*). This main principle in addition with different national statutory corporate tax rates in the European Union (EU) thus provides multinational enterprises (MNEs) with the opportunity to shift profits from high–tax to low–tax countries. The incentive to relocate corporate income could be even larger for European MNEs compared to US–based multinationals, as tax differences in Europe can be large even among neighboring states and, additionally, as most EU countries employ the *exemption system* for taxing foreign corporate profits, under which international tax differentials in the source country of the investment are directly relevant for the after–tax profits of companies.[1] It is therefore of fundamental importance for governments in EU high–tax countries to protect their national corporate tax revenue against various kinds of profit shifting.[2] However, the tax auditing of the MNEs' transfer pricing documentations constitutes substantial costs for governments and, furthermore, in many cases it is unfeasible to reveal all potential shifting activities of a MNE. The current proposal of the European Commission (2001) aims to eliminate or at least substantially reduce these tax avoidance incentives by consolidating all corporate tax bases of a MNE and reallocating this profit to the different subsidiary locations according to a specific formula (*formula apportionment*). Fuest (2008) gives a comprehensive review on the current state of the European Commissions renewed proposal for a directive on the introduction of a *Common Consolidated Corporate Tax Base* (CCCTB), which is supposed to be submitted at the end of 2008.[3]

With respect to this proposed changeover to a EU corporate tax system of *formula apportionment*, it is of fundamental importance to evaluate the actual magnitude of profit shifting in the EU under the current principle of *separate accounting*. A high dimension of multinational income shifting activities would give one strong argument for

[1]The system of foreign *tax credit* applied in the US aims to equalize international differences in corporate tax rates through compensating supplementary taxation of foreign source income in the parent country. This should induce fewer incentives to shift profits, other things being equal.

[2]Basically, three methods of shifting profits can be distinguished. First, charging intra–company intermediate goods for a higher or a lower than the arm's length price (*transfer pricing*). Second, *overhead costs*, e.g. for R&D or headquarter services, can be allocated strategically to subsidiaries in different countries in order to bias their pre–tax profits. Third, MNEs can shift profits via the channel of intercompany *financial transactions*, for instance by granting advantageous interest rates for loans.

[3]See European Commission (2008) for a recent working paper by the Commissions working group which presents and discusses possible parts of the final proposal.

the transition to *formula apportionment*. This paper estimates the intensity of profit shifting behavior in the EU and thus can contribute to this decision making problem; particularly, as empirical studies on profit shifting with European data are still scarce. Hence, our results could help to assess the level of the bias in national corporate tax bases in the EU that results from the relocation of profits. We analyze this issue using a broad European micro data set in a panel structure (AMADEUS database) which thus allows the application of the fixed–effects method. While controlling for unobservable time–constant heterogeneity between affiliates, we explain variations in affiliate's pre–tax profits with various firm and country characteristics and additionally with the statutory corporate tax rate differential to the parent firm. This tax measure captures the direct profit shifting incentive. Our baseline sample consists of 67,804 observations from 14,077 multinational subsidiaries within the EU–25 for the years 1995 to 2005. Our results show a robust inverse relationship between the statutory tax rate of a subsidiary relative to the parent firm location and the subsidiary's unconsolidated pre–tax profitability which can be interpreted as indirect evidence of profit shifting. Quantitatively, we find a semi–elasticity of $-.71$, meaning that a decrease in a subsidiary's statutory tax rate difference to its parent by 10 percentage points increases the subsidiary's pre–tax profitability by 7.1%, other things being equal. Various robustness tests support this profit shifting inference.

In addition, we provide evidence that a higher parent's ownership share of a subsidiary leads to an increase in the level of profit shifted between these two affiliates, and vice versa. Theoretically, the ownership share is highly relevant for a MNE's profit shifting activities as it directly affects the feasibility of implementing tax planning strategies and thus determines the shifting cost. For example, an increase in the parent's ownership share can lead to a boost in shifting activities via an eased enforceability of tax strategies due to more management influence at the subsidiary in general, or more share voting rights in particular, as opposed management interests from other parties involved are now reduced (*management effect*). Robust empirical evidence for this positive impact of the ownership share on the intensity of profit shifting is scarce in the existing literature. However, on the outbound side of German FDI, Weichenrieder (2008) finds some evidence of the ownership share impact on profit shifting behavior comparing tax rate effects for affiliates that are wholly owned vs. non–wholly owned. Our continuous ownership effect strengthen this result of Weichenrieder (2008) by providing evidence that changes in the tax differential yield a stronger effect on pre–tax profitability for multinational subsidiaries that are owned by their foreign parent with a higher ownership share.

The existing empirical literature on profit shifting focuses mainly on US data (see Hines, 1997, Hines, 1999, and Devereux, 2006, for comprehensive surveys). Most studies provide *indirect* evidence as data on intra–firm transactions is limited even in the US.[4] In doing so, the standard method used in this literature tries to explain differences in (unconsolidated) pre–tax profits of affiliated companies by the statutory corporate tax *rate* which is effective at the affiliate's location, while controlling for firm and country characteristics. Grubert and Mutti (1991) and Hines and Rice (1994), for example, perform this with aggregate data on affiliates by country, whereas e.g. Collins et al. (1998) as well as Harris et al. (1993), with a similar methodology, use firm–level data. A more precise explanatory tax measure is however, to describe the incentive of a MNE to shift profits between two affiliates with the bilateral statutory tax rate *difference* of an affiliated multinational corporation to its foreign parent firm. In our paper, we use this tax differential for the identification of shifting activities.

Evidence of profit shifting with European data is still rare. Weichenrieder (2008) confirms profit shifting into and out of Germany with German panel FDI–data (MiDi database), using statutory tax rates and after–tax profits as identification. With the same database, Overesch (2006) demonstrates for German MNEs a negative impact of the statutory tax rate on the size of balance sheet items that reflect intra–company sales. Huizinga and Laeven (2008), with a methodology close to Hines and Rice (1994), perform a cross–section analysis for the year 1999 with affiliate level data from the AMADEUS database to provide evidence of profit shifting within European MNEs by explaining variations in *Earnings before Interest and Taxes (EBIT)* with various tax differentials, among firm and country controls. We use the same micro database as Huizinga and Laeven (2008), but undertake a panel analysis over 11 years controlling for fixed firm effects. This method can alleviate the endogeneity problem of unobservable firm–specific characteristics in explaining variations in profits. A firm's profitability is likely to be driven by internal firm–specific factors, which are impossible to control for by variables available in standard accounting databases (e.g. management quality, degree of product innovation, product popularity, etc.). Therefore, to analyze firm behavior issues, using panel data in combination with the fixed–effects estimation model should lead to more reliable and robust results.

The remainder of the paper is organized as follows. In section 2, a simple model of profit shifting is presented. From this model, we derive the hypotheses for our econometric specifications. Section 3 describes the data and the sample composition. Section

[4]So far, only a few papers yield *direct* evidence of profit shifting by using affiliate level data on intra–company *transfer prices* (Swenson, 2001, Clausing, 2003, and Bernard et al., 2006).

4 presents the estimation approach, the empirical results and various robustness checks. Section 5 concludes.

# 2 A simple model of profit shifting

We set up a simple and well–established theoretical model of profit shifting. For this purpose, we relate for instance to Grubert (2003) but incorporate a parameter for the ownership share, as first introduced by Weichenrieder (2008). This model serves to derive our testable hypotheses for the empirical analysis of section 4.

We assume a MNE with some degree of market power and with one foreign subsidiary. The parent firm, subscripted with $p$, has to bear the statutory corporate tax rate $0 \leq t_p < 1$, the subsidiary, subscripted with $s$, has to bear $0 \leq t_s < 1$. The two affiliates engage in exogenous *intra–company, i.e. inter–affiliate, transactions* $T > 0$, that is they purchase and sell a given amount of intermediate products or intra–company services. This provides the MNE with the opportunity to shift profits by deviating from the arm's length price for these intra–company sales.

Profit shifting is modeled through the *shifting parameter* $s$ which represents the amount of profit shifted *per* transaction. If $t_p > t_s$, profits are shifted from the parent to the subsidiary, i.e. $s > 0$, and a higher $s$ means more shifting. The opposite results for a reversed tax scenario. The parameter $\rho > 0$ represents *all expected costs of shifting*, including the probability of detection, the penalty, potential image loss, costs of distorted management incentives, etc.

The parameter $0 < \delta \leq 1$ denotes the *parent's ownership share of its subsidiary*, with $\delta = 1$ indicating a wholly owned affiliate. We incorporate a major effect that the parent's ownership share of its foreign subsidiary can have on the level of profits shifted from or to this affiliate. A lower ownership share results in a limited enforceability of profit shifting strategies due to more potentially opposed management interests from other parties involved, and vice versa. We call this the *management effect* of the ownership share on the shifting intensity and model this effect by an increase in the costs of shifting if the ownership share declines, and vice versa.

The output of the parent, $F_p(K_p, L_p)$, is produced with mobile capital and immobile labor with cost $r$ and $w_p$, respectively. We assume no depreciation of capital. The deductibility of the tax penalty is fully embodied in $\rho$. Hence, the after–tax profit of

the parent is given by

$$\begin{aligned}\pi_p^{net} &= (1-t_p)\left[F_p(K_p,L_p) - rK_p - w_pL_p - s\,T\right] \\ &\quad - (\rho/2)(s/\delta)^2\,T \end{aligned} \tag{1}$$

The last term gives a quadratic specification of the *expected shifting costs function* which is frequently used in the literature. We also assume that these costs are solely borne by the parent.[5] The respective after–tax profit of the subsidiary is

$$\pi_s^{net} = (1-t_s)\left[F_s(K_s,L_s) - rK_s - w_sL_s + s\,T\right] \tag{2}$$

Summing up these two affiliates' profits yields the overall after–tax profit of the MNE:[6]

$$\begin{aligned}\Pi^{net} &= (1-t_p)\left[F_p(K_p,L_p) - rK_p - w_pL_p\right] \\ &\quad + (1-t_s)\left[F_s(K_s,L_s) - rK_s - w_sL_s\right] \\ &\quad + (t_p-t_s)s\,T - (\rho/2)(s/\delta)^2\,T \end{aligned} \tag{3}$$

The *shifting term* (first term in the last row of Eq. (3)) reflects the tax gain from shifting profits (before penalties). Maximizing overall net profits of the MNE holding *all* input factors fixed yields the *optimal level of shifting*

$$s^* = \frac{(t_p-t_s)\,\delta^2}{\rho} \tag{4}$$

Thus, in the optimum, $s^* > 0$ if $t_p > t_s$, i.e. the MNE shifts profits from the parent to the subsidiary. Vice versa, $s^* < 0$ if $t_p < t_s$ and profits are shifted *to* the parent. The optimal level of shifting has the following comparative static properties:

$$\frac{\partial s^*}{\partial(t_p-t_s)} > 0 \tag{5}$$

$$\begin{aligned}\frac{\partial s^*}{\partial\delta} = \frac{(t_p-t_s)\,2\,\delta}{\rho} &> 0 \qquad \text{if } t_p > t_s \\ &< 0 \qquad \text{if } t_p < t_s \end{aligned} \tag{6}$$

[5] We do not assume any effect of the ownership share on the probability of detection, i.e. we expect that a parent with a partly owned affiliate (e.g. 51% of the shares) is treated equal by the tax authority as if the affiliate is wholly owned (same intensity of investigation).

[6] We do not model the relevance of the ownership share for the overall profit of the MNE, i.e. we do not incorporate the effect, that a lower ownership share gives the incentive to shift profits from the partly owned affiliate to the (wholly owned) parent and vice versa, as this *ownership effect* is independent of tax differences between these two affiliates. In our analysis, we want to focus on profit shifting resulting solely from tax differentials. See Grubert (2003) for a similar procedure.

The optimal level of shifting increases with the tax differential (and decreases with the expected cost of shifting parameter $\rho$). A rise in the ownership share $\delta$ increases the optimal level of shifting $s^*$ via the *management effect*, independent of the direction of shifting. We test this hypothesis from Eq. (6) empirically in section 4.4. If $t_p > t_s$, profits are shifted to the subsidiary and, thus, $s^* > 0$. Hence, an increase in $\delta$ leads to a higher level of shifting. The same results if $t_p < t_s$, as profits are shifted to the parent and $s^* < 0$.

Holding again all inputs fixed, we get our main theoretical hypothesis which will be tested throughout our econometric analysis to identify profit shifting:

$$\begin{aligned} \frac{\partial \pi_p^{gross}}{\partial (t_p - t_s)} &= \left(\frac{\partial \pi_p^{gross}}{\partial s^*}\right)\left(\frac{\partial s^*}{\partial (t_p - t_s)}\right) \\ &= -T(1 + t_p - t_s)\left(\frac{\partial s^*}{\partial (t_p - t_s)}\right) < 0 \end{aligned} \tag{7}$$

In the tax scenario $t_p > t_s$ (tax scenario $t_p < t_s$), a rise (decline, i.e. getting more negative) in the tax differential results in a higher level of shifting and yields a decrease (increase) in the gross profit of the parent (and finally, a rise in the overall net profit of the MNE). In addition, a rise in the ownership share $\delta$ leads to intensified shifting (Eq. (6)) which further reduces (increases) the pre–tax profit of the parent.

Summarized, the simple model results in the following propositions which constitute the theoretical basis of our empirical analysis in section 4.

**Proposition 1.**
*A larger tax difference of the two affiliates leads to a higher optimal level of profit shifting. This reduces the pre–tax profit of the 'high–tax affiliate' and, vice versa, increases the pre–tax profit of the 'low–tax affiliate'.*

**Proposition 2.**
*A rise in the parent's ownership share of its subsidiary leads to a higher optimal level of profit shifting.*

# 3 Data

We employ the European micro database AMADEUS provided by Bureau van Dijk which contains standardized unconsolidated and/or consolidated annual accounts for up to 1.5 million national and multinational, public and privat companies in 38 European countries from 1993 to 2006. The database involves detailed descriptive informa-

tion, numerous balance sheet and profit & loss account items as well as information on the ownership structure, but is unbalanced in structure.

There is no legal commitment for firms to give out information for the database. However, usually the real source of the AMADEUS data is *Creditreform*. The purpose of this institution[7] insures a strong incentive for firms to participate and additionally insures an adequate quality of the data. As in reality the calculation of arm's length prices for transfer pricing auditing by national tax authorities is difficult, time intensive or even unfeasible, e.g. in case of specific patents, other methods are usually applied. Mostly, this is the so called *Transaction Based Net Margin Method*, which compares the net profit margin of the respective affiliate with similar but non–affiliated firms of the same branch with the help of a database. For this, both sides, transfer pricing consultants (e.g. *Deloitte* and *KPMG*) as well as more and more tax authorities (e.g. in Germany and France), use the AMADEUS database.[8]

Our sample contains firms from all EU–25 member states despite Cyprus and Malta (*EU–23* in the remainder) for the time period of 1995–2005. These countries and years are sufficiently represented by the database. The country statistics are presented in Table 1 in the Appendix. Furthermore, our analysis accounts only for non–public and for industrial MNEs. The observational units of our analysis are multinational subsidiaries. Thereby, we consider a subsidiary to be *multinational* if there exists a corporate immediate shareholder with totally *at least 90%* of the ownership shares, i.e. the parent firm, which is located in a *foreign* country worldwide.[9] Finally, our baseline regression consists of 67,804 observations from 14,077 multinational subsidiaries; hence, we observe each subsidiary for 4.8 years on average.[10] Moreover, 30.5% of the subsidiaries in

[7] *Creditreform International* traces active commercial enterprises worldwide and checks their creditworthiness to provide credit reports and debt collection services to creditors.

[8] However, firms can self–select into the database or stay out. But by assuming that (more intransparent) firms which refuse the inclusion in the database are more willing to engage in (illegal) profit shifting activities, our estimation results should be biased downwards. Thus, with possibly underestimated but significant coefficient estimates, profit shifting inference is still feasible.

[9] The data restriction to subsidiaries which are owned by 90% or more ensures that the potential relocation of profit to this affiliate is actually relevant for the MNE. We analyze the effect of the parent's ownership share on the shifting intensity in section 4.4.

[10] For our econometric specification (explained in detail in the next section), we need the balance sheet items calculated in *unconsolidated* form. In addition, we have restricted the export from the AMADEUS database to MNEs that are currently active. Finally, this baseline sample consists of 22,991 relevant firms. Note, that no financial corporations are included in AMADEUS, and that only profitable subsidiaries are considered in our regressions. Furthermore, we drop the few observations

our sample are owned by a parent that is located outside of the EU–23, thus, for 69.5% of the cases there exists an immediate shareholder within the EU–23.

The AMADEUS data has the drawback that information on the ownership structure is available for the last reported date only which is the year 2004 in most cases of our database version. Therefore, in the context of our panel study, there exists some scope for misclassifications of *parent–subsidiary–connections* since the ownership structure may have changed over the sample period.[11] However, in line with previous studies, we are not too concerned about this issue since potential misclassifications would introduce noise to our estimations that would (again) bias our results towards zero (see e.g. Budd et al., 2005). In addition, in subsection 4.3.1, we regress our data for the cross–section of the year 2004 as a qualitative robustness check.

[Table 2 here]

The descriptive sample statistics are shown in Table 2. The mean of profit before taxation is calculated with 7.4 million US dollars. On average, a subsidiary holds fixed assets amounting to 41.9 million US dollars, observes yearly cost of employees of 9.5 million US dollars and employs 211 workers. Furthermore, the mean of a subsidiary's operating revenue amounts to 93.4 million US dollars, and the average subsidiary has 62.3% of its total assets financed through borrowing.

We merge data on the statutory corporate tax rate (including local taxes) at the subsidiary and parent location, as well as basic country characteristics like GDP, GDP per capita, the unemployment rate, and a corruption index.[12] On the subsidiary level, the statutory tax rate spreads from 10.0% to 56.8% with a mean of 33.4%, whereas, on the parent level, the tax rate spreads from 0% to 56.8% with a mean of 35.2%. Our main tax measure, the *Tax Difference to Parent*, is defined as the statutory corporate tax rate of a subsidiary minus the tax rate of the parent. This tax differential spreads from

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that exhibit implausible variable values, i.e. negative assets, cost or sales, or leverage ratios of less than 0 or greater than 1.

[11] However, we have compared our 2004 ownership data with that of the year 1998 and found that for 87% of our subsidiaries the country of the parent firm is the same for both years.

[12] The statutory tax rates are taken from the *European Commission (2006)*. Data on GDP comes from the *IMF*. Data on GDP per capita (in Purchasing Power Standards, EU–25 = 100) and on the unemployment rate is from the *European Statistical Office (Eurostat)*. The corruption index (Corruption Perceptions Index, CPI) is taken from *Transparency International* and ranks from 0 (extrem level of corruption) to 10 (free of corruption).

−46.8% to 43.2% with a mean of −1.8% and a standard deviation of 8.9 percentage points.

# 4 Empirical analysis

In this section, we first describe the econometric methodology to test Propositions 1 and 2 from section 2. Then, subsection 4.2 presents our baseline estimation results. In subsection 4.3, two fundamental robustness checks are undertaken. Finally, in subsection 4.4, the influence of the parent's ownership share on the level of profit shifting is empirically analyzed.

## 4.1 Methodology

Our specification to identify profit shifting activities is the regression of the unconsolidated pre–tax profitability[13] of a profit–making multinational subsidiary on various firm and country characteristics and on the *statutory corporate tax rate difference to its parent firm*, controlling for fixed firm and year effects.[14] Taking tax differentials is a more precise procedure in capturing the extent of the profit shifting incentive for a multinational affiliate than working with single tax rates. Quantitative interpretations of purely tax *rate* coefficients have to be taken with care. Calculated tax rate effects on pre–tax profits might not be confined solely to profit shifting activities, as the incentive to invest in a given country also decreases with the corporate tax rate.[15]

Based on our main hypothesis from Eq. (7) of the theoretical model[16], the estimation

[13]Pre–tax profits are taken form the balance sheet item *Profit (Loss) before Taxation* which is net of all cost but before taxation.

[14]Note that 69% of our observational units own no further subsidiaries and 22% own solely *domestic* subsidiaries. Therefore, the vast majority of the subsidiary in the sample cannot engage in (downward) profit shifting activities with own foreign subsidiaries and, thus, the tax rate difference *to the parent* is an appropriate measure of the overall (upward) shifting incentive of our observational units.

[15]By constructing the tax differential, the *statutory* tax rate is the relevant tax measure for an analysis of profit shifting activities, in contrast to the effective (average or marginal) tax rate (see e.g. Devereux (2006) for an extensive commentary). Furthermore, a MNE can define its own tax base by the shifting of profits. Thus, using effective tax rates instead of statutory rates would be misleading in this application.

[16]Note, to confer the theoretical model on our empirical specification, the status of the parent and of the subsidiary have to switch. Hence, from the perspective of the subsidiary, the cost of shifting term is irrelevant which further simplifies the derivative in Eq. (7).

equation takes on the following form

$$Log(PBT_{ijt}) = \beta_0 + \beta_1 X_{it} + \beta_2 Y_{jt} + \gamma DIFFSTR_{it} + z_i + v_j + \rho_t + \epsilon_{ijt} \tag{8}$$

with subscript $i$ denoting the observational unit, i.e. a multinational subsidiary. Subscript $j$ indicates the macro level, i.e. a member state of the EU–23, and $t$ denotes the time period (year). The dependent variable $PBT_{ijt}$ is the profit before taxation of a subsidiary. $X_{it}$ stands for a vector of firm characteristics. These control variables on the micro level are the subsidiary's fixed assets as a proxy for the installed capital, the cost of employees as a proxy for the use of labor, and the financial leverage ratio (see e.g. Huizinga and Laeven, 2008, for a similar application of micro controls).[17] All firm variables are calculated per employee to control for subsidiary size and to get a comparable profitability measure which is, however, neither qualitatively nor quantitatively decisive for our results. All variables besides the tax variables and the leverage ratio are transformed in logarithmic form to mitigate the potential effect of outliers.

$Y_{jt}$ is a vector of time–varying country characteristics. These control variables on the macro level are GDP (as a proxy for the market size), GDP per capita (as a proxy for the degree of development), the unemployment rate (as a proxy for the economic situation), and an index for the degree of corruption (as a proxy for the overall risk of a country). The variables will also enter in logarithmic form which is again not crucial for our results. The explanatory variable of central interest is $DIFFSTR_{it}$ which stands for our main tax measure, i.e. the statutory tax rate difference of affiliate $i$ to its foreign parent in year $t$. As this differential is calculated by subtracting the parent tax rate from the subsidiary tax rate, we expect $\gamma$ to have a significantly negative sign to get (indirect) evidence of profit shifting. $z_i$ and $v_j$ represent unobserved characteristics on the firm level and on the country level, respectively. The error term is denoted by $\epsilon_{ijt}$. In the baseline panel regressions, we include year dummy variables $\rho_t$ to control for shocks over time common to all affiliates. Instead, in the cross–section regressions of the robustness checks, we are able to additionally include (time–constant) industry dummies and, when leaving out the macro control variables, country dummies.

The panel structure of our sample allows the application of fixed–effects methods on

[17] In line with previous studies, we are not too concerned about potential endogeneity problems with these firm regressors as we apply them as control variables whose inclusion does not affect the coefficient estimate of our tax differential, i.e. we yield qualitatively equal and quantitatively very similar tax effects in our regressions if we completely leave out these micro controls. Additionally, as a robustness check, we alternatively apply the *number* of employees instead of the cost of employees as a proxy for the labor input (cf. section 4.3). Again, we find no change in any of our qualitative and quantitative results.

the micro level. This considerably alleviates the endogeneity problem of unobservable, time–constant firm–specific factors $z_i$ in explaining variations in profits, e.g. management quality or product popularity. The fixed–effects model is also preferred to a random–effects approach as suggested by a Hausman–Test. Potentially unobserved, time–constant country characteristics $v_j$ are controlled for by the included fixed firm effects because together the firm–specific fixed effects of all affiliates in one country perfectly account also for all unobservable macro factors. Thus, we estimate Eq. (8) with our panel data by OLS with subsidiary fixed effects.

Huizinga and Laeven (2008) likewise use the AMADEUS database but undertake a cross–section analysis of the year 1999 without the possibility to control for fixed effects. In addition, compared to Huizinga and Laeven (2008), as dependent variable we use the balance sheet item *Profit (Loss) before Taxation*. Employing *EBIT*, which includes interest payments, as dependent variable could blur the effect of the tax differential as these payments can also serve as a profit shifting channel.

To analyze the effect of the parent's ownership share of its subsidiary on the shifting intensity between these two affiliates, in a cross–section analysis of the year 2004 in section 4.4, we interact $DIFFSTR_{i2004}$ with the parent's ownership share of the considered subsidiary $i$ in 2004.[18] For this, in section 4.4, we will relax our initial sample requirement of the parent's minimum ownership share of 90% to 25%. Finally, we expect this interaction term to exhibit a negative coefficient estimate indicating an additional negative impact of the tax differential on pre–tax profitability for a higher ownership share, holding the tax differential fixed.

## 4.2 Baseline estimation results

Our baseline results are shown in Table 3. We run panel estimations for the years 1995–2005 and for up to 14,077 subsidiaries applying OLS with fixed–effects. With at maximum 67,804 observations, the regressions thus comprise on average 4.8 observations per affiliate. All estimations include year dummy variables and heteroscedasticity robust standard errors adjusted for firm clusters, which are displayed in the tables in parentheses.

Throughout all specifications of Table 3, the coefficient estimates of our firm controls, the fixed assets and the cost of employees variables (calculated per employee, respec-

[18]The advantage of the cross–section analysis for this issue is discussed in section 4.3. The reason are the data restrictions on historical ownership (share) information addressed in the data section.

tively), are positive and significant at the 1%–level. They remain quite stable and sum up to .65 which would denote decreasing returns to scale. The contribution of labor to pre–tax profits is about four times higher than that of capital and an increase in the cost per employee of 1% leads to a rise in pre–tax profits per employee of .5%. The effect of the cost per employee variable can be better interpreted as a proxy for that part of labor productivity which is reflected in pre–tax profits. Controlling for fixed firm effects, we can explain up to 75.4% of the variation in profits before taxation.

[Table 3 here]

As a test of sensitivity and to compare the tax effect with the second robustness check in subsection 4.3.2, we first regress each specification with the single statutory tax rate separately. We find a strongly negative effect which is significant at the 1%–level. However, more important, our coefficient estimate of the statutory tax rate difference to the parent has the expected negative sign and is likewise highly significant, indicating that affiliates with a lower tax rate relative to the parent location observe a higher pre–tax profit per employee, and vice versa. This confirms our theoretical expectations from Eq. (7) and, thus, gives indirect evidence for profit shifting activities. The size of the tax difference effect slightly decreases with the inclusion of the macro controls in column (4). Quantitatively, our most preferred specification (column (6) of Table 3) suggest an increase in pre–tax profits of 7.1% if the tax difference to the parent decreases by 10 percentage points.

This semi–elasticity of $-.71$ is by about one fourth smaller as the analogous one estimated in a recent study by Huizinga and Laeven (2008). They run cross–section estimations for the year 1999, likewise with the AMADEUS database, and, with their largest sample of $1,218$ observations, they find a coefficient estimate of the tax difference to the parent of $-.975$. However, our panel regressions yielding the smaller coefficient of $-.71$ simultaneously control for fixed effects at the firm level which is not feasible in a cross–section analysis. For example, if high–profitable (low–profitable) affiliates, e.g. due to more (less) efficient managers or engineers, are more often located in low–tax (high–tax) countries (cf. Becker and Fuest, 2007), we capture these unobservable affiliate characteristics by the fixed–effects approach and thus obtain a lower effect of the profit shifting incentive, i.e. the tax differential.

In specification (5) and (6), we additionally control for the financial leverage ratio of a subsidiary which results in a significant and large coefficient of $-1.4$. This is not surprising as the balance sheet item *Profit (Loss) before Taxation* is minus all

deductible costs which includes interest payments, in contrast to *EBIT* or *EBITDA*. The coefficients of all other explanatory variables show no significant change and, furthermore, stay statistically significant. However, the effect of the tax difference to the parent slightly decreases with the inclusion of the leverage ratio. A smaller impact of the incentive to shift profits (e.g. via classical transfer pricing manipulations) is consistent if we assume larger leverage ratios in high–tax than in low–tax countries (for the purpose of legally biasing the MNE's different national tax bases, e.g. via heightened debt financing of a high–tax affiliate).

To account for time–varying country effects, we include our set of macro control variables. This inclusion raises the adjusted $R^2$ value only a little. The coefficient of GDP turns out significantly negative. An explanation could be that big markets are characterized by a high degree of competition which results in a lower profitability. The results further indicate that wealthier countries, measured by GDP per capita, which thus possess the more advanced technologies, yield a more profitable production. Moreover, a lower risk of a country, proxied by a higher level of the corruption index (i.e. a lower degree of corruption), seems to impact pre–tax profits per employee positively.

## 4.3 Robustness checks

We firstly undertake some smaller sensitivity tests before we focus on two fundamental robustness checks in subsections 4.3.1 and 4.3.2. The results of these minor tests described in the following two paragraphs are not presented in the paper but are available from the author upon request.

At first, we check if our firm variables are robust against a variation in the method of normalization. Instead of dividing by the number of employees, we alternatively calculate our subsidiary variables in ratios of operating revenue and additionally in ratios of total assets. Both of these modifications yield almost equal quantitative results but a slightly smaller coefficient of the tax differential. However, a firm's number of employees is likely to be less influenced by tax rates than monetary values which makes a division by the number of employees a more suitable way to control for subsidiary size.[19] Furthermore, instead of using the cost of employees as a proxy for the labor input, we alternatively apply the *number* of employees as an explanatory firm variable. Again, we find no significant change in any of our qualitative and quantitative results.

The possibility that some subsidiaries in our sample exhibit the same parent firm

[19]Moreover, without any normalization our quantitative results again do not change significantly.

could potentially bias the standard errors or overestimate the effect of the tax differential. To test the relevance of this problem, we randomly deleted observations with a duplicated *subsidiary–parent–connection* to exclusively keep firms with unique parents in the sample. Hence, the sample reduces to 6,925 subsidiaries, i.e. almost the half of our affiliates are now dropped. However, with this reduced sample, all specifications of Table 3 yield very similar quantitative results. The coefficient of the tax differential turns out to be only slightly larger (−0.75) in our preferred specification (6) of Table 3 and is again significant at the 1%–level. Furthermore, this quantitatively almost equal effect of the tax difference to the parent with this reduced sample, compered to our baseline estimations with the full sample, suggests that profits are shifted mainly between the affiliate and the parent firm and not between the affiliate and other subsidiaries of its parent.

#### 4.3.1 Cross–section analysis

Due to the data restrictions of the historical ownership information mentioned described in section 3, a fundamental qualitative sensitivity check of our results is to additionally run our regressions from Table 3 in a cross–section. We do this with OLS for the year 2004 as this is the last reported date in most cases of our database version. The results are presented in Table 4 in the Appendix. In the cross–section regressions, it is now feasible to include 59 industry dummy variables (NACE Rev.1 2–digit level).

However, with the cross–section analysis, we cannot control for fixed firm effects which consequently results in higher coefficient estimates and in a small $R^2$ value of about .31, less than half of the value from the fixed–effects panel regressions of Table 3. Though, all decisive coefficients still exhibit the expected sign and are highly significant. In particular, the tax difference to the parent has a significantly negative effect on a subsidiary's pre–tax profits (−1.21 in column (6) of Table 4). This confirms our (indirect) evidence of profit shifting and states that our qualitative results are robust to a cross–section analysis. This in turn mitigates the concerns about the restricted ownership information.

#### 4.3.2 Domestic individual firms

Another fundamental robustness check to confirm our profit shifting inference is to compare the tax rate elasticities of MNEs with those of purely domestic companies (cf. Mintz and Smart, 2004). In such an analysis, we obviously have to revert to the statutory tax *rate* as differentials to a foreign parent do not exist for Non–MNEs. With

the AMADEUS database, we construct a separate sample of at maximum 114,728 individual *domestic* firms with no shareholders and no subsidiaries to compare these regressions with those done with our initial MNE–sample. For the purpose of a qualitative robustness test, in this comparison, we focus on cross–section analysis for the year 2004 with OLS to get definite ownership information necessary for precisely separating a multinational from a domestic company.[20]

The results are shown in Table 5 in the Appendix. With this sample of solely domestic firms, we cannot find any significantly negative effect of the statutory tax rate, in contrast to the regressions with our MNE–sample in Table 4. Moreover, although insignificant (besides a weak significance in column (5)), the coefficient estimate of the tax rate in Table 5 is positive. This underlines the relevance of the statutory tax rate for companies with at least one connection to a foreign country via its parent firm (MNEs) in explaining variations in pre–tax profits. This in turn supports our prior profit shifting findings. In specifications (2), (4) and (6), we leave out GDP because of a high correlation between the statutory tax rate and GDP (86%) which could result in upwards biased standard errors of the respective coefficients and thus in insignificance due to multicollinearity problems.

## 4.4 Parent's ownership share and profit shifting

The theoretically stimulating effect of the parent's ownership share of its subsidiary on the level of shifting is described in section 2. An increase in the ownership share leads to a boost in profit shifting activities via lower shifting costs as the feasibility of implementing shifting strategies improves due to more management influence at the subsidiary in general, or more share voting rights in particular (*management effect*).

To test this hypothesis from Eq. (6), we renew our initial MNE–sample requirement of the parent's minimum total ownership share of its foreign subsidiary of 90% (cf. section 3) to a minimum *direct* ownership share requirement of 25%.[21] All other criteria from the baseline MNE–sample stay the same. Now, the average direct ownership share is 92.9% with a standard deviation of 16.1 percentage points. To capture the additional effect of the ownership share, we generate an interaction term between the

[20] See section 3 for a discussion on the ownership data restrictions.

[21] To precisely test our hypothesis from Eq. (6), we apply the parent's direct ownership share instead of the total share which is the sum of directly and indirectly held shares. In doing so, we assure that no potentially opposed effects via the indirect holding of shares can emerge from other affiliates' management interests.

tax differential and the parent's direct ownership share. Based on our hypothesis from Eq. (6) in combination with our indirect approach of profit shifting evidence from Eq. (7), we expect a negative coefficient of this interaction term to represent *more* shifting via an additional impact of the tax differential on pre–tax profits for a higher ownership share.

[Table 6 here]

The regression results of a cross–section analysis for the year 2004 with OLS are shown in Table 6.[22] Due to the large number of subsidiaries with a parent that fully owns the affiliate (71.9% of the subsidiaries), the tax differential and the interaction term between the tax differential and the parent's direct ownership share (*(TaxDiff.toParent)*×*(ParentShare)*) are highly correlated (98.9%). This multicollinearity is very likely to increase the standard errors of the estimated coefficients of the two collinear variables which can result in insignificance (cf. columns (5) and (6) in Table 6). The interpretation of such an interaction effect is also not straightforward (cf. last paragraph of this section). For this reason, to get a more clear–cut interpretation, we calculate the interaction term by multiplying the tax differential with the *deviation of the ownership share from its mean* (*centering*). The correlation between this interaction term and the tax differential is at the moderate level of 13.0%. These results are displayed in column (1)–(4) of Table 6.

Basically, the coefficient of the tax differential alone describes the effect of the tax difference on pre–tax profits for an *average ownership share of* 92.9%. For an ownership share above this mean, an increase in the tax differential has a stronger negative impact on pre–tax profits than for ownership shares below 92.9%.[23] Thus, an increase in the ownership share, holding the tax differential fixed, strengthens profit shifting in the sense that the sum of both coefficients decreases further. This qualitative result is in line with the expectations from Eq. (6) and (7). In specification (2), a full set of country dummy variables is included instead of the macro controls which results in an increased significance of the interaction term coefficient (1%–level). The inclusion of country dummies is feasible as the tax differential varies across subsidiaries. To

[22]The cross–section analysis for the year 2004 is again preferred to the fixed–effects panel study due to the data restrictions on historical ownership (share) information addressed in section 3.

[23]This results as the coefficient of the interaction term multiplied with the respective (positive or negative) deviation from the mean ownership share has to be added to the original coefficient of the tax differential.

conclude, our results provide (indirect) evidence that firms which are owned by their parent with a higher ownership share are engaged in a higher level of profit shifting.

Note, that robust results can also be inferred without *centering* the ownership share in the interaction term (see column (5) and (6) of Table 6). It is evident that with this little modification all coefficients of regressions (5) and (6) are equal to the respective results in the similar specifications (1) and (4), except for the tax differential. As mentioned above, multicollinearity leads here to higher standard errors of the tax differential's coefficient estimates which strongly reduces the significance but leaves the coefficients unbiased. Now, the coefficient of the tax differential alone generally represents the effect of the tax difference on pre–tax profits for an ownership share of *zero*. Thus, with an increasing ownership share the total effect of the tax differential (the sum of both coefficients) decreases, and gets negative at an ownership share of 59.0% (for regression (6)). Above this share, the effect of the tax differential on pre–tax profits is negative. Focusing on this group, a further increase in the ownership share, holding the tax differential fixed, intensifies profit shifting in the sense that the sum of both coefficients decreases further.

# 5 Conclusions

This paper provides indirect evidence of profit shifting activities by multinational enterprises (MNEs) within the EU–25 applying a panel analysis with the European micro database AMADEUS. In addition, our estimations show that a higher parent's ownership share of its subsidiary leads to an increase in the level of shifting activities between these two affiliates, and vice versa. Robust empirical evidence for this positive impact of the ownership share on the intensity of shifting is scarce in the existing literature. We incorporate this ownership effect of enhanced or reduced shifting possibilities, respectively, in a well–established simple theoretical model of profit shifting. The main hypotheses for our econometric specifications are derived from this short model.

For identifying profit shifting behavior, we explain variations in pre–tax profitability of profit–making multinational subsidiaries located in the EU–25 with the statutory tax rate difference of these affiliates to their respective foreign parent firms, while controlling for a range of firm and country variables. We apply a panel analysis for the years 1995 to 2005 with OLS fixed–effects estimations controlling for unobservable subsidiary characteristics. Our regressions indicate a highly significant negative impact of the tax differential on profits before taxation which is consistent with profit shifting behavior.

Quantitatively, the results suggest an increase in a subsidiary's pre–tax profitability of 7.1% if the statutory tax rate difference (between the subsidiary and its foreign parent firm) decreases by 10 percentage points, and vice versa. Several fundamental robustness checks confirm our profit shifting inference, e.g. a comparison of the tax rate effects of MNEs with those of domestic individual companies.

A precise comparison of semi–elasticities of different empirical studies is complicated in most cases as the data structure and the methodology, specially with respect to the tax measure for identifying shifting activities, varies in the literature. However, in comparison to the overall empirical literature using US data, our results suggest that the suspicion of more intensive profit shifting in Europe than in the US, due to large tax rate differences and the mostly employed *exemption system* within the EU, cannot be confirmed. Even though e.g. Grubert and Mutti (1991) or Hines and Rice (1994) apply cross–section estimations without the feasibility to control for unobserved fixed firm effects which generally might yield overestimated tax effects, their calculated semi–elasticities of reported profits with respect to the statutory tax *rate* are still very large ($-6.3$ in the case of Hines and Rice, 1994; cf. our respective result of $-1.7$ in column (5) of Table 3). Furthermore, our semi–elasticity with respect to the tax *differential* of $-.71$ is by about one fourth smaller as the analogous one estimated in a recent study by Huizinga and Laeven (2008) who likewise undertake a cross–section analysis. If higher profitable affiliates, e.g. due to a better management, are more often located in a low–tax country (Becker and Fuest, 2007), we capture this unobservable affiliate characteristic by the fixed–effects approach and thus obtain a lower effect of the profit shifting incentive on pre–tax profitability.

However, the robust empirical results of our paper indicate a statistically as well as economically significant effect of corporate taxes on the location of profit. More precisely, the allocation of gross profits is distorted by the statutory tax rate differential to the parent firm. Therefore, the shifting of profits from high–tax to low–tax countries seems to be relevant and can result in a substantial bias of national tax revenues in Europe. Hence, in the light of our results, concerning the advantage of abolishing transfer pricing problems, there is an argument for the European Commission's proposed changeover from the current EU corporate tax principle of *separate accounting* to a system of *formula apportionment* which substantially reduces the incentives for profit shifting activities.

With respect to the estimated positive ownership effect on the shifting intensity, under the principle of *separate accounting*, one policy implication for the tax audit by national fiscal authorities might be to condition the investigation intensity of MNEs'

intra–company transactions with foreign affiliates on the level of the respective shareholding. Due to the time intensive and complex assessment of transfer pricing documentations this selection could improve the efficiency of the auditing.

# 6 Appendix

| Table 1: Country Statistics | | |
|---|---|---|
| *Country* | *Subsidiaries* | *Share* |
| Austria | 146 | 1.04% |
| Belgium | 1,058 | 7.52% |
| Czech Republic | 396 | 2.81% |
| Denmark | 844 | 6.00% |
| Estonia | 206 | 1.46% |
| Finland | 472 | 3.35% |
| France | 1,731 | 12.30% |
| Germany | 1,046 | 7.43% |
| Great Britain | 2,610 | 18.54% |
| Greece | 60 | 0.43% |
| Hungary | 30 | 0.21% |
| Ireland | 480 | 3.41% |
| Italy | 877 | 6.23% |
| Latvia | 6 | 0.04% |
| Lithuania | 33 | 0.23% |
| Luxembourg | 20 | 0.14% |
| Netherlands | 1,036 | 7.36% |
| Poland | 643 | 4.57% |
| Portugal | 84 | 0.60% |
| Slovakia | 60 | 0.43% |
| Slovenia | 7 | 0.05% |
| Spain | 1,390 | 9.87% |
| Sweden | 842 | 5.98% |
| *Sum* | 14,077 | 100.00% |

| Table 2: Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| *Variable* | *Obs.* | *Mean* | *Std. Dev.* | *Min.* | *Max.* |
| *Subsidiary Level:* | | | | | |
| Profit before Taxation★ | 67,804 | 7,399 | 76,644 | 1 | 8,055,052 |
| Fixed Assets★ | 67,804 | 41,933 | 473,442 | 1 | 3.76e+07 |
| Cost of Employees★ | 67,804 | 9,540 | 42,387 | 1 | 2,746,471 |
| Number of Employees | 67,804 | 211.0 | 887.3 | 1 | 62,784 |
| Operating Revenue★ | 64,904 | 93,403 | 466,587 | 1 | 2.10e+07 |
| Financial Leverage Ratio♦ | 62,355 | .6230 | .2335 | 0 | 1 |
| Statutory Corporate Tax Rate | 67,804 | .3337 | .0549 | .1 | .5676 |
| Tax Difference to Parent▲ | 66,045 | -.018 | .089 | -.4676 | .432 |
| *Parent Level:* | | | | | |
| Statutory Corporate Tax Rate | 66,045 | .3519 | .077 | 0 | .5676 |
| *Country Level:* | | | | | |
| GDP▼ | 67,634 | 1,016 | 692.9 | 5.54 | 2,792 |
| GDP per Capita◄ | 67,634 | 108.0 | 17.37 | 35.4 | 222.4 |
| Unemployment Rate | 67,634 | 8.18 | 3.4 | 2.1 | 19.9 |
| Corruption Index► | 67,634 | 7.46 | 1.66 | 2.99 | 10 |

Notes:
★ In thousand US dollars, current prices.
♦ = (total liabilities / total assets).
▲ = (subsidiary statutory corporate tax rate – parent statutory corporate tax rate).
▼ In billion US dollars, current prices.
◄ In Purchasing Power Standards (PPS), EU–25 = 100.
► Corruption Perceptions Index (CPI) from Transparency International (TI), ranks from 0 (extrem level of corruption) to 10 (free of corruption).

**Table 3: Baseline Estimation – Profit Shifting Evidence**
**OLS Fixed–Effects, Panel 1995–2005**
Dependent Variable: Log Profit before Taxation (per Employee)

| *Explanatory Variables:* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* |
|---|---|---|---|---|---|---|
| Log Fixed Assets (per Employee) | .1191*** (.0103) | .1169*** (.0105) | .1180*** (.0104) | .1155*** (.0105) | .1350*** (.0105) | .1329*** (.0106) |
| Log Cost of Employees (per Employee) | .5079*** (.0208) | .5050*** (.0212) | .5105*** (.0209) | .5089*** (.0213) | .5186*** (.0224) | .5166*** (.0227) |
| Financial Leverage Ratio | | | | | -1.354*** (.0502) | -1.355*** (.0511) |
| Statutory Tax Rate | -1.757*** (.2673) | | -1.891*** (.2696) | | -1.703*** (.2714) | |
| Tax Difference to Parent | | -.7504*** (.1570) | | -.7347*** (.1570) | | -.7147*** (.1570) |
| Log GDP | | | -.5062*** (.1172) | -.4388*** (.1190) | -.6878*** (.1210) | -.6136*** (.1228) |
| Log GDP per Capita | | | 1.150*** (.2404) | .8751*** (.2446) | .8846*** (.2390) | .6155*** (.2428) |
| Log Unemployment Rate | | | .0818 (.0555) | .1500*** (.0558) | .0838 (.0572) | .1432*** (.0575) |
| Log Corruption Index | | | .2012*** (.0690) | .2282*** (.0699) | .3090*** (.0696) | .3431*** (.0705) |
| Year Dummy Variables | √ | √ | √ | √ | √ | √ |
| Number of Observations | 67,804 | 66,045 | 67,634 | 65,877 | 62,355 | 60,783 |
| Number of Firms | 14,077 | 13,741 | 14,067 | 13,731 | 13,515 | 13,198 |
| Adjusted $R^2$ | .7369 | .7371 | .7374 | .7376 | .7535 | .7539 |

Notes: Heteroscedasticity robust standard errors adjusted for firm clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit–making multinational subsidiaries that exhibit a foreign parent which owns at least 90% of the ownership shares. The dependent variable is the natural logarithm (Log) of the subsidiary's unconsolidated pre–tax profit calculated per employee. An OLS model with fixed effects is estimated. *Tax Difference to Parent* is defined as the statutory corporate tax rate of the considered subsidiary minus the tax rate of the subsidiary's parent. All regressions include year dummies. Adjusted $R^2$ values are calculated from a dummy variables regression equivalent to the fixed–effects model.

**Table 4: Robustness Check 1 – Cross–Section Analysis**

**OLS, Cross–Section 2004**

Dependent Variable: Log Profit before Taxation (per Employee)

| *Explanatory Variables:* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* |
|---|---|---|---|---|---|---|
| Log Fixed Assets | .2843*** | .2831*** | .2857*** | .2856*** | .2702*** | .2690*** |
| (per Employee) | (.0353) | (.0352) | (.0350) | (.0341) | (.0295) | (.0294) |
| Log Cost of Employees | .6238*** | .5940*** | .6377*** | .6412*** | .6421*** | .6453*** |
| (per Employee) | (.0529) | (.0505) | (.0595) | (.0633) | (.0654) | (.0688) |
| Financial Leverage Ratio | | | | | -1.400*** | -1.411*** |
| | | | | | (.1794) | (.1704) |
| Statutory Tax Rate | -3.324*** | | -2.713*** | | -2.281** | |
| | (.7391) | | (.9686) | | (1.057) | |
| Tax Difference to Parent | | -2.113*** | | -1.551*** | | -1.210*** |
| | | (.4170) | | (.3009) | | (.2757) |
| Log GDP | | | .0410 | .0288 | .0409 | .0306 |
| | | | (.0280) | (.0280) | (.0306) | (.0314) |
| Log GDP per Capita | | | -.4436 | -.8072*** | -.1054 | -.4305* |
| | | | (.3070) | (.2180) | (.3058) | (.2329) |
| Log Unemployment Rate | | | -.1299 | -.2252* | -.0516 | -.1332 |
| | | | (.1186) | (.1148) | (.1225) | (.1276) |
| Log Corruption Index | | | .0536 | .1940 | -.2006 | -.0734 |
| | | | (.1624) | (.1389) | (.1962) | (.1650) |
| Industry Dummy Variables | √ | √ | √ | √ | √ | √ |
| Number of Observations | 9,305 | 9,104 | 9,305 | 9,104 | 8,589 | 8,412 |
| $R^2$ | .2611 | .2619 | .2621 | .2641 | .3087 | .3107 |

Notes: Heteroscedasticity robust standard errors adjusted for country clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit–making multinational subsidiaries that exhibit a foreign parent which owns at least 90% of the ownership shares. The dependent variable is the natural logarithm (Log) of the subsidiary's unconsolidated pre–tax profit calculated per employee. An OLS model is estimated. *Tax Difference to Parent* is defined as the statutory corporate tax rate of the considered subsidiary minus the tax rate of the subsidiary's parent. All regressions include 59 industry dummies (NACE Rev.1 2–digit level).

**Table 5: Robustness Check 2 – Domestic Individual Firms**

**OLS, Cross–Section 2004**

Dependent Variable: Log Profit before Taxation (per Employee)

| *Explanatory Variables:* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* |
|---|---|---|---|---|---|---|
| Log Fixed Assets | .3287*** | .3295*** | .2885*** | .2893*** | .2589*** | .2603*** |
| (per Employee) | (.0449) | (.0446) | (.0191) | (.0189) | (.0193) | (.0193) |
| Log Cost of Employees | .8427*** | .8408*** | .8044*** | .8027*** | .7944*** | .7916*** |
| (per Employee) | (.0394) | (.0389) | (.0325) | (.0325) | (.0416) | (.0411) |
| Financial Leverage Ratio | | | | | -1.612*** | -1.608*** |
| | | | | | (.2233) | (.2236) |
| Statutory Tax Rate | 1.194 | .6454 | .8664 | .4431 | 2.501* | 1.756 |
| | (1.096) | (.9032) | (1.320) | (1.231) | (1.396) | (1.466) |
| Log GDP | -.0603 | | -.0472 | | -.0803 | |
| | (.0523) | | (.0552) | | (.0633) | |
| Log GDP per Capita | -.9961*** | -1.297*** | -.7235* | -.9614*** | -.0403 | -.4449 |
| | (.3138) | (.2820) | (.3732) | (.3245) | (.5081) | (.4333) |
| Log Unemployment Rate | -.6095*** | -.7463*** | -.6471*** | -.7541*** | -.5514** | -.7322*** |
| | (.1462) | (.1831) | (.1473) | (.1784) | (.2068) | (.2008) |
| Log Corruption Index | .3516*** | .4272*** | .1532 | .2143 | -.2670 | -.1630 |
| | (.1188) | (.1276) | (.1971) | (.2034) | (.2115) | (.2293) |
| Industry Dummy Variables | | | √ | √ | √ | √ |
| Number of Observations | 114,728 | 114,728 | 114,728 | 114,728 | 108,646 | 108,646 |
| $R^2$ | .2987 | .2985 | .3462 | .3460 | .3871 | .3867 |

Notes: Heteroscedasticity robust standard errors adjusted for country clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit–making domestic individual firms with no shareholders and no subsidiaries. The dependent variable is the natural logarithm (Log) of a firms's unconsolidated pre–tax profit calculated per employee. An OLS model is estimated. 59 industry dummies (NACE Rev.1 2–digit level) are includes where indicated. The correlation between *Statutory Tax Rate* and *Log GDP* is 86.2% which could result in larger standard errors and thus in an upwards biased P–value due to multicollinearity problems; therefore, in specification (2), (4), and (6), we leave *Log GDP* out.

**Table 6: Parent's Ownership Share and Profit Shifting**

**OLS, Cross–Section 2004**

Dependent Variable: Log Profit before Taxation (per Employee)

| *Explanatory Variables:* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* |
|---|---|---|---|---|---|---|
| Log Fixed Assets (per Employee) | .2665*** (.0264) | .2661*** (.0259) | .2739*** (.0315) | .2493*** (.0261) | .2665*** (.0264) | .2493*** (.0261) |
| Log Cost of Employees (per Employee) | .7930*** (.0690) | .8088*** (.0747) | .6593*** (.0645) | .6541*** (.0679) | .7930*** (.0690) | .6541*** (.0679) |
| Financial Leverage Ratio | | | | -1.477*** (.1840) | | -1.477*** (.1840) |
| Tax Difference to Parent | -1.334*** (.3780) | -.8475*** (.2365) | -1.516*** (.3222) | -1.111*** (.3208) | 1.480 (1.168) | 1.950 (1.494) |
| (TaxDiff.toParent)×(Parent Share–MeanParentShare) | -3.031** (1.253) | -3.570*** (1.264) | -3.046** (1.157) | -3.306** (1.517) | | |
| (TaxDiff.toParent)× (ParentShare) | | | | | -3.031** (1.253) | -3.306** (1.517) |
| Parent Share | .0375 (.1020) | -.1187 (.1058) | .0540 (.1054) | .1075 (.0958) | .0375 (.1020) | .1075 (.0958) |
| Log GDP | .0184 (.0402) | | .0301 (.0364) | .0262 (.0380) | .0184 (.0402) | .0262 (.0380) |
| Log GDP per Capita | -.9381*** (.3317) | | -.6978** (.3122) | -.2060 (.3246) | -.9381*** (.3317) | -.2060 (.3246) |
| Log Unemployment Rate | -.3654** (.1343) | | -.3640*** (.1180) | -.2652* (.1361) | -.3654** (.1343) | -.2652* (.1361) |
| Log Corruption Index | .0880 (.1754) | | -.0705 (.1647) | -.3843** (.1816) | .0880 (.1754) | -.3843** (.1816) |
| Industry Dummy Variables | | | √ | √ | | √ |
| Country Dummy Variables | | √ | | | | |
| Number of Observations | 8,815 | 8,815 | 8,815 | 8,107 | 8,815 | 8,107 |
| $R^2$ | .2254 | .2326 | .2674 | .3176 | .2254 | .3176 |

Notes: Heteroscedasticity robust standard errors adjusted for country clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit–making multinational subsidiaries that exhibit a foreign parent which owns at least 25% of the direct ownership shares. The dependent variable is the natural logarithm (Log) of the subsidiary's unconsolidated pre–tax profit calculated per employee. An OLS model is estimated. *Tax Difference to Parent* is defined as the statutory corporate tax rate of the considered subsidiary minus the tax rate of the subsidiary's parent. *(TaxDiff.toParent)×(ParentShare–MeanParentShare)* is the interaction term between the statutory corporate tax rate difference to the parent and the deviation of the parent's direct ownership share from its mean (correlation between this interaction term and the tax differential is 13.0%). *(TaxDiff.toParent)×(ParentShare)* is the interaction between the tax differential and the parent's direct ownership share (correlation between this term and the tax differential is 98.9%). *Parent Share* is the parent's direct ownership share in the considered subsidiary. 59 industry dummies (NACE Rev.1 2–digit level) are includes where indicated. In specification (2), a full set of country dummies is included instead of the macro controls.

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