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Working Paper

Do Corporate Tax Cuts Reduce International Profit Shifting?

Diskussionsbeiträge, No. 2014/10

Provided in Cooperation with:
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Suggested Citation: Brandstetter, Laura (2014) : Do Corporate Tax Cuts Reduce International Profit Shifting?, Diskussionsbeiträge, No. 2014/10, Freie Universität Berlin, Fachbereich Wirtschaftswissenschaft, Berlin

This Version is available at:
https://hdl.handle.net/10419/96416

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Do Corporate Tax Cuts Reduce International Profit Shifting?

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School of Business & Economics
Discussion Paper

FACTS

2014/10

Do Corporate Tax Cuts Reduce International Profit Shifting?*

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April 2014

ABSTRACT

This paper analyzes whether a corporate tax cut reduces profit shifting to low-tax countries. I use firm-level data of 2,812 German corporations around the Business Tax Reform in 2008. Applying a difference-in-differences framework with a one-on-one matching strategy, which compares earnings of multinational and domestic corporations, I do not find empirical evidence that even a 10 percentage points cut in the business tax rate leads to a reduction of profit shifting activities.

Keywords: Corporate taxation, international profit shifting

JEL classification: F23, H25, H26

* I thank Jochen Hundsdoerfer, Martin Jacob, and the participants of the 2014 doctoral seminar at Freie Universität Berlin for their valuable comments and support.

1. Introduction

Policy makers in several countries seek reforms in tax laws to improve their position in international tax competition. Profit shifting of multinational companies is considered a major issue in high-tax countries, as it reduces taxable profits and thus domestic tax revenue. Companies with affiliates in low-tax countries may use manipulated transfer prices or inter-company finance strategies to reallocate profits, and to reduce the overall tax burden on the group level. Several high-tax countries cut corporate tax rates in order to reduce tax rate differences to tax havens, and thus incentives to shift profits abroad to avoid domestic taxation: The German government identified a reduction of tax incentives for profit shifting to be a major goal of the 2008 tax reform.[1] Similarly for the U.S., the President's Framework for Business Tax Reform states that the "combination of a broader base and a lower rate would (…) reduce incentives for U.S. companies to move their operations abroad or to shift profits to lower-tax jurisdictions".[2]

Prior research on international profit shifting is large: Numerous studies have found empirical evidence for profit shifting within multinational enterprises. Subsidiaries in high-tax countries, which are part of an international group, show lower profitability than comparable subsidiaries without foreign affiliates (e.g., Dworin 1990; Oyelere and Emmanuel 1998; Langli and Saudagaran 2004; Egger, Eggert, and Winner 2010). Also, the level of reported pre-tax earnings is found to be sensitive to the local tax rate compared to the affiliate's tax rate (e.g., Rousslang 1997; Collins, Kemsley, and Lang 1998; Mills and Newberry 2004; Clausing 2009; Klassen and Laplante 2012a; Dischinger and Riedel 2011). Studies attempt different approaches to identify profit shifting through transfer pricing, on the one hand, and inter-company financing strategies, on the other hand. Analyzing prices for imported and exported goods (e.g., Swenson 2001; Clausing 2003), the amount of international intrafirm trading (e.g., Clausing 2001 and 2006; Grubert 2003), or the level of EBIT (e.g., Hines and Rice 1994; Huizinga and Laeven 2008; Maffini and Mokkas 2011) filters transfer pricing strategies. Numerous studies also provide evidence that the amount of internal loans is sensitive to the

[1] See the draft legislation of the tax reform act from 3/27/2007, available at http://dip21.bundestag.de/dip21/btd/16/048/1604841.pdf, last accessed on 4/14/2014.

[2] See the President's Framework for Business Tax Reform, A Joint Report by the White House and the Department of the Treasury, available at http://www.treasury.gov/resource-center/tax-policy/Documents/The-Presidents-Framework-for-Business-Tax-Reform-02-22-2012.pdf, last accessed on 4/14/2014; also, pp. 20/21 of the Budget Statement from the Budget Bill 2013 in Sweden assumes that "internationalization means that international companies have great opportunities for tax planning by exploiting differences in national tax systems. (..) Competition for investment and the opportunities for tax planning in international groups demands active tax policy. In order to attract investment and provide good conditions for entrepreneurship in Sweden, it is important to have a competitive tax rate", available at http://www.government.se/content/1/c6/20/39/65/8bd45b2b.pdf, last accessed on 4/14/2014.

tax rate, or tax rate difference (e.g., Desai, Foley, and Hines 2004; Hebous and Weichenrieder 2010; Buettner et al. 2011). Additionally, thin-capitalization rules are identified to limit income shifting through financing strategies (e.g., Overesch and Wamser 2010; Buettner et al. 2012).

Although there is a large body of literature on profit shifting through transfer pricing and financing strategies, with many studies using tax rate variation to identify profit shifting, there are few studies analyzing the consequences of a specific tax cut on companies' incentives. Previous studies are based on rudimental assumptions on the interaction between tax incentives and other factors influencing profit shifting strategies (e.g. shifting costs), but do not analyze in more detail how company reactions are affected by endogenous changes of shifting conditions. Put differently, many studies provide evidence that profit shifting exists, but only little is known about why and when companies change an existing strategy. Studies that analyze tax cuts use tax reforms more than 20 years ago (e.g., Harris 1993; Klassen et al. 1993), but internationalization has increased since then and a lot more companies are operating globally. Also, transfer pricing strategies may have become more widespread and elaborate in the last 25 years.

To contribute to this field, I use an innovative dataset of more than 2,800 listed and unlisted German corporations over the period 2004-2011.[3] The dataset includes information on the location of the immediate shareholder.[4] I analyze changes in companies' profit shifting strategies after a tax cut using the German 2008 tax reform, which reduced the corporate tax rate significantly from about 40% to about 30% (depending on the local tax rate) and additionally increased legal barriers to profit shifting and documentation requirements. Therefore, I compare earnings of foreign-owned and domestically owned corporations around the 2008 tax reform.

A graphical comparison of foreign-owned and domestically owned firms reveals a parallel trend in both earnings before interest and taxes, and pretax earnings. It supports previous findings of general profit shifting activities (e.g., Egger, Eggert, and Winner 2010) as earnings of foreign-owned subsidiaries are lower than earnings of domestic subsidiaries that are comparable in economic activity. However, there is no change in the parallel trend around 2008 that would suggest that multinationals shift less profits abroad.

[3] While Harris (1993) and Klassen et al. (1993) use samples of between 37 and 191 multinational firms, my sample includes more than 1,400 multinational firms.

[4] In a robustness test, I alternatively use the ultimate shareholder, which is also available in the dataset.

I test the hypothesis using a difference-in-differences setting that analyzes differences between foreign-owned subsidiaries and domestically owned subsidiaries in EBIT and pre-tax earnings around the 2008 tax cut. I apply an exact one-on-one matching procedure without replacement according to pre-reform characteristics. This ensures that the companies compared are similar in size, asset structure, and turnover, and that the differences identified result from their shareholders being foreign or domestic. The matching approach also allows a separation of earnings changes due to profit shifting from a general economic trend. The setting includes several firm-level control variables, firm-fixed and year-fixed effects. If foreign-owned companies have adjusted their shifting strategy due to lower incentives, taxable earnings of multinationals should increase after the tax cut compared to domestic corporations. However, I do not find a significant change in earnings of foreign-owned subsidiaries compared to domestically owned subsidiaries after the tax cut that would point towards a change in profit shifting. I conduct several robustness tests to account for certain influences that may impact my approach in a way that prohibits the identification of a profit shifting effect. One concern is that the financial crisis around 2008 and 2009 affects subsidiaries of domestic and foreign shareholders differently. As foreign countries were hit by the crisis more severely than Germany, economic consequences of the shareholder country may have had an effect on the subsidiary as well. If this is the case, such an influence may eliminate a potential change in the difference between the two groups, and thus eliminate the identification of an effect. The impact of the financial crisis is captured by two robustness tests: First, I include the shareholder country's GDP growth rate to account for the shareholder's economic situation. Second, I limit the sample to firms that survive all sample years, and thus exclude corporations that went bankrupt and showed an abnormal, crisis-related performance. Another robustness test analyzes the difference in earnings every year to account for a potential delay in multinationals' reactions. As profit shifting requires an elaborate tax planning strategy, I focus on large companies in another robustness tests, since these companies may be more likely to have the resources needed for proficient tax planning. Eventually, I change the definition of a foreign-owned company to tie in with the ultimate owner, and rerun all regressions. None of these tests provides significant evidence for a change in taxable earnings of foreign-owned German subsidiaries compared to domestic subsidiaries. That is, the results do not suggest that multinationals change their profit shifting strategy after a tax cut, and shift less profits to tax havens.

This coincides with Bucovetsky (2013), who derives from a model-based approach that sheltering of income depends on the fee that a tax haven charges and thus its credibility.

In this model, tax rates in high-tax countries, however, have an impact on the number of tax havens, but not on the amount of income shifted. However, there are more potential explanations: First, the tax rate difference may actually not be the main incentive for profit shifting. Instead, the incentive is stable over years due to transaction costs, administrative issues, and foreign tax credits (Klassen and Laplante 2012b). Therefore, profit shifting may be sticky. Second, given the lower business tax rate, the government's disadvantage from profit shifting is lower and consequently there may be less governmental control. That way, shifting costs decrease and counteract the reduced tax incentive for profit shifting after the reform. Other explanations relate to certain conditions during the observation period. Due to the financial crisis, certain competitive goals may have been distorted, which may make profit shifting even more important for a company's performance. Eventually, the tax cut may have triggered companies to shift accruals (e.g., depreciation expenses) to pre-reform years with a higher tax rate, resulting in higher earnings after the reform. This would cause a parallel trend of earnings of foreign-owned and domestic firms after the reform, and work against finding the expected effect.

My findings are particularly relevant considering the ongoing "race to the bottom" in corporate tax rates in many countries. Whereas reactions in corporate investment following a tax cut are empirically supported (e.g., Brandstetter and Jacob 2013), expectations of the government related to profit shifting cannot be confirmed: the benefits of shifting earnings to tax havens may still be favorable after the tax cut.

In the following, I first give an overview of the institutional background, and introduce the model that my hypothesis is based on. In section 3, the empirical design, and the data used are described. Section 4 presents the empirical results. Section 5 concludes.

2. The Effect of a Tax Rate Cut on International Profit Shifting

2.1 Hypothesis Development

I follow a standard model in prior research that the tax benefits of profit shifting are higher, the higher the tax difference between the two affiliated companies is (e.g., Dischinger 2007; Huizinga and Laeven 2008; Weichenrieder 2009; Dharmapala and Riedel 2011). I use an inbound investment scenario with a foreign shareholder F, that controls the domestic subsidiary D. The domestic tax rate is τ_D, the tax rate in the country of the shareholder τ_F. Goods, services, or loans G are transferred within the two companies. G can be positive or negative: a positive sign of G describes the number of units transferred from the shareholder to

the subsidiary; a negative sign means the opposite case. The arm's length price for G, i.e, the good, service, or loan, is p. D generates a taxable profit (without intercompany transactions) P_D, F's profit amounts to P_F. π is the after-tax profit at group-level. Therefore, without any shifting efforts of the group, π is

$$\pi = (1 - \tau_D)(P_D - pG) + (1 - \tau_F)(P_F + pG) \quad \text{(i)}$$

It is assumed that F is able to modify the transfer price and thus cause profit shifting by setting a manipulated price $(p + \Delta p)$. Δp can be positive or negative: a positive modification of p results in overpricing the good or service, or excessive interest payments; a negative modification results in underpricing.

Manipulation of prices comes with costs (e.g., Huizinga and Laeven 2008). These costs arise due to the process of shifting a certain amount of profit to a tax haven (e.g. for tax compliance, documentation; also non-tax costs (distortion of intra-group inventive systems)). Costs are described by a concave function, with higher marginal costs the higher the total amount of profits shifted. However, shifting costs are hard to define. Profit shifting strategies are usually not public information about a company. Consequences, like effective tax rates, or complex group structures, are an indicator, but there is no exact information whether a corporate decision is mainly based on tax incentives. Consequently, companies' costs to pursue these strategies are not public either.

A company engages in profit shifting in order to maximize after-tax group profits:

$$\max \pi\,(\Delta p) = (1 - \tau_D)(P_D - (p + \Delta p)G) + (1 - \tau_F)(P_F + (p + \Delta p)G) - C(\Delta p) \quad \text{(ii)}$$

The first order condition with respect to Δp is:

$$\frac{\partial \pi(\Delta p)}{\partial(\Delta p)} = 0 \quad \text{(iii)}$$

$$(\tau_D - \tau_F)G = \frac{\partial C(\Delta p)}{\partial(\Delta p)} \quad \text{(iv)}$$

Equation (iv) states the condition for optimal profit shifting. The left hand side gives the marginal (positive or negative) benefit of a price manipulation on the group's after tax profit. The right hand side shows how the costs develop with the price change. According to equation (iv), there is a linear relation between Δp and $(\tau_G - \tau_F)T$. That is, the change in benefit is higher with a higher difference in tax rates, and with every unit of goods or services transferred. The shifting costs are assumed to be the limiting factor for the redistribution. The basic assumptions on the costs are:

$$C(\Delta p) \geq 0 \quad \text{(v)}$$

$$C(\Delta p) = 0 \; if \; \Delta p{=}0 \quad \text{(vi)}$$

$$\frac{d^2C(\Delta p)}{d(\Delta p)^2} > 0 \qquad \text{(vii)}$$

Equations (v) to (vii) implicate that the costs rise with the extent of manipulation, regardless if positive or negative. If the price at arm's length is chosen, no costs arise. Also, the higher $|\Delta p|$, the higher is the marginal rise in costs for further modification. A company group will refrain from profit shifting activities, when the benefit of further manipulation does not exceed the costs. If $G = 0$ or if $\tau_F = \tau_G$, there is either no option for price manipulations, or there is no resulting benefit. In all other cases, appropriate modifications lead to a reallocation of profits to the country with lower taxation, which result in tax savings on the group level.

When a high-tax country cuts corporate taxes, the difference in corporate tax rates between F and D decreases, and so does the tax benefit resulting from shifting profits abroad as stated in Equation (iv). Then, marginal shifting costs exceed the benefits from price manipulation at a lower level of profit shifting. Therefore, Δp and consequently the amount of profits shifted decreases. I state the following hypothesis:

Hypothesis: A corporate tax cut in a high-tax country leads to a reduction of profit shifting to low-tax countries within multinational enterprises.

2.2 Institutional Setting

Germany participated in the international "race to the bottom" in 2008: the business tax rate was cut by about ten percentage points from about 40% to about 30%, depending on the local tax rate. The tax cut resulted from the international tax competition, and countries' efforts to establish an attractive tax environment for companies. The reform also included base broadening elements concretizing transfer pricing rules, and introducing the interest barrier rule that limits the amount of interest expenses that are deductible for tax purposes. This thin capitalization rule aims at cutting profit shifting through financing strategies. Both provisions may lead to a reduction of profit shifting, and act in favor of the hypothesis. Their effects are not separable from the effect of the corporate tax cut. However, Blaufus and Lorenz (2009) suggest that the interest barrier rule is only applicable to very few firms, due to several escape clauses. Therefore, I do not expect this rule to bias my results. In contrast, the stricter transfer pricing rules may strengthen results in support of the hypothesis.

3. Empirical Research Design and Data

3.1 Estimation Strategy

I use two difference-in-differences settings to test the hypothesis. This strategy compares earnings before interest and taxes (EBIT) and pre-tax income of multinational and domestic corporations around the 2008 tax cut in Germany. That way, my approach covers shifting effects in transfer pricing, and financing strategies. The following two regression equations are used:

$$EBIT_{i,t} = \alpha_0 + \beta_1 MNE_i \times Reform_t + \beta_2 Sales_{i,t} + \beta_3 Labor_{i,t} + + \beta_4 Fixed_{i,t} + \beta_5 Loss_{i,t} + \alpha_i + \alpha_t + \varepsilon_{it} \quad \text{(viii)}$$

$$PreTax_{i,t} = \alpha_0 + \beta_1 MNE_i \times Reform_t + \beta_2 Sales_{i,t} + \beta_3 Labor_{i,t} + + \beta_4 Fixed_{i,t} + \beta_5 Loss_{i,t} + \alpha_i + \alpha_t + \varepsilon_{it} \quad \text{(ix)}$$

Dependent variables are earnings before interest and taxes (*EBIT*) in equation (viii), and pre-tax earnings (*PreTax*) in equation (ix). The independent variable of interest in both equations is the interaction term *MNExReform*. The dummy variable *MNE* is 1 for multinational enterprises and 0 for domestic enterprises. I define corporations as multinational if their direct shareholder, which holds an interest of more than 50 percent in the subsidiary, is situated in a country other than Germany. Subsidiaries with their shareholder in Germany are defined as domestic. I focus on German inbound investment as prior research finds significant evidence for profit shifting analyzing German inbound investment, but no or only weak evidence for German outbound investment (e.g., Weichenrieder 2009). The interaction term *MNExReform* captures the level of earnings of multinational firms compared to domestic firms after the 2008 tax cut. The respective country of the shareholder is not relevant for this definition. However, one robustness test analyzes the sensitivity of earnings to the tax rate differential of subsidiary and shareholder, which is tied to the particular foreign tax rate.

According to the hypothesis stated above, both EBIT and pre-tax earnings of multinationals should increase compared to domestic companies. This results from the adjustment in profit shifting strategies: Due to lower tax incentives, multinationals are assumed to shift less taxable profits abroad, and keep more earnings in Germany. Domestic companies are less engaged in profit shifting, and do not show the respective reaction. Thus, the estimated coefficient of *MNExReform* is expected to be positive. The advantage of the difference-in-differences setting is that it accounts for the general trend in earnings: the observation period is severely affected by the financial crisis, which resulted in lower corporate earnings. If the consequences are identical for all companies, the difference-in-

differences approach is efficient, as the effect results from the difference between domestically owned and foreign-owned corporations.[5]

Another underlying assumption of the strategy is that treatment and control group, i.e. multinational and domestic corporations, only differ in the location of their shareholders, and that differences in their reactions to the 2008 tax cut are only due to that criteria. To make sure that there are no other structural differences between these two groups, which may bias the results, I conduct a one-on-one matching without replacement. Each domestic firm is matched to a multinational firm according to the natural logarithms of sales, labor costs, fixed and total assets of each year prior to the tax cut in the sample. Also, firms are matched within one industry. This approach ensures that the composition of the matched treatment and control groups does not change after the reform, and is thus not affected by reform effects. The matching procedure results in two equally large groups of companies with similar economic activities.

The regression model also controls for the influences of sales, wages, the level of fixed assets, and loss firms on EBIT, or pre-tax earnings, respectively. Firm-fixed effects control for firm-specific characteristics that do not vary over time. Therefore, the main effect of *MNE* cannot be added separately.[6] Year-fixed effects capture effects of the business cycle, and any other effects that are identical for every firm in the respective year. Similar to above, year dummies also cover the main effect of the *Reform* dummy.

3.2 Data Description

I use firm-level company data from Bureau van Dijk's *dafne* database to test the hypothesis. The database contains financial data from German companies, as well as information about the company structure, industry, or business activity. The sample covers an observation period from 2004 to 2011, and consists of 1,406 subsidiaries with a domestic shareholder, and 1,406 subsidiaries with a foreign shareholder. This results in 15,981 observations. I exclude companies offering financial or insurance services from the sample. All financial information is based on German accounting rules.

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[5] If the financial crisis affects domestically owned firms differently than foreign-owned firms, my results may be biased. Therefore, I conduct two robustness tests to control for further potential influences of the crisis (see Chapters 4.3 and 4.4 below).

[6] This is based on the assumption that the ownership structure does not change over time. As the database *dafne* provides holding information only for the last reported date, potential changes in the ownership structure are not observable. Therefore, *MNE* is constant over time in this sample. Following Budd, Konings, and Slaughter (2005), I assume that this measurement error produces a bias towards zero.

I use two different ownership definitions to identify whether a German corporation is part of a multinational enterprise, and has therefore opportunities to shift taxable profit to another country, or if the company is part of a domestic enterprise with no (or less) opportunities: First, I assume German subsidiaries with a foreign direct majority shareholder to be multinational. In a robustness test, I define corporations with a foreign parent to be multinational, and thus able to shift profits. That way, I account for complex group structures, as well as direct and indirect shifting destinations.

The composition of treatment and control group (foreign-owned and domestically owned corporations) is based on a one-on-one propensity score matching strategy without replacement. I obtain the propensity score for *MNE* from estimating a probit model for the year 2007. The natural logarithms of turnover, wages, fixed and total assets, as well as lagged variables of the two previous years are the independent variables. I match each observation from foreign-owned companies to an observation of domestically owned companies according to the nearest neighbor propensity score. The two groups of foreign-owned and domestically owned corporations resulting from this procedure do not change over the observation period. That is, changes in economic activities after the tax cut do not affect the composition of the groups. To make sure that treatment and control group are comparable, I estimate yearly t-tests analyzing the means of the natural logarithms of turnover, wages, fixed, and total assets. The tests suggest that the groups do not significantly differ from each other. Therefore, differences in economic activities between the two groups should not bias my results.

Table 1 presents descriptive statistics for the data used. Companies observed have average EBIT of 6.6m € and average pre-tax income of 7.3m €.[7] Average turnover amounts to 171.6m €, average wages to 17.8m €, and average fixed assets to 51.4m €. Also, 14.4% of the observations have a negative income.

[Insert Table 1 about here]

The model developed above is based on the assumption that after the tax cut, the tax rate difference to low-tax countries, and thus the incentive to shift profits abroad, decreases. However, if foreign tax rates drop correspondingly, the model does not predict an effect on profit shifting. [8] Compared to available tax rates in the sample, Germany dropped from having

[7] Data coverage for pre-tax earnings is lower than for the other variables: there are only 14,907 observations available.

[8] Overesch and Rincke (2011) analyze tax rates developments in 32 European countries. They find that tax competition between countries has led to the observed race to the bottom. According to their simulation, the 2006 tax level would have been 12.5 percentage points above the actual level, if tax competition did not play a role. Following Heinemann, Overesch, and Rincke (2010), a tax cutting reform is especially probable in countries, which are surrounded by low-tax countries. This suggests a possible chain reaction.

the fifth-highest of 63 business tax rates in the sample in 2007 to rank 17 in 2008. This change in ranks alone rejects the concern that the international tax rates' race to the bottom could have eliminated the influence of the German tax cut on global tax competition, and therefore the tax rate difference analyzed. Even if the international trend in tax rates lowers the effect of the tax cut analyzed, I assume that a tax cut of ten percentage points is large enough to induce observable reactions.

4. Results

4.1 Graphical Evidence

The graph in Figure 1 (Figure 2) plots EBIT (pre-tax earnings) of multinational corporations compared to the matched sample of domestic corporations to get a first hint of potential profit shifting reactions after the 2008 tax cut. Average earnings of foreign-owned companies are lower than average earnings of domestically owned companies with comparable economic activity over the observation period. This points towards profit shifting of multinationals as identified in prior studies (e.g., Egger, Eggert, and Winner 2010).

[Insert Figures 1 and 2 about here]

If multinational corporations adjust their profit shifting strategy as a consequence of the 2008 tax reform, and thus shift less taxable profits abroad, multinationals' EBIT, or pre-tax earnings, respectively, should increase compared to domestic companies after the tax cut. However, the graphs of multinational and domestic corporations remain parallel even after the reform.

[Insert Figures 3 and 4 about here]

Figure 3 (Figure 4) plots the difference in EBIT (pre-tax income) between domestic and foreign-owned subsidiaries. Both figures show a positive difference of earnings after the reform, suggesting that domestic subsidiaries still have higher earnings than multinationals after the reform. In case of EBIT, the difference even increases.

None of the figures shows signs of a growth in earnings of foreign-owned subsidiaries compared to domestic subsidiaries, and therefore a reduction in shifting of taxable profits from Germany to low-tax countries.

4.2 OLS Results

I use a difference-in-differences approach to test the hypothesis. Results are displayed in Table 2. The independent variable of interest is the interaction of *MNE* and *Reform*: it

compares the level of earnings before interest and taxes of multinational and domestic companies after the 2008 tax cut in columns 1 and 2, and the level of pre-tax earnings in columns 3 and 4.[9] That way, the approach covers shifting solely through the channel of transfer pricing on the one hand, and shifting through both transfer pricing and financing strategies on the other hand. Variables are used as natural logarithms in columns (1) and (3), and divided by prior year's total assets in columns (2) and (4).

[Insert Table 2 about here]

The estimated coefficient of *MNExReform* is insignificant in all specifications. That is, there is no empirical evidence that earnings of foreign-owned subsidiaries increase compared to domestically owned subsidiaries after the tax cut, which would indicate that more taxable profits remain in Germany.

There are several possible explanation for this result: First, multinationals' profit shifting strategies are actually not sensitive to a tax cut. This supports Bucovetsky's (2013) findings, who derives from a model-based approach that sheltering of income depends on the fee that a tax haven charges, and thus its credibility that is connected with this fee. Tax rates in high-tax countries, however, have an impact on the number of tax havens, but not on the amount of income shifted. Second, there may be high costs to adjust an existing profit shifting strategy that keep companies from modifying it (e.g., Chetty et al. 2011). Even if tax incentives have reduced, it is optimal to choose profits to be taxed in a jurisdiction where taxes are still lower. Due to transaction costs, tax administrative issues that would arise from a new strategy, and foreign tax credits that are tied to one country, the incentive for profit shifting may be stable over periods so that profit shifting may be sticky (Klassen and Laplante 2012b). Third, given the lower business tax rate, the government's disadvantage from profit shifting is lower and consequently there may be less governmental control. That way, shifting costs would decrease and allow more profit shifting after the reform. Other explanations relate to certain conditions during the observation period: due to the financial crisis, competitive goals may have been distorted, which made profit shifting even more important for a company's performance. Eventually, the tax cut may have triggered companies to shift depreciation expenses to pre-reform years with a higher tax rate, resulting in higher earnings after the reform. This would cause a parallel trend of earnings of foreign-owned and domestic firms after the reform, and work against finding an effect in favor of the hypothesis.

[9] The number of observations varies due to differences in data availability between EBIT and pre-tax income. Also, there are less observations in the specifications using the natural logarithm as it is not defined for negative values.

The estimated coefficients of *Sales* and *loss* are as expected: an increase in the turnover of 10% would increase EBIT by 8.2%. The ratio of pre-tax income to prior year total assets of firms with negative income is 11% lower than of firms with positive income. Estimated coefficients of the other control variables are not significant.

It may be argued that e.g. adjustment costs only postpone an adjustment, but not exclude it. The idea is that contracts have a certain duration, after which they need to be renegotiated anyway. The adaption to new tax incentives may thus not take place immediately after the 2008 tax cut, but with a certain delay. To identify a possible delay, I run the baseline regression, but split up the *MNExReform* variable into yearly effects for the years 2008 until 2011. These variables capture the difference in the level of EBIT (or pre-tax income) between multinational and domestic enterprises for every single year. Results are presented in Table 3.

[Insert Table 3 about here]

The estimated coefficients of the variables *MNEx2008* until *MNEx2011* are insignificant in all specifications. That means, if the adjustment to the lower tax rate is just delayed, the effect is not identifiable until the year 2011. For a period of four years after the actual tax cut, a reduction in international profit shifting cannot be empirically identified.

4.3 Influence of Economic Environment in Shareholder Country

The economic situation during the observation period has been severely affected by the financial crisis in 2008 and 2009. The matching procedure, also the inclusion of year-fixed effects in the regression, and the difference-in-differences approach account for the business cycle. However, if the financial crisis has affected domestic and foreign-owned companies in different ways, my results may be biased. I include the GDP growth rate of the parent country in the regression to account for potential spillover effects on the German subsidiary. If the financial crisis hit the economy of foreign countries differently than Germany, and this effect had an influence on foreign-owned companies, which is different to the effect of the crisis on domestic companies, the variable *GDP* captures this impact. The results of this robustness test are presented in Table 4.

[Insert Table 4 about here]

Table 4 duplicates the baseline results, but adds the variable *GDP*. The estimated coefficient of *GDP* is insignificant in all specifications. Therefore, the economic differences between the parent country and Germany do not influence the level of EBIT and pre-tax earnings in a certain way. The negative sign of the estimated coefficient in three specifications suggests that a weaker economy in the parent's country could lead to higher earnings on the

subsidiary level. This may be the result of higher investments in a country with a strong economy, rather than in an economic downturn, as this promises higher returns (e.g., Brandstetter and Jacob 2013, Becker and Riedel 2012). As foreign countries have experienced worse impact by the financial crisis than Germany has, such an influence of the GDP growth rate should rather bias my findings towards a positive result. However, the estimated coefficient of *MNExReform* is still insignificant. The difference in earnings between domestic and foreign-owned firms has not changed after the tax cut, and profit shifting has not decreased.

4.4 Companies Surviving All Sample Years

During the financial crisis, many companies left the market due to insolvency. Thus, there may be big differences across companies in the sample regarding how hard they have been hit by the crisis. If there are differences in insolvency risks between domestic and foreign-owned firms, the estimated coefficient for *MNExReform* is biased. If multinational subsidiaries' earnings decrease stronger due to the crisis, the two effects – crisis and profit shifting adjustment – would even out. That is, the fact that there is no empirical evidence for a change in shifting activities so far may actually be due to the economic circumstances in the observation period. To account for these differences in insolvency risk, I restrict the sample to companies, which survive all sample years in the observation period. This excludes all corporations that have entered or exited the market during the years 2004 until 2011. All remaining companies should not have been existentially threatened by the crisis. Results are depicted in Table 5.

[Insert Table 5 about here]

The estimated coefficient for *MNExReform* is insignificant even for the restricted sample. The differences in insolvency risk do not bias the results in such a way that would not allow to identify changes in profit shifting. There is still no empirical evidence for a change in profit shifting as a reaction to the 2008 tax cut.

4.5 Large Companies

In another robustness test, I focus on large companies, which may be more likely to shift profits abroad than smaller companies due to scale economies in tax planning, i.e., which are also more likely to adjust their shifting strategy after the tax cut. Profit shifting requires a certain effort in tax planning, and experience in international tax planning, that not all companies have access to. Moreover, the absolute benefit from shifting profits abroad may

have an influence on the shifting decision in general, which means that profit shifting may only be interesting for larger companies with higher profits that can be subject to shifting. Smaller firms might not be involved in elaborate tax planning. I therefore conduct the baseline regressions for companies, whose total assets are higher than the median of total assets in the sample. Table 6 contains the regressions results.

[Insert Table 6 about here]

The estimated coefficient of *MNExReform* is insignificant, and economically very small. Even if the sample is restricted to those companies, which are more likely to engage in elaborate tax planning, there is no evidence that companies shift less profits abroad after the 2008 tax cut.

4.6 Sensitivity to Tax Rate Variation

Further, I test whether the sample companies' earnings show any sensitivity to tax rate variation in Germany or in the shareholder country. Even if most variation of tax rates in the sample results from the 2008 tax cut in Germany, other countries have also faced various tax rate changes. Tax rate changes in affiliate countries also change the level of tax advantages that result from shifting profits abroad. If multinational corporations adjust their transfer pricing strategies to tax changes, there should be a significant effect of the corporate tax rate variation on the level of earnings. I thus replace *MNExReform* by the difference in business tax rates between Germany and the respective country of the shareholder in the baseline regression. The variable *taxdiff* reflects all changes in corporate tax rates in the shareholder countries during the observation period 2004 to 2011. Results are displayed in Table 7.

[Insert Table 7 about here]

The estimated coefficient of *taxdiff* is insignificant in all four specifications. There is no evidence that the tax rate difference explains the level of earnings of foreign-owned subsidiaries and thus be the main incentive for profit shifting. This finding confirms Klassen and Laplante's (2012b) concerns about using the foreign tax rate as a proxy for income shifting, as they assume the incentive for profit shifting to be stable across periods. This test supports prior results that German subsidiaries did not reduce activities to shift taxable profits from Germany to low-tax countries.

4.7 Different Ownership Definition

The previous empirical tests have assumed the direct shareholder to be the relevant destination for profit shifting of German subsidiaries. However, shifting networks within

multinational enterprises may be more complex. I thus change the definition of the relevant shifting destination, and conduct the baseline regressions as well as all robustness tests assuming the ultimate owner to be the relevant affiliate for profit shifting purposes. This robustness test accounts for different shifting networks within a company group.

Results are not tabulated, but are comparable to the results obtained using the direct shareholder as the relevant affiliate. The tests do not suggest that corporations adjust their transfer pricing strategy after a tax rate cut.

5. Conclusion

The study analyzes whether a corporate tax cut in a high-tax country has an effect on profit shifting of foreign-owned subsidiaries to tax havens, i.e., if multinationals shift less taxable income to countries where profits are taxed a lower rate. I use a difference-in-differences setting that compares EBIT and pre-tax earnings of foreign-owned and domestically owned German companies around the 2008 tax reform in Germany. The empirical tests do not provide significant evidence that earnings of foreign-owned subsidiaries have increased after the tax cut compared to domestically owned subsidiaries. According to multiple robustness tests, these results are not explained by the special economic circumstances in the observation period due to the financial crisis, amongst other factors. I cannot conclude that multinationals adjust their transfer pricing strategy after a tax cut, that less profit is shifted to tax havens, and that more taxable earnings remain in the subsidiary's country.

This raises concerns that the tax rate difference between the subsidiary's country and the parent country may not be the main incentive for international profit shifting. Shifting may rather depend on the fee charged by tax havens for their credibility (Bucovetsky 2013). Alternatively, due to transaction costs, tax administrative issues, and foreign tax credits, existing shifting strategies may actually be long-term arrangements (Klassen and Laplante 2012b).

The study contributes to a large body of literature on international profit shifting. The results are particularly important considering the international "race to the bottom" in tax rates, and the expected partial self-financing of tax cuts. Whereas the effect on corporate investment as intended by governments can be empirically supported (e.g., Brandstetter and Jacob 2013), the policy makers' expectations regarding profit shifting are not confirmed by this analysis. This can be of high importance for future tax reforms.

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Appendix

Figure 1: Average EBIT of Multinational and Domestic Firms

This figure plots the average *EBIT* of domestic firms (dashed line) vs. foreign-owned firms (black line). *EBIT* is defined as earnings before interest and taxes divided by prior year total assets.

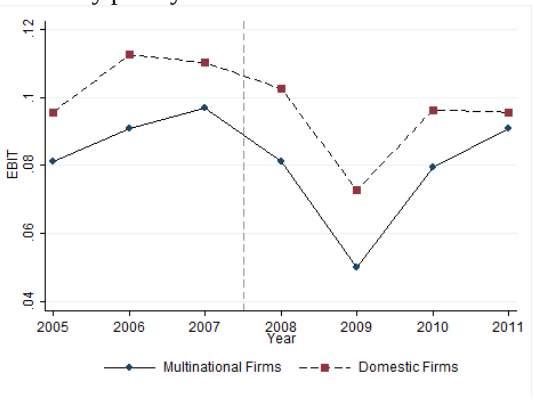

Figure 2: Average Pre-tax income of Multinational and Domestic Firms

This figure plots the average *PreTax* of domestic firms (dashed line) vs. foreign-owned firms (black line). *PreTax* is defined as pre-tax income divided by prior year total assets.

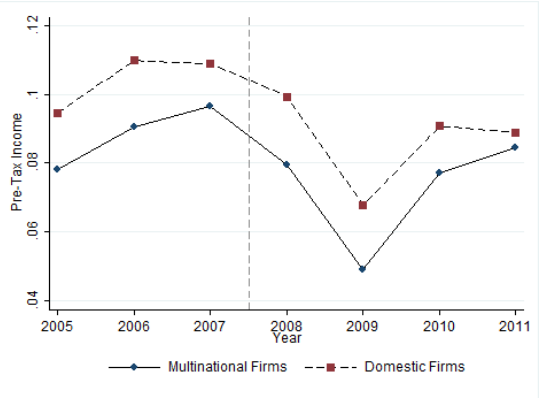

Figure 3: Difference between EBIT of Domestic and Multinational Firms

This figure plots the difference between average EBIT of domestic and multinational firms (black line). The upper and lower 95% confidence intervals are indicated by the grey lines. *EBIT* is defined as earnings before interest and taxes divided by prior year total assets.

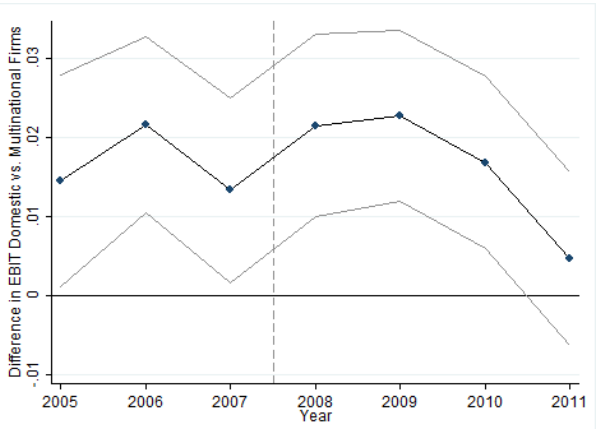

Figure 4: Difference between Pre-tax income of Domestic and Multinational Firms

This figure plots the difference between average pre-tax income of domestic and multinational firms (black line). The upper and lower 95% confidence intervals are indicated by the grey lines. *PreTax* is defined as pre-tax income divided by prior year total assets.

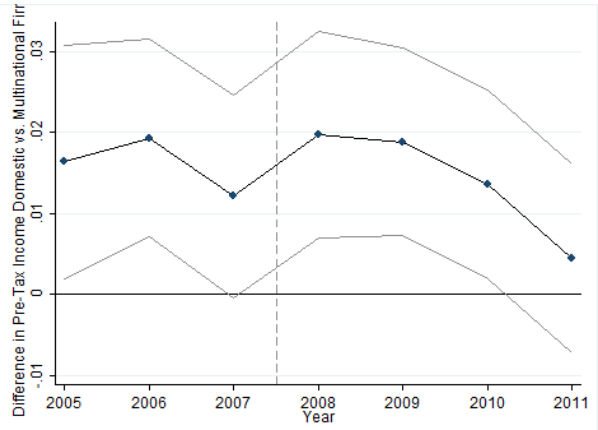

Table 1: Summary Statistics

This table presents summary statistics of the firm-level data used for the analysis. The panel consists of 2,812 firms, resulting in 15,981 observations between 2004 and 2011. Data source is *dafne*.

Variable	Description	Mean	25th Percentile	75th Percentile
Dependent variables				
EBIT	Earnings before interest and taxes in thousand €	6,630.78	146.03	4,126.43
PreTax	Pre-tax income in thousand €	7,279.30	116.44	4,333.10
Independent variables				
Sales	Turnover in thousand €	171,588.20	14,621.42	96,455.25
Labor	Wages in thousand €	17,776.39	2,184.26	14,797.81
Fixed	Fixed assets in thousand €	51,390.73	522.45	15,335.51
Loss	Dummy variable equal to 1 if income<0	0.14	0	0

Table 2: Profit Shifting Around the 2008 Tax Cut

This table presents the regression results on firm's EBIT and pre-tax income over 2004-2011. Dependent variable in columns (1) and (2) is EBIT, defined as the natural logarithm of earnings before interest and taxes in (1), and earnings before interest and taxes relative to prior year total assets in (2). Dependent variable in columns (3) and (4) is PreTax, defined as the natural logarithm of pre-tax income in (3), and pre-tax income relative to prior year total assets in (4). The independent variables are defined in Table 1. They are used in logs in columns (1) and (3), and divided by prior year's total assets in (2) and (4). I include firm fixed effects and year fixed effects in all specifications. Standard errors, clustered at the firm level, are reported in parentheses. ***, **, and * refer to a significance level of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
	EBIT		PreTax	
	ln	/total$_{t-1}$	ln	/total$_{t-1}$
MNExReform	0.0242	-0.0012	0.0316	0.0009
	(0.034)	(0.004)	(0.039)	(0.004)
Sales$_t$	0.8194***	0.0362***	0.8447***	0.0364***
	(0.049)	(0.003)	(0.051)	(0.003)
Labor$_t$	-0.0169	0.0010	-0.0221	0.0059
	(0.056)	(0.012)	(0.060)	(0.013)
Fixed$_t$	0.0369**	0.0082	-0.0078	0.0083
	(0.016)	(0.011)	(0.018)	(0.012)
Loss$_t$	-0.9963***	-0.1065***	-1.0939***	-0.1147***
	(0.064)	(0.004)	(0.101)	(0.004)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	15,558	15,981	14,337	14,907
R-squared	0.887	0.713	0.876	0.717

Table 3: Profit Shifting Around the 2008 Tax Cut: Effect by Year

This table replicates Table 2 but presents regressions results, which estimate the reform effect separately for each year. Dependent variable in columns (1) and (2) is EBIT, defined as the natural logarithm of earnings before interest and taxes in (1), and earnings before interest and taxes relative to prior year total assets in (2). Dependent variable in columns (3) and (4) is PreTax, defined as the natural logarithm of pre-tax income in (3), and pre-tax income relative to prior year total assets in (4). The independent variables are defined in Table 1. They are used in logs in columns (1) and (3), and divided by prior year's total assets in (2) and (4). I include firm fixed effects and year fixed effects in all specifications. Standard errors, clustered at the firm level, are reported in parentheses. ***, **, and * refer to a significance level of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
	EBIT		PreTax	
	ln	/total$_{t-1}$	ln	/total$_{t-1}$
MNE×2008	0.0031	-0.0018	0.0219	-0.0002
	(0.041)	(0.005)	(0.047)	(0.005)
MNE×2009	0.0205	0.0007	0.0239	0.0029
	(0.050)	(0.006)	(0.055)	(0.006)
MNE×2010	0.0217	-0.0040	0.0203	-0.0012
	(0.047)	(0.005)	(0.050)	(0.006)
MNE×2011	0.0584	0.0004	0.0632	0.0024
	(0.048)	(0.005)	(0.055)	(0.006)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	15,558	15,981	14,337	14,907
R-squared	0.887	0.713	0.876	0.717

Table 4: Profit Shifting Around the 2008 Tax Cut: Controlling for Economic Situation in Shareholder Country

This table replicates Table 2, but further includes GDP, the growth in the gross domestic product in the shareholder's country, as additional control variable. I include firm fixed effects and year fixed effects in all specifications. Standard errors, clustered at the firm level, are reported in parentheses. ***, **, and * refer to a significance level of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
	EBIT		PreTax	
	ln	/total$_{t-1}$	ln	/total$_{t-1}$
MNExReform	0.0119	-0.0012	0.0237	0.0006
	(0.035)	(0.004)	(0.040)	(0.004)
GDP$_t$	-0.0089	0.0001	-0.0048	-0.0003
	(0.007)	(0.001)	(0.008)	(0.001)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	15,542	15,960	14,322	14,886
R-squared	0.887	0.713	0.877	0.717

Table 5: Profit Shifting Around the 2008 Tax Cut: Firms Surviving All Sample Years

This table replicates Table 2 but restricts the sample to firms that survived all sample years. I include firm fixed effects and year fixed effects in all specifications. Standard errors, clustered at the firm level, are reported in parentheses. ***, **, and * refer to a significance level of 1%, 5%, and 10%, respectively.

	(1)	(2)		
	EBIT		PreTax	
	ln	/total$_{t-1}$	ln	/total$_{t-1}$
MNE×Reform	0.0246	-0.0008	0.0243	0.0013
	(0.035)	(0.004)	(0.039)	(0.004)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	15,012	15,333	13,826	14,302
R-squared	0.886	0.712	0.875	0.719

Table 6: Profit Shifting Around the 2008 Tax Cut: Large Firms

This table replicates Table 2, but restricts the sample to firms, whose total assets are above the median of total assets in the sample. I include firm fixed effects and year fixed effects in all specifications. Standard errors, clustered at the firm level, are reported in parentheses. ***, **, and * refer to a significance level of 1%, 5%, and 10%, respectively.

	(1)	(2)		
	EBIT		PreTax	
	ln	/total$_{t-1}$	ln	/total$_{t-1}$
MNE×Reform	0.0003	0.0016	0.0025	0.0026
	(0.050)	(0.005)	(0.053)	(0.006)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	7,779	8,169	7,559	7,999
R-squared	0.822	0.748	0.825	0.747

Table 7: Profit Shifting Around the 2008 Tax Cut: Sensitivity to Tax Rate Variation

This table replicates Table 2, but measures sensitivity of earnings to tax rate variation instead of level changes. I include firm fixed effects and year fixed effects in all specifications. Standard errors, clustered at the firm level, are reported in parentheses. ***, **, and * refer to a significance level of 1%, 5%, and 10%, respectively.

	(1)	(2)		
	EBIT		PreTax	
	ln	/total$_{t-1}$	ln	/total$_{t-1}$
taxdiff	0.0005	0.0002	0.0009	-0.0000
	(0.004)	(0.000)	(0.004)	(0.000)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	15,520	15,947	14,302	14,873
R-squared	0.886	0.713	0.877	0.717

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