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Multinational Tax Avoidance and Tax Policy

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Content

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1. Abstract

Previous literature provides evidence that multinational corporations (MNC) are significantly less profitable in terms of taxable income than domestic controlled corporations (DCC) in Norway. The differential in taxable income profitability is partly attributed to MNCs' tax avoidance behavior. This paper aims to complement these studies by looking at recent data and extend the literature by considering recent tax policy changes in Norway, i.e. corporate tax cuts and the introduction of the interest barrier rule. With a sample of 724 087 observations spread over ten years, we get results consistent with multinational tax avoidance. When controlling for firm size, age, industry, leverage and asset composition, MNCs have on average a 1.1% lower taxable income profitability than DCCs. Corporations changing status from DCC to MNC experience a reduction in the taxable income profitability by 0.57%. Though significant, our results indicate a reduction in multinational tax avoidance when comparing with Langli and Saudagaran (2004) and Balsvik, Jensen, Møen, and Tropina (2009). Adoption of the interest barrier rule results in a significantly positive treatment effect on tax profitability of affected firms. However, we do not get significant results for MNCs. Attempting to isolate the effect of a corporate tax cut does not yield any indications of reduced multinational tax avoidance.

2. Introduction

There is a widespread interest and concern over the magnitude, determinants and consequences of corporate tax avoidance (Hanlon & Heitzman, 2010). Recent leakages of confidential off-shore information such as Panama Papers in 2016 (Süddeutsche Zeitung) and Paradise Papers in 2017 (ICIJ) sparks a new interest in how corporations and wealthy individuals reduce their tax burden through tax avoidance and tax evasion. Tax avoidance research is conducted in an array of disciplines, e.g. finance, public economics and accounting. Taxable income is confidential and difficult to access. However, accounting income, and accounting tax expenses are available through financial statements. Hence, our most feasible option is to look at the issue from an accounting perspective, requiring estimation of taxable income.

In the U.S., foreign controlled corporations (FCC) report significantly lower taxable income profitability than DCCs, see for example Klassen, Lang, and Wolfson (1993) and D. Harris, Morck, and Slemrod (1993). This profitability differential in taxable income is partly attributed to tax avoidance by MNCs (Langli & Saudagaran, 2004). Studies on Norwegian data, such as Langli and Saudagaran (2004) and Balsvik et al. (2009) shows that a similar profitability differential also occurs in Norway. Balsvik et al. (2009), the most recent study on Norwegian data (except for master theses), includes data from 1993 to 2005. The economic landscape has changed since then; in the era of both Langli and Saudagaran (2004) and Balsvik et al. (2009), the tax policy landscape was stable. The corporate tax rate has been 28% since 1992, and there was no regulation on intra-group interest expenses. This changed in 2014 with a corporate tax cut to 27% (Finansdepartementet, 2013b) and the introduction of the interest barrier rule (Finansdepartementet, 2013a).

MNCs has incentives to shift debt to affiliates where the corporate tax rate is higher. In comparison to many tax jurisdictions, Norway has a high effective tax rate (PricewaterhouseCoopers, 2016). The Norwegian government had multinational tax avoidance through debt-shifting in mind when introducing the interest barrier rule. By limiting the deductibility of intra-group interest costs, MNCs should find it less profitable to shift internal debt to Norwegian affiliates. Reducing the tax rate in Norway makes multinational tax avoidance less attractive, since deductions are less valuable.

Recent policy changes motivate a new study on multinational tax avoidance in Norway. What differences are there in taxable income profitability between DCCs and MNCs? And will a corporate tax cut, or the introduction of the interest barrier rule, reduce the previously discovered profitability differentials between DCCs and MNCs? We believe our thesis will shed valuable light on the state of tax avoidance in Norway today, including the effect of the policy changes in 2014.

The remainder of this thesis consists of five parts. Section 3 reviews existing literature on multinational tax avoidance and policy. Section 4 discusses the methodological theory and application to conduct our research. Section 5 describes the data-gathering process, sample selection criteria and descriptive statistics. Results and the conclusion are presented in sections 6 and 7, respectively.

3. Literature review

The literature on corporate tax avoidance is extensive, developed since the early 1970's. Both Shackelford and Shevlin (2001) and Hanlon and Heitzman (2010) provide a thorough literature review on tax avoidance and tax research in general. This thesis is specifically oriented on two kinds of tax research: multinational tax avoidance and the treatment effects of tax policy. Previous literature concerning both topics are presented below.

3.1. Prior studies on multinational tax avoidance

Devereux and Maffini (2007) present a comprehensive review of studies done on MNC's tax avoidance behavior. The tax avoidance literature is primarily concerned with MNCs' ability to manipulate transfer prices and tax avoidance through intra-group lending, shifting profits from high to low tax jurisdictions. Methods for measuring multinational tax avoidance are constellated into two groups: the direct and the indirect method. The direct method uses customs data to estimate manipulation of transfer prices. The indirect method uses accounting information to estimate profitability differentials, which can both be attributed to transfer price manipulation and/ or tax avoidance through intra-group lending. Swenson (2001) applies the direct method when looking at import data in the U.S. between 1981 and 1988, to test whether a corporate tax cut altered transfer pricing behavior. Other studies, e.g. Clausing (2003) and Bernard, Jensen, and Schott (2006) find evidence that multinationals avoid taxes through transfer pricing manipulation, where income is shifted to the countries with the lowest tax rates. Grubert, Goodspeed, and Swenson (1993) applies the indirect method to show that MNCs have a negative profitability differential in comparison to DCCs. Foreign-owned affiliates in the US report a lower taxable income than domestic corporations. They attribute 50% of the negative profitability differential to firm characteristics and other observable factors. Related studies, such as Grubert and Mutti (1991), Hines Jr and Rice (1994), J. Collins, Kemsley, and Lang (1998) and by Grubert (1998) obtain similar results.

Klassen et al. (1993) looks at whether the profitability of US multinationals is related to tax rate changes over time. They yield results consistent with profit being shifted to the countries where the tax rate was lowered. This is also in line with D. Harris et al. (1993) and Jacob (1996). J. Collins et al. (1998) found that

the profitability of US manufacturing MNC firms is related to foreign tax rates. European examples include Oyelere and Emmanuel (1998), Dischinger (2007) and Egger, Eggert, and Winner (2010). Oyelere and Emmanuel (1998) uses UK firm data and found results consistent with FCCs engaging in profit shifting behavior. Kinney and Lawrence (2000) however attribute other reasons than tax avoidance for the difference in taxes paid between DCCs and MNCs.

In Norway, Hægeland (2003) was the first to research corporate tax avoidance empirically. He found weakly significant results of profit being shifted into Norway. Huizinga and Laeven (2008) agrees with Hægeland, using European data from 1999.

Langli and Saudagaran (2004) however, found opposed to Hægeland/Huizinga, that FCC's in Norway report a systematically lower profitability than DCCs. They also find evidence that tax avoidance is true for small- and medium-sized firms. Whereas earlier studies only found results indicating tax avoidance between large firms, and that income shifting increases by firm size e.g. Scholes, Wilson, and Wolfson (1992), Klassen et al. (1993), D. G. Harris (1993) and Shackelford (1993). Balsvik et al. (2009) find evidence of profit being shifted out of Norway, they extend Langli and Saudagaran (2004), adding a longer timeseries and additional industries. They also include domestic multinational corporations (DMNC) in the MNC category, since they also hold tax avoidance capabilities. Interestingly, Balsvik et al. (2009) find a much smaller profitability differential than Langli and Saudagaran (2004).

3.2. Prior studies on tax policy

Several of the studies concerning tax avoidance often looks at the effect of government policy, such as tax cuts and restrictions on intra-group lending. D. G. Harris (1993) analyses the effect of the 1986 U.S. Tax Reform Act under a difference-in-difference method (DiD). He finds that U.S. MNCs shifts a substantial amount of income in response to the tax cut. Other studies that looks at the U.S. Tax Reform Act are Klassen et al. (1993) Swenson (2001), Froot and Hines Jr (1995) and Altshuler and Mintz (1996). The latter find significantly higher profits for MNCs when the US tax rate was lowered.

J. H. Collins and Shackelford (1992) find evidence of companies restructuring their financing activities, shifting to debt-like securities as a response to a

regulatory change in tax credits in the U.S., providing early evidence on the treatment effect of tax policy.
Desai, Foley, and Hines (2004) examines the use of debt in affiliates of US multinational companies, finding evidence that debt decisions were strongly influenced by tax rates.

Blouin, Huizinga, Laeven, and Nicodème (2014) find that interest barrier rules and thin-capitalization rules regulating the foreign affiliates of U.S. MNCs greatly affect the capital structure, reducing intra-group leverage by as much as 6.3%. Germany introduced interest barrier regulation in 2008 (Luther Rechtsanwaltsgesellschaft mbH, 2013), almost identical to the Norwegian legislation in 2014. The literature is using the DiD-framework to estimate the treatment of interest barrier rules. Buettner, Overesch, Schreiber, and Wamser (2012) find evidence that the interest barrier rule reduces the incentive to shift debt between foreign affiliates. Dreßler and Scheuering (2012) shows that the interest barrier rule drove firms to lower their leverage. Surprisingly, mostly external debt, not internal debt is reduced. Buslei and Simmler (2012) find strong evidence of affected firms increasing their tax base. In contrast to Dreßler and Scheuering (2012), Wamser (2014) shows multinational firms responding by reducing internal debt. The only comparative study on the treatment of the interest barrier rule in Norway is Finnanger and Leland (2017), a master thesis from NHH. They find evidence that affect firms become more profitable, increasing their tax base, due to the regulation. However, the literature is not consistent on what the effects of interest barrier regulations are. Saunders-Scott (2015), using panel data from multinationals in multiple countries, report that affected firms experience on average a reduction in EBITDA (earnings before interest, taxes, depreciations and amortizations), by 3.8%.

Norway also started reducing the corporate tax rates in 2014, which can reduce tax avoidance. The logic being the cost of tax avoidance, estimated at around 0.6% of a firm’s tax base (Huizinga & Laeven, 2008). A reduction in the corporate tax rate can incentivize firms to reduce tax avoidance, as it becomes less profitable to shift profits. Germany, along with the introduction of the interest barrier, also performed a corporate tax cut in 2008. Brandstetter (2014) finds no evidence of less tax avoidance due to the tax cut.

4. Methodology

First, we will use the indirect method to estimate the profitability differential between MNCs and DCCs, similar to Langli and Saudagaran (2004) and Balsvik et al. (2009). We follow the literature by using the profitability differential as a proxy for tax avoidance. Second, the framework of estimating the treatment effect of the interest barrier rule is presented. We will deploy a DiD-method, resembling Buettner et al. (2012). Finally, our methodology for measuring the effect tax cuts has on multinational tax avoidance will also be conducted through a quasi-DiD framework, influenced by Brandstetter (2014).

4.1. Estimating tax avoidance

Following the framework of Langli and Saudagaran (2004) and Balsvik et al. (2009), we will apply the indirect method to estimate the profitability differential. One limitation with the indirect method is that the profitability differential between MNCs and DCCs cannot be solely attributed to tax avoidance. Acquiring tax data and customs data is difficult, which makes the indirect method more feasible. The indirect method captures the effect of tax avoidance through transfer pricing, debt-shifting and royalties, whereas the direct method is only applicable to estimating transfer pricing manipulation.

Klassen et al. (1993) uses the measure of estimated taxable income over sales to identify possible profit shifting behaviors. Due to the lack of tax data, taxable income is estimated as follows:

$$TI_{i,t} = NIBT_{i,t} + [(DTL_{i,t-1} - DTL_{i,t} + DTA_{i,t} - DTA_{i,t-1})] \,/\, TR_{i,t} \quad (1)$$

$TI_{i,t}$ is the estimated taxable income for firm *i* in year *t*;

$NIBT_{i,t}$ is the net income before taxes for firm *i* in year *t*;

$DTL_{i,t}$ is the deferred tax liability for firm *i* in year *t*;

$DTA_{i,t}$ is the deferred tax asset for firm *i* in year *t*;

$TR_{i,t}$ is the effective tax rate for firm *i* in year *t*, given by:

$$TR_{i,t} = {TE_{i,t}}\Big/{NIBT_{i,t}}$$

where $TE_{i,t}$ is the tax expense for firm *i* in year *t*.

4.1.1. Pooled ordinary least squares estimation

Jacob (1996) divides taxable income (TI) by equity as a modified return on equity, which can be compared between firms. Langli and Saudagaran (2004) uses a

measure for profitability instead, dividing TI by sales. The variable is treated as endogenous and used as the comparative measure between MNCs and DCCs. The pooled least ordinary squares (POLS) regression Langli and Saudagaran (2004) uses for estimating profitability is:

$$\Pi_{it} = \beta_1 \cdot f_{it} + \gamma \cdot X_{it} + \sigma_t + u_{it} \quad (2)$$

Π_{it} is the profitability measured by the ratio of taxable income over sales.

f_{it} is a variable equaling 1 for MNC, 0 otherwise.

β_1 coefficient represents the profitability differential between DCC and MNC.

X_{it} are the firm characteristic control variables (size, leverage, age, ratio of fixed assets and industry), γ the associated coefficients.

σ_t represent the year effects.

u_{it} is the error term.

Applying the same framework to our research question, our model becomes:

$$\begin{aligned} TI\_SALES_{i,t} = {} & \beta_0 + \beta_1 MNC_{i,t} + \beta_2 MAN_{i,t} + \beta_3 WHS_{i,t} + \beta_4 RET_{i,t} + \\ & \beta_5 TRA_{i,t} + \beta_6 HOS_{i,t} + \beta_7 REE_{i,t} + \beta_8 CON_{i,t} + \beta_9 ADV_{i,t} + \\ & \beta_{10} TEC_{i,t} + \beta_{11} PHA_{i,t} + \beta_{12} DEBT\_TA_{i,t} + \beta_{13} FIXASS\_TA_{i,t} + \\ & \beta_{14} SIZE_{i,t} + \beta_{15} AGE_{i,t} + \beta_{16} YR07_{i,t} + \beta_{17} YR08_{i,t} + \\ & \beta_{18} YR09_{i,t} + \beta_{19} YR10_{i,t} + \beta_{20} YR11_{i,t} + \beta_{21} YR12_{i,t} + \\ & \beta_{22} YR13_{i,t} + \beta_{23} YR14_{i,t} + \beta_{24} YR15_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

$TI\_SALES_{i,t}$ = taxable income divided by total operating income for firm *i* in year *t*. Taxable income estimated by equation 1.

$MNC_{i,t}$ = categorical variable for firm i in year t, equal 1 for multinational corporations and 0 for domestic corporations. Criteria for multinational status given in table 1.

$MAN_{i,t}$ categorical variable for firm i in year t equal to 1 for firms in the manufacturing industry, 0 otherwise.

$WHS_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the wholesale industry, 0 otherwise.

$RET_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the retail industry, 0 otherwise.

$TRA_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the transportation industry, 0 otherwise.

$HOS_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the hospitality industry, 0 otherwise.

$REE_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the real estate industry, 0 otherwise.

$CON_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the construction industry, 0 otherwise.

$ADV_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the advisory industry, 0 otherwise.

$TEC_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the technology industry, 0 otherwise.

$PHA_{i,t}$ = categorical variable for firm i in year t equal to 1 for firms in the pharmaceuticals industry, 0 otherwise.

$DEBT\_TA_{i,t}$ = interest bearing debt divided by total assets for firm i in year t.

$FIXASS\_TA_{i,t}$ = fixed assets divided by total assets for firm i in year t.

$SIZE_{i,t}$ = calculated as total operating income in MNOK for firm i in year t.

$AGE_{i,t}$ = calculated as year (2006-2015) minus year of foundation for firm i in year t.

$YRm_{,i,t}$ = categorical variables for firm i in year t equals 1 if year = m for firm i in year t and 0 otherwishe, where $m = \{2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015\}$.

$\varepsilon_{i,t}$ = residual term.

Firms belonging to the "Other" industry, e.g. service industries, rental firms, gyms etc., have a value of 0 for all industry dummies.

POLS estimation is basically ordinary least squares regression on panel data, where all observations are treated as a pool of data. The estimation does not distinguish what firms the observations belong to. Hence, we can interpret the MNC-coefficient to be the estimated expected effect on TI_SALES if the firm is a MNC. Time-invariant variables are also estimated.

Robust standard errors will be used since both the White test (White, 1980) and the Breusch-Pagan test (Breusch & Pagan, 1979) clearly shows there is heteroskedasticity present. The industry dummy variables control for industry-specific effects. DEBT_TA (leverage) controls for firm-specific leverage effects on TI_SALES. SIZE is a control for firm size, since profitability varies by firm size (see for example: Chan and Chen (1991)). AGE is a control for differences in firms' ages. Research suggests that older firms are less profitable (see for example: Majumdar (1997)). Year-effects are included.

Hence, we will expect that the MNC-coefficient captures tax avoidance behavior, due to the extensive amount of controls included in the regression. We differ in our framework from Langli and Saudagaran (2004) and Balsvik et al. (2009) in that we allow controls for size and age to be continuous. We also include more industries.

Our hypothesis under POLS estimation is that the MNC-coefficient will be negative, hence implying that MNCs are less profitable than DCCs, which can be attributed to tax avoidance behavior.

4.1.2. Fixed effects (FE)

Since we have panel data, it is advantageous to use panel data methods to estimate tax avoidance. Panel data methods groups observations together per firm, and estimates changes per firm over time. Two possible models are fixed effects (FE) and random effects (RE).

One problem with only using POLS estimation on panel data is that we require the covariance between the error term, $u_{i,t}$ and the independent variables to be zero. Also, we require that the covariance between the unobserved heterogeneity, α_i and the independent variables are zero, or:

$$Cov(\beta_{i,t}, \iota_{i,t}) = 0 \tag{4}$$

Where $\iota_{i,t,} = \alpha_i + u_{i,t}$.

When requiring our ordinary least squares (OLS) estimator to be consistent and unbiased, we do not allow the error term to covary with our independent variables.

Unobserved heterogeneity leads POLS to be both biased and inconsistent. This holds for RE. But FE controls for unobserved heterogeneity and overcomes the effect of omitted variable bias (Dranove, 2012). Examples of unobserved heterogeneity are management quality, culture, etc., which we expect a priori affects a firm's profitability.

The Hausman-test decides whether a random or a fixed effects panel data method should be applied (Hausman, 1978). Balsvik et al. (2009) also conducts this test in their study. The Hausman-test gives clear results that the fixed effects model should be used due to unobserved heterogeneity in the data. The reader is guided to the Appendix for results. However, we will use RE when FE is not applicable due to semi time-invariance.

FE estimation is in line with Balsvik et al. (2009) and Tropina (2010). The FE-model is represented in Equation 5:

$$\Pi_{it} = \beta_1 \cdot f_{it} + \gamma \cdot X_{it} + \sigma_t + \alpha_i + \varepsilon_{it} \quad (5)$$

α_i is a parameter which represent the unobservable firm-specific effects that are time variant (management quality etc.).
ε_{it} is the idiosyncratic error term which can vary across firms and time.

The fixed effects estimator removes most of the omitted variable bias by only looking at the within-firm changes. Hence, our FE-estimation regression will not use industry dummies, as they are quite constant over time i.e. time invariant. The MNC variable will not vary much within firms, but it will vary for some. Under the fixed effects model, it is the transition from DCC to MNC which are estimated. Thus, we will interpret the MNC-coefficient of how taxable income is affected if the firm transitions from DCC to MNC.
However, Balsvik et al. (2009) uses both POLS and FE estimation, since they argue that FE can underestimate the effect of profit shifting by MNCs.

Our hypothesis under the FE estimation is that the MNC-coefficient will be negative, however possibly lower in absolute terms compared to the POLS estimation.

4.2. Measuring the treatment effect of the interest barrier rule

The increased ability of MNCs to shift profits through over-leveraging affiliates in high-tax jurisdictions, financed by group-firms in low-tax jurisdictions (i.e. debt shifting), is on the agenda for regulators (see for example: OECD (2016)). Debt-shifting as a tax minimization strategy results in many governments imposing restrictions on the interest deductibility of debt (Buettner et al., 2012). In October 2013, the Norwegian government proposed the interest barrier rule, which took effect from the 1st of January 2014 (Finansdepartementet, 2013a). The rule imposes a cap on the deductibility of intra-group interest expenses. Firms with net interest expenses exceeding 5 MNOK qualifies for the deductibility cap. Qualified firms calculates a tax EBITDA (earnings before interest, taxes, depreciation and amortization), which is calculated as follows:

$$Tax\ EBITDA = Taxable\ income + net\ interest\ expenses + taxable\ depreciations \quad (6)$$

If net interest expenses exceed 30% (25% from 2016) of tax EBITDA, then intra-group interest expenses cannot be deducted for the part that exceeds 30% of tax EBITDA, see The Norwegian Tax Act of 1999, §6-41. (Finansdepartementet, 1999).

There are some issues when estimating the tax EBITDA from accounting data (Equation 6). Under Norwegian regulation, tax depreciations are accelerated, whereas accounting depreciations mostly follow straight line. Taxable income is not given from accounting data, but can be estimated by Equation 1, but it does not give the true taxable income. Interest expenses are mostly the same under both regulatory regimes.

We deem the estimation of tax EBITDA to yield unrealistic results, mainly because of the differences in tax and accounting depreciation methods. Instead, we propose a more feasible method to estimate which firms are likely affected by the rule. The method is also used by Finnanger and Leland (2017).

To select a treatment group, we impose two criteria which must be true for treated firms:

1) net interest expenses above 5 MNOK
2) intra-group interest expenses > 0.

Our belief is that firms fulfilling the two criteria are likely affected by the interest barrier rule.

4.2.1. Difference-in-difference

The DiD-method is applied to measure the treatment of government policies (Imbens & Wooldridge, 2009). Thus, it is the suitable method for measuring the treatment of the interest barrier rule. A treatment group, affected by the interest barrier rule, is compared with a control group, unaffected by the treatment. The DiD-method requires that the treatment happens at a specific point in time, for comparability of pre-/post-treatment period on the treatment group. The most important assumption under the DiD-framework is that both groups, control and treatment, follow a common trend prior to treatment (Lechner, 2011). If the common trend assumption fails, difficulties arise estimating the treatment effect.

In addition to the common trend assumption, the treatment cannot have any effect in the pre-treatment period.

Our DiD-regression model is:

$$TI\_SALES_{i,t} = \beta_0 + \beta_1 TREATMENT_{i,t} + \beta_2 AFTER_{i,t} + \beta_3 TREAT \times AFTER_{i,t} + \beta_4 FIXASS\_TA_{i,t} + \beta_5 SIZE_{i,t} + \varepsilon_{i,t} \quad (7)$$

$TI\_SALES_{i,t}$	=	taxable income divided by total operating income for firm *i* in year *t*. Taxable income estimated by equation 1.
$TREATMENT_{i,t}$	=	categorical variable for firm i in year t, equal 1 for firms in the treatment group and 0 for firms in control group. Selection criteria for treatment and control group given in 5.3.
$AFTER_{i,t}$	=	categorical variable for firm i in year t equal to 1 if year is 2014 or 2015, 0 otherwise.
$TREAT \times AFTER_{i,t}$	=	Interaction term between $TREATMENT_{i,t}$ and $AFTER_{i,t}$, equals 1 if both $TREATMENT_{i,t}$ and $AFTER_{i,t}$ are 1, 0 otherwise.
$FIXASS\_TA_{i,t}$	=	fixed assets divided by total assets for firm i in year t.
$SIZE_{i,t}$	=	calculated as total operating income in millions for firm i in year t.
$\varepsilon_{i,t}$	=	residual term.

Year-effects are omitted due to collinearity with the pre-/ post-treatment periods. The interaction term, $TREAT \times AFTER$, measures the treatment effect. We will measure the treatment effect under RE and POLS estimation. The FE method is not used since we omit the $TREATMENT$ dummy due to time invariance. Additional covariates are added to control for firm-specific trends, like the size of the firm and the ratio of fixed assets. To include controls increases the likelihood of $E[\varepsilon|TREAT] = 0$ to be true, since controls decompose the residual term, leaving less to non-specified characteristics of the data. We expect the treatment group to be on average larger than the control group, since large corporations often lend internally. The fixed asset ratio can be advantageous to control for, since firms with more fixed assets are expected to have more depreciations, when comparing to firms mainly consisting of labor costs (advisory firms etc.). Affected firms can reduce internal leverage, due to the strict regulation on deductibility of intra-group interest expenses. Since leverage can be affected by the treatment, it is not suitable as a control variable (Angrist & Pischke, 2013, pp. 236-237).

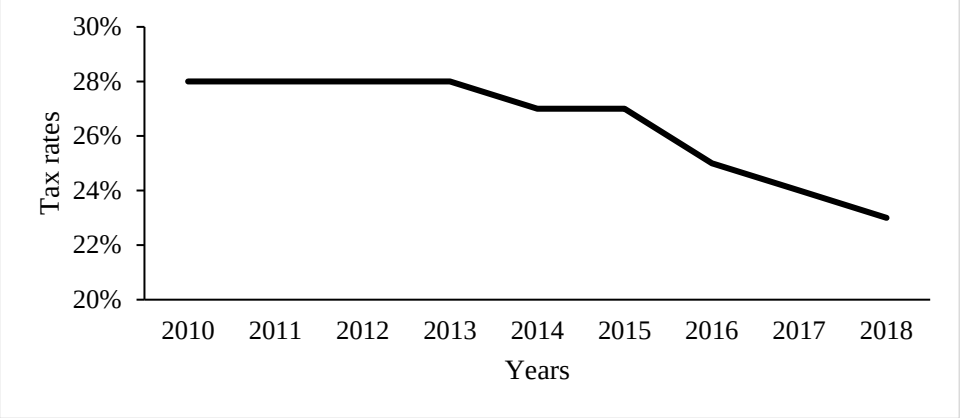
Our treatment group consists of firms which both have net interest expenses above 5 MNOK, and intra-group interest expenses greater than zero. Our control group will consist of firms with a similar level of net interest expenses (greater than 5 MNOK), but who do not receive intra-group financing.

Our hypothesis is that the interaction term, $TREAT \times AFTER$, which captures the treatment effect, will be significantly positive. Hence, firms affected by the interest barrier rule increase in profitability due to the reduction of debt-shifting opportunities.

4.3. Measuring change in tax avoidance under falling statutory tax rates

Norway's corporate tax rates remained constant at 28% since the tax reform in 1992 until 2014. In 2014 it was lowered to 27% and to 25% in 2016, with an additional 1% reduction the subsequent years till this date (2018).

Graph 1. *The Development of The Corporate Tax Rate in Norway*



Corporate tax rates in Norway from 2010 to 2018 (Ministry of Finance, 2017).

As pointed out in the literature review, there are few studies estimating the effect corporate tax cuts has on tax avoidance. We cannot use the same DiD-approach as with the interest barrier rule, since a tax cut affects all firms. A reduction in the tax rate will, in isolation, make losses less valuable while increase the value of profits. As Huizinga and Laeven (2008) pointed out, tax avoidance is a costly endeavor, therefore tax cuts might reduce the incentives to shift profits out of Norway. Therefore, we expect a positive effect on the MNC-coefficient. Though the reduction in the corporate tax rate is negligible, firms were informed that the corporate tax rate would be lowered in the future (Finansdepartementet, 2013b).

Multinational tax avoidance is our point of interest, a capability primarily contained by MNCs. We find it reasonable to use MNCs as the "treatment" group, with the control group equal DCCs. The effect of tax cuts on multinational tax avoidance will be estimated by the following model:

$$\begin{aligned} TI\_SALES_{i,t} = {} & \beta_0 + \beta_1 MNC_{i,t} + \beta_2 AFTER_{i,t} + \beta_3 MNC \times AFTER_{i,t} + \\ & \beta_{5-14} IND_{i,t} + \beta_{15} DEBT\_TA_{i,t} + \beta_{16} FIXASS\_TA_{i,t} + \\ & \beta_{17} SIZE_{i,t} + \beta_{18} AGE_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (8)$$

$TI\_SALES_{i,t}$	=	taxable income divided by total operating income for firm *i* in year *t*. Taxable income estimated by equation 1.
$MNC_{i,t}$	=	categorical variable for firm i in year t, equal 1 for multinational corporations and 0 for domestic corporations. Criteria for multinational status given in table 1.
$AFTER_{i,t}$	=	categorical variable for firm i in year t equal to 1 if year is 2014 or 2015, 0 otherwise.
$MNC \times AFTER_{i,t}$	=	Interaction term between $MNC_{i,t}$ and $AFTER_{i,t}$, equals 1 if both $MNC_{i,t}$ and $AFTER_{i,t}$ are 1, 0 otherwise.
$IND_{i,t}$	=	industry dummy variables, see 4.1.
$DEBT\_TA_{i,t}$	=	interest bearing debt divided by total assets for firm i in year t.
$FIXASS\_TA_{i,t}$	=	fixed assets divided by total assets for firm i in year t.
$SIZE_{i,t}$	=	calculated as total operating income firm i in year t.
$AGE_{i,t}$	=	calculated as year (2012-2015) minus year of foundation for firm i in year t.
$\varepsilon_{i,t}$	=	residual term.

Companies affected by the interest barrier rule are omitted from the sample. The sample period is concentrated to the years 2012-2013 pre-treatment and 2014-15 post-treatment. The concentrated period reduces the influence of omitted year effects. The interaction term $MNC \times AFTER$ will measure the effect of the tax cut given that the observation is a MNC. Specific year effects different from the tax cut are also contained by the interaction term, but we have not found a way to isolate the tax cut entirely. We will use both POLS, RE and FE estimation.
Our hypothesis, though very uncertain, is we expect the negative profitability differential between MNCs and DCCs to be less negative after the tax cut, since it is less profitable to shift profits, consistent with results from Swenson (2001).

Thus, the coefficient of the interaction term $MNC \times AFTER$ is expected to be positive.

5. Data

This section contains information on which sources data is drawn from, which assessments that underlies our classification of the data, descriptive statistics and finally an evaluation of data quality.

5.1. Data collection

5.1.1. Data sources and merging

Data is collected from two sources: The Center of Corporate Governance and Research (CCGR) and Experian. The CCGR-database contains accounting data, industry codes and ownership information on all Norwegian firms from 2000 to 2015. Experian contains information on foreign affiliates of Norwegian companies, drawn from the notes of the firms' financial statements. The Experian database is cross-sectional, with separate files acquired from the years 2008, 2010, 2014 and 2016. Foreign holdings are evaluated to be relatively time-invariant. Missing data for some years are deemed not to substantially impact our analysis and conclusions.

The CCGR and Experian datasets were merged using the company ID, illustrated below.

Table 1. *Merging of data*

FOREIGN SUBSIDIARY DATA (EXPERIAN)		MAIN DATA (CCGR)
2008	→	2006 – 2008
2010	→	2009 – 2010
2014	→	2011 – 2014
2016	→	2015

5.1.2. Classification

Firms are classified into two categories based on their international tax shifting capabilities: MNC and DCC. MNCs consists of domestic multinational

corporations, i.e. Norwegian-owned firms who hold majority stakes in firms abroad, and foreign controlled corporations, i.e. Norwegian firms with foreign owners where the majority owner is a company and possesses control. This is in line with prior research (Balsvik et al., 2009), given that both have tax avoidance capabilities in transfer pricing, debt shifting etc.

The other category, DCCs, are firms who do not have a majority stake in foreign firms and are controlled by Norwegian owners - not part of a multinational group. DCCs are deemed not to possess international tax avoidance capabilities.

Table 2. *Criteria for multinational status*

	Controlling owner is domestic	Controlling owner is foreign
No foreign subsidiaries	Domestic controlled corporation (DCC)	Foreign controlled corporation (FCC)
Foreign subsidiaries	Domestic multinational corporation (DMNC)	Foreign controlled corporation (FCC)

5.2. Data used in the profitability differential test

5.2.1. Sample selection

Certain industries, i.e. oil and gas, mining, shipping and finance are subject to special tax regulations, and are excluded from the sample. Small firms with total assets less than 1 MNOK, or sales less than or equal to zero are excluded. Observations with extreme values of leverage (greater than 3 or less than 0), or extreme values of taxable income to sales (greater than 1) are also excluded. These exclusion criteria are in line with Langli and Saudagaran (2004) and Balsvik et al. (2009). Full sample selection is showed in Table 3. MNCs constitute 13% of our final sample, higher than Balsvik et al. (2009), where MNCs constitutes 7% of the observations.

Table 3. *Tax avoidance sample selection*

Panel A: Sample size and criteria	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Pooled all years
Number of observations	75 219	85 497	98 151	103 500	102 137	103 382	105 935	109 395	112 444	115 207	1 010 867
Exclusion criteria:											
Belonging to petroleum, mining, shipping or finance industry	1 710	6 558	9 479	10 883	10 783	10 854	6 899	6 158	6 080	5 785	75 189
Sales less than or equal to 0 and total assets less than or equal to 1 million	6 384	7 413	10 489	11 366	10 333	10 242	13 115	13 975	14 381	14 815	112 513
Debt-to-asset ratio below 0 or greater than 3	38	39	72	63	73	63	89	112	111	126	786
Absolute value of taxable income to sales greater than 1	6 328	7 367	8 950	9 014	8 414	8 379	9 822	10 584	10 739	11 309	90 906
Absolute value of (taxable income - net income before taxes) greater than 0.5	566	563	684	748	685	622	714	845	838	1 121	7 386
Final sample size	60 193	63 557	68 477	71 426	71 849	73 222	75 296	77 721	80 295	82 051	724 087
Panel B: Sample composition by ownership											
Multinational corporations	7 354	7 548	7 731	8 663	8 797	9 213	8 737	8 665	11 378	7 393	85 479
Domestic controlled corporations	52 839	56 009	60 746	62 763	63 052	64 009	66 559	69 056	68 917	74 658	638 608

Table 4. *Transitions from MNC to DCC (within firms over time - 2006-2015)*

Years	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Number of DCCs	52 839	56 009	60 746	62 763	63 052	64 009	66 559	69 056	68 917	74 658
Number of MNCs	7 354	7 548	7 731	8 663	8 797	9 213	8 737	8 665	11 378	7 393
Transitions from DCC to MNC		1 655	1 221	2 005	1 529	2 395	2 565	1 384	3 858	554
Transitions from MNC to DCC		1 183	463	635	458	1 009	2 143	689	1 066	2 147
Sum transitions: DCC → MNC	17 166									
Sum transitions: MNC → DCC	9 793									

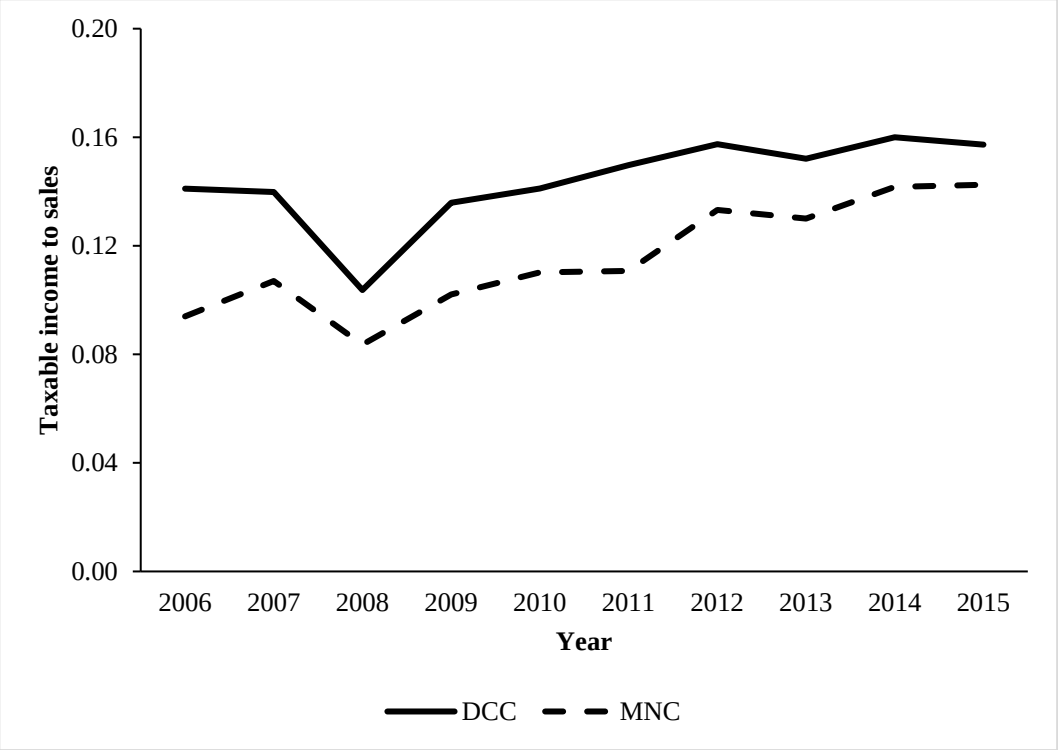
64% of transitions are DCCs converting to MNCs. This is in line with Balsvik et al. (2009). Under FE estimation, it is only the transitions which will be estimated by the MNC-coefficient, due to FE omitting time-invariant variables.

5.2.2. Descriptive statistics

Graph 2 plots average taxable income to sales from 2006 – 2015 for DCCs and MNCs. The volatility from 2007 to 2009 is caused by the financial crisis. The differential in average profitability between MNCs and DCCs persist throughout the period. If this is due to tax avoidance alone, or differences in leverage or industry exposure, cannot be answered by descriptive statistics alone.
Another interesting observation is that the gap between MNCs and DCCs appears to decrease.

Graph 2. *Difference in taxable income to sales*

This graph shows the average taxable income between MNCs and DCCs.



Graph 3 gives us an overview of the industry distribution of the two groups. Overall, they are approximately operating equally in the different industries. But some differences are evident. MNCs are more concentrated in the manufacturing, wholesale and technology sectors. While DCCs in retail, real estate and construction. It seems reasonable to include industry controls in the regressions, as proposed in section 4.1. To capture industry idiosyncratic effects.

Graph 3. *Industry distribution between DCC and MNC*

This graph shows the relative distribution on industry representation between DCCs and MNCs.

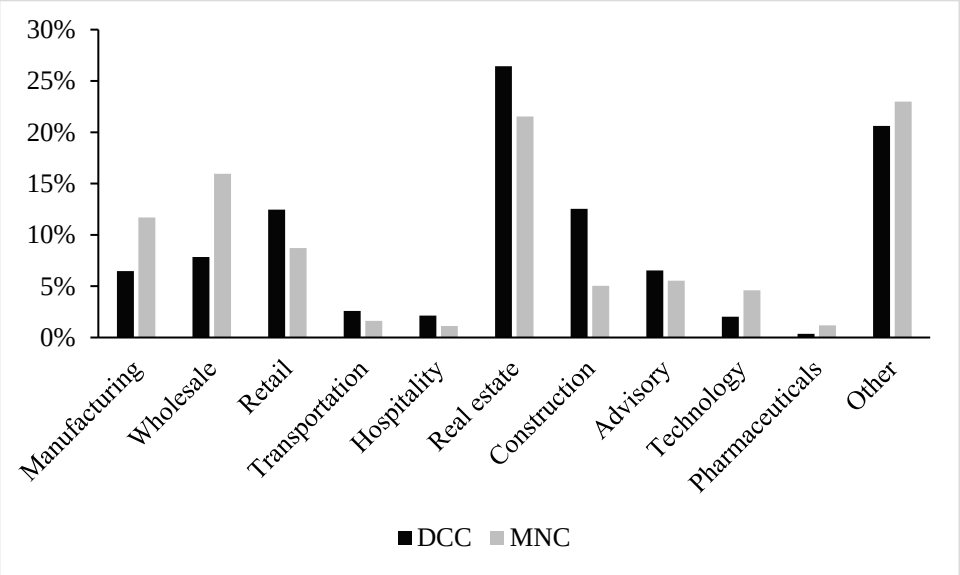


Table 5 shows the descriptive statistics of our data set. When estimating tax avoidance, the literature uses TI_SALES, TI_TA and TI_EQ as dependent variables under the indirect method. Clearly, TI_EQ varies considerably more than TI_SALES and TI_TA, which can lead to less statistically significant results when estimating with TI_EQ. Comparing Panel B and Panel C, MNCs are on average less profitable than DCCs (see also Graph 2). This is true regardless of using TI_SALES, TI_TA or TI_EQ as profitability measures.

MNCs are on average substantially larger than DCCs, both in terms of sales and total assets. MNCs average sales (total assets) is 172.22 (163.78) MNOK versus 21.779 (20.486) MNOK for DCCs. Capital composition also show clear differences between the groups. DCCs carries on average a higher ratio of fixed assets (property, plant, equipment etc.) with 0.3238 versus MNCs fixed asset ratio of 0.2526. MNCs are also older than DCCs, with an average of 15.44 years old versus 13.89 for DCCs. However, the two groups are quite similar in leverage (interest bearing debt divided by total assets). MNCs leverage is on average 0.4455 and DCCs 0.4347.

Table 5. *Descriptive statistics (2006 – 2015)*

	Mean	Standard deviation	1. percentile	10. percentile	25. percentile	Median	75. percentile	90. percentile	99. percentile
Panel A: Pooled all years									
SALES (million NOK)	39.539	412.653	.168	.75	2.246	6.317	17.678	51.632	515.503
TAXABLE INCOME (million NOK)	2.875	55.479	−8.638	−.416	.071	.484	1.468	4.108	41.526
TI_SALES	.1413	.2782	−.6875	−.0871	.0134	.0827	.2458	.5367	.6976
TI_TA	.1085	.242	−.6426	−.0716	.01488	.0867	.2093	.3612	.7276
TI_EQ	.5489	37.2352	−6.0357	−.2469	.0670	.3023	.7459	1.7352	8.9508
TOTAL ASSETS (million NOK)	37.4013	1056.311	1.082	1.619	2.631	5.489	14.155	41.429	470.258
DEBT_TA	.4359	.2885	.0007	.0736	.1917	.4064	.6537	.8426	1.0445
FIXASS_TA	.3154	.3411	0	0	.0245	.1499	.6021	.9026	.9920
AGE (years)	14.08	13.04	1	3	5	11	19	28	71
Panel B: Pooled all years, DCC									
SALES (million NOK)	21.779	146.026	.163	.703	2.072	5.756	14.942	38.639	239.738
TAXABLE INCOME (million NOK)	1.689	21.839	−5.146	−.332	.076	.459	1.313	3.280	22.094
TI_SALES	.1446	.2759	−.6757	−.0790	.0151	.0849	.2501	.5370	.9134
TI_TA	.1124	.2323	−.5969	−.0630	.0167	.0886	.2112	.3624	.7207
TI_EQ	.5758	38.4595	−5.5143	−.2191	.0726	.3066	.7449	1.7219	8.8030
TOTAL ASSETS (million NOK)	20.486	203.443	1.078	1.585	2.512	5.017	11.849	29.935	232.469
DEBT_TA	.4347	.2884	.0009	.0732	.1897	.4035	.6540	.8438	1.0415
FIXASS_TA	.3238	.3419	0	0	.0285	.1626	.6195	.9052	.9917
AGE (years)	13.89	12.72	1	2	5	11	19	27	69

Table 5. *Continued*

	Mean	Standard deviation	1. percentile	10. percentile	25. percentile	Median	75. percentile	90. percentile	99. percentile
Panel C: Pooled all years, MNC									
SALES (million NOK)	172.22	1123.92	.22	1.54	4.84	17.86	72.07	255.70	2828.89
TAXABLE INCOME (million NOK)	11.739	149.737	−50.786	−2.255	.009	.937	4.664	18.587	238.853
TI_SALES	.1167	.2941	−.7438	−.1497	.0008	.0672	.2105	.5340	.9254
TI_TA	.0794	.3038	−.8974	−.1532	.0008	.0724	.1935	.3522	.7784
TI_EQ	.3484	26.3436	−10.0359	−.4996	.0241	.2662	.7544	1.8256	10.3572
TOTAL ASSETS (million NOK)	163.78	3020.69	1.13	2.23	5.05	16.64	61.64	219.15	2398.10
EQUITY (million NOK)	63.13	1895.87	−2.66	.30	1.07	4.01	17.47	69.89	924.00
DEBT_TA	.4455	.2889	.0000	.0774	.2083	.4266	.6520	.8344	1.0728
FIXASS_TA	.2526	.3285	0	0	.0083	.0703	.4269	.8756	.9938
AGE (years)	15.44	15.15	1	3	6	11	20	30	86

TI_SALES = taxable income divided by sales.
TI_TA = taxable income divided by total assets.
TI_EQ = taxable income divided by equity.
DEBT_TA = interest bearing debt divided by total assets. Interest bearing debt calculated as convertible loans, bonds, intra-group loans, loans to financial institutions, overdrawn credit line and other liabilities.
FIXASS_TA = fixed assets divided by total assets. Fixed assets calculated as property, plant, equipment, vehicles/ ships/ aircrafts, office tools and land) divided by total assets.

5.3. Data used in the interest barrier rule tests

5.3.1. Sample selection

When conducting the DiD-test we need to, as explained in part 4, identify a control- and a treatment group. The interest barrier rule that was introduced in Norway applied only to companies that had at least 5 MNOK in net interest expenses and received intra-group financing. As Finnanger and Leland (2017) we exclude observations before 2011. Treatment and control groups are selected in the year 2012. The treatment group consists of 526 firms, all of which have received intra-group financing and with net interest expenses equal or exceeding 5 MNOK in 2012. The control group are the firms that also had 5 MNOK or more in net interest expenses in 2012 but did not receive intra-group financing, in total 366 firms. Equal sized treatment and control groups are preferable, as differences in group sizes requires a stronger treatment effect in absolute value to give statistical significance (Ellis, 2010). This has been overlooked in previous master thesis studies (Finnanger & Leland, 2017).

We also remove 2013 from our sample, because of the zero pre-treatment assumption. The interest barrier rule, introduced in late 2013, informed companies ahead of implementation. We discuss the trend assumption under section 5.3.2.

Table 6. *Interest barrier rule sample selection*

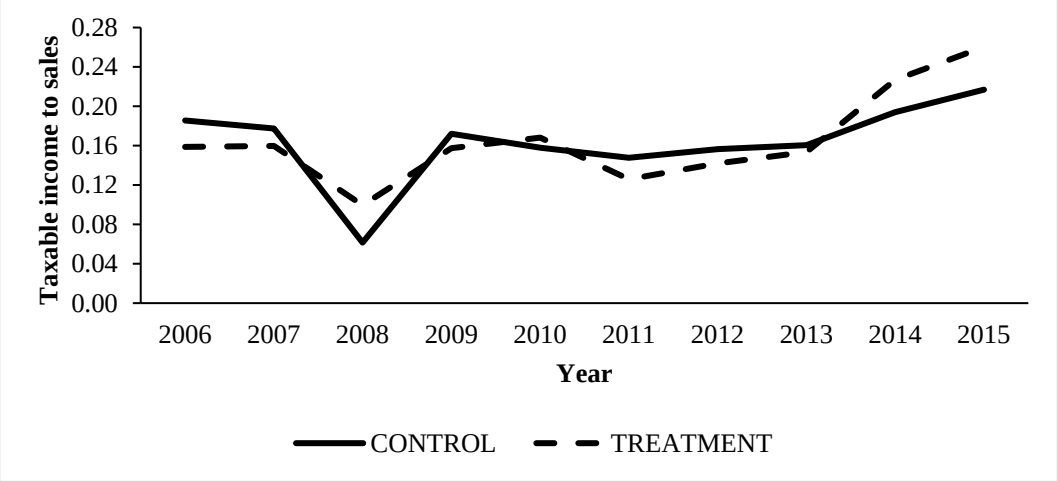
	Observations
Observations from 2011 - 2015, after initial cleaning in Table 3	388 585
Excluding companies not in treatment or control group	384 243
Excluding 2013	878
Final sample all years	3 464
Final sample in 2012	892
Number of observations in control group in 2012	366
Number of observations in treatment group in 2012	526
Number of observations that are MNC in 2012	349
Number of observations that are DCC in 2012	543

5.3.2. Descriptive statistics

Graphs 4-6 show no violation of the common trend assumption on either segment. It is important to note that the DiD-test runs on the years 2011-2012 as the pre-treatment period, and 2014-15 as the post-treatment period.

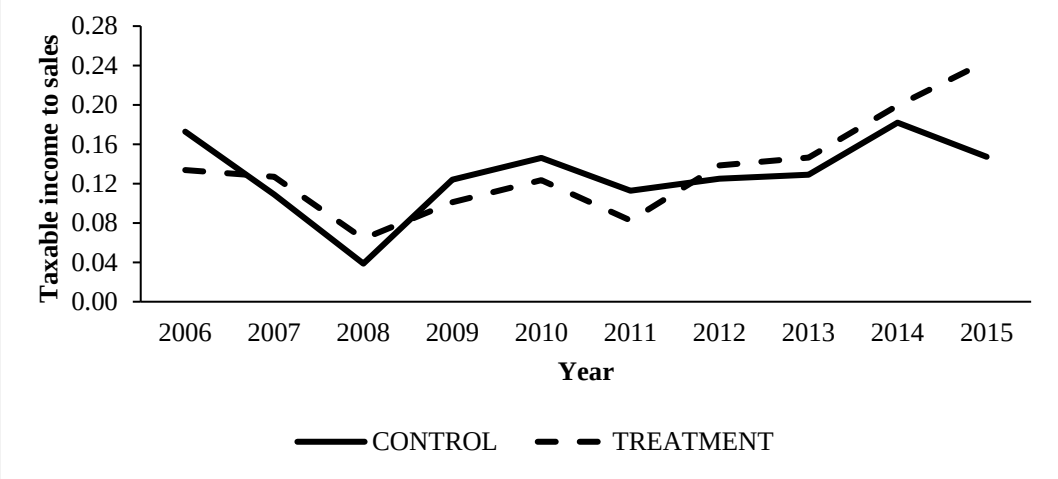
Graph 4. *Mean TI_SALES - groups of 2012 - MNC + DC*

This graph shows the average TI_SALES (taxable income/ sales) for the control group and treatment group respectively. The treatment and control group are selected in year 2012.



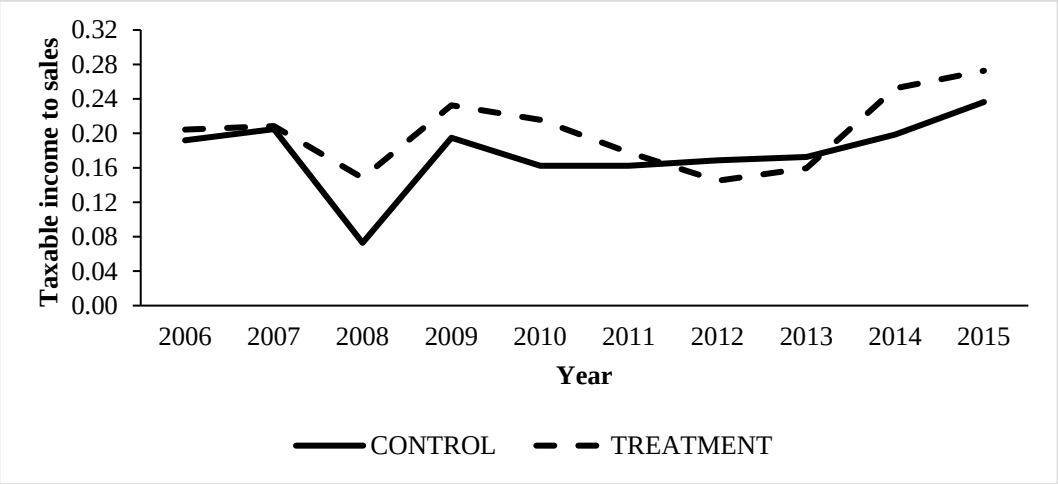
Graph 5. *Mean TI_SALES - group of 2012 – MNC*

This graph shows the average TI_SALES (taxable income/ sales) for the control group and treatment group that are MNCs. The treatment and control group are selected in year 2012.



Graph 6. *Mean TI_SALES - group of 2012 – DCC*

This graph shows the average TI_SALES (taxable income/ sales) for the control group and treatment group that are not MNCs. The treatment and control group are selected in year 2012.



Graphs 4-6 clearly show an increase in TI_SALES after 2014, but it will be interesting to see how much of it is attributable to the treatment effect alone.

Table 7 shows the descriptive statistics of the control and treatment group for the years 2011-2012. The treatment group are on average larger both in terms of sales, 849.94 MNOK, and total assets, 1 119.96 MNOK. Whereas the control group only have on average 369.94 MNOK in sales and 793.70 in total assets. However, on average, TI_SALES are not very different, with the treatment group having 0.18 versus 0.1745 for the control group. Leverage is quite similar for both groups, as is the ratio of fixed assets. Age is also very similar for the two groups.

One important remark is that out of around 80 000 yearly observations, we estimate the interest barrier rule to affect 526. In total, not a very effective tool for combatting tax avoidance. It will also be preferable to use a larger control sample, perhaps through matching, but earlier attempts give results violating the common trend assumption, which is the most crucial assumption in the DiD-framework. DiD does not rely on randomness, hence our sampling selection does not pose any threats. The small sample size is deemed sufficient for including 5 independent variables, see Equation 7.

Table 7. *Descriptive statistics - interest barrier rule (2011 - 2015)*

	Mean	Standard deviation	1. percentile	10. percentile	25. percentile	Median	75. percentile	90. percentile	99. percentile
Panel A: Treatment group									
SALES (million NOK)	849.94	3072.71	5.04	13.25	25.22	72.95	582.98	1932.31	9993.36
TAXABLE INCOME (MNOK)	46.76	223.69	−300.29	−24.45	−.86	11.15	36.37	135.13	1154.33
TI_SALES	.1800	.3666	−.8640	−.4767	−.2371	.1294	.4492	.6763	.9165
TI_TA	.0307	.1312	−.3921	−.0472	−.0029	.0329	.0726	.1283	.3158
TI_EQ	.2097	7.1516	−6.2195	−.2761	−.0038	.1245	.3361	.6694	4.1912
TOTAL ASSETS (million NOK)	1119.96	3682.81	58.71	146.26	229.06	429.80	894.42	2270.60	10123.77
EQUITY (million NOK)	412.88	2265.15	−12.37	12.69	39.34	108.91	291.63	749.39	3643.47
DEBT_TA	.6114	.2553	.0311	.2471	.4481	.6453	.7966	.9019	1.0725
FIXASS_TA	.6057	.3741	.0000	.0109	.2310	.7972	.9445	.9810	.9996
AGE (years)	18.79	20.64	2.00	4.00	7.00	13.00	20.00	41.00	108.00
Panel B: Control group									
SALES (million NOK)	369.34	1094.65	5.48	11.86	18.46	49.16	263.89	1014.39	4854.05
TAXABLE INCOME (MNOK)	35.48	182.48	−204.26	−10.41	.02	7.87	28.76	95.35	726.58
TI_SALES	.1745	.3481	−.8665	−.2190	.0001	.1636	.4109	.6149	.9082
TI_TA	.0381	.1291	−.2752	−.0418	.0001	.0305	.0689	.1262	.4118
TI_EQ	.0090	16.7964	−3.8879	−.2912	.0036	.1578	.3852	1.0461	7.2390
TOTAL ASSETS (million NOK)	793.70	1821.92	51.75	123.28	173.97	306.69	582.85	1460.18	9013.05
EQUITY (million NOK)	233.46	603.19	−36.97	4.03	18.48	53.97	159.95	517.81	2918.71
DEBT_TA	.6963	.2252	.0627	.3813	.5609	.7319	.8508	.9438	1.1728
FIXASS_TA	.6178	.3497	.0000	.0275	.2847	.7674	.9224	.9679	.9959
AGE (years)	18.91	20.20	2.00	5.00	7.00	12.00	23.00	41.00	99.00

TI_SALES = taxable income divided by sales.
TI_TA = taxable income divided by total assets.
TI_EQ = taxable income divided by equity.
DEBT_TA = interest bearing debt divided by total assets. Interest bearing debt calculated as convertible loans, bonds, intra-group loans, loans to financial institutions, overdrawn credit line and other liabilities.
FIXASS_TA = fixed assets divided by total assets. Fixed assets calculated as property, plant, equipment, vehicles/ ships/ aircrafts, office tools and land) divided by total assets.

5.4. Data used in the corporate tax cut test

5.4.1. Sample selection

We exclude the interest barrier treatment group from the sample. Also, since we cannot include year effects due to collinearity, it is preferable to concentrate the time-period of the sample, to reduce the exposure of time-specific events. I.e. excluding observations from before 2012. It is important to note that even though the sample is concentrated around 4 years, time-specific events can still affect our results.

Table 8. *Corporate tax sample selection*

	Observations
Observations from 2012 - 2015, after initial cleaning in Table 3	315 363
Excluding observations in treatment group – interest barrier rule	2 011
Final sample	313 352
Number of observations pre 2014	151 976
Number of observations post 2014	161 376
Number of observations that are MNC	35 246
Number of observations that are DCC	278 106

5.4.2. Descriptive statistics

Table 9 shows the descriptive statistics of only MNCs. The reason being that the coefficient measuring the treatment effect of lower taxes only concerns MNCs (Equation 8). However, as Table 8 shows, the entire sample consists of 313 352 observations.

Panel A and Panel B gives some interesting results as of changes in MNCs after the tax cut in 2014. Average profitability in terms of TI_SALES increases from 0.1313 in 2012-13 to 0.1401. The same is true for TI_TA, with an increase from 0.0805 to 0.0819. Number of MNCs increases from 2012-13 to 2014-15 but leverage and the ratio of fixed assets remains quite stable.

Table 9. *Descriptive statistics - corporate tax cut (2012 - 2015) on MNCs*

	Mean	Standard deviation	1. percentile	10. percentile	25. percentile	Median	75. percentile	90. percentile	99. percentile
Panel A: MNC 2012-13									
SALES (million NOK)	129.08	696.10	.21	1.30	3.82	13.47	57.78	211.10	2138.82
TAXABLE INCOME (million NOK)	10.02	142.36	−37.24	−1.78	.02	.84	3.76	14.50	193.67
TI_SALES	.1313	.3037	−.7431	−.1413	.0030	.0732	.2430	.5782	.9375
TI_TA	.0805	.2763	−.8522	−.1410	.0030	.0713	.1890	.3494	.7422
TOTAL ASSETS (million NOK)	114.32	834.86	1.12	2.13	4.69	15.15	51.92	162.27	1555.52
DEBT_TA	.4436	.2858	.0000	.0784	.2049	.4225	.6554	.8304	1.0477
FIXASS_TA	.2694	.3362	.0000	.0000	.0086	.0803	.4970	.8848	.9948
AGE (years)	15.25	14.37	1.00	3.00	6.00	12.00	20.00	29.00	78.00
Number of observations	*16 918*								
Panel B: MNC 2014-15									
SALES (million NOK)	122.50	838.58	.17	1.10	3.27	11.59	47.23	175.37	1960.54
TAXABLE INCOME (million NOK)	9.13	142.05	−36.03	−1.71	.02	0.75	3.26	13.16	154.57
TI_SALES	.1401	.3125	−0.7481	−.1558	.0020	.0770	.2734	.6013	.9348
TI_TA	.0819	.3176	−0.8960	−.1556	.0018	.0704	.1909	.3576	.8216
TOTAL ASSETS (million NOK)	154.59	6122.49	1.11	1.98	4.07	12.60	44.09	148.64	1555.81
DEBT_TA	.4348	.3001	.0000	.0596	.1799	.4072	.6578	.8431	1.0847
FIXASS_TA	.2816	.3487	.0000	.0000	.0076	.0830	.5343	.9141	.9961
AGE (years)	15.46	14.19	1.00	3.00	6.00	12.00	20.00	29.00	78.00
Number of observations	*18 328*								

TI_SALES = taxable income divided by sales.
TI_TA = taxable income divided by total assets.
TI_EQ = taxable income divided by equity.
DEBT_TA = interest bearing debt divided by total assets. Interest bearing debt calculated as convertible loans, bonds, intra-group loans, loans to financial institutions, overdrawn credit line and other liabilities.
FIXASS_TA = fixed assets divided by total assets. Fixed assets calculated as property, plant, equipment, vehicles/ ships/ aircrafts, office tools and land) divided by total assets.

5.5. Data quality

The quality and limitations of the data is essential for reliable results. We regard CCGR and Experian to be reliable sources. One limitation in the Experian data, is that we only have subsidiary data for certain years. Table 1 illustrates which datasets we use for the different years. But since ownership over foreign subsidiaries are relatively time-invariant, we do not believe this will adversely affect our results or conclusions.

We keep observations not present in all years. The reason being that we could impose survival bias on the data. Modern statistical tools (in our case: Stata) can adjust for the panel data being unbalanced. However, to compute estimates of taxable income, we require the previous financial data. Observations failing this requirement is excluded.

Since we only have accounting data available, taxable income must be estimated (see Equation 1). There are numerous tax-income differences which a simplified estimation equation fails to consider, e.g. tax-free capital gains and differences in depreciation methods. Previous literature suffers under the same limitations (Balsvik et al., 2009; Langli & Saudagaran, 2004). Hence, we can compare our results with previous studies, but it is difficult to give true estimates. The limitations that arise when estimating taxable income from financial statements are also discussed in Hanlon and Heitzman (2010), Hanlon (2003) and McGill and Outslay (2004).

DCCs dominate in number of observations. Tests conducted by Langli and Saudagaran (2004) find no explanatory bias effect resulting from the dominance of DCCs. We regard this to hold for our analysis.

The OLS method will most likely contain unobserved heterogeneity/ omitted variable bias between firms, which can cause a bias in the profitability differential estimates. The bias will be removed when using the panel data techniques from the FE method (Tropina, 2010).We can expect a positive bias in the β coefficient due to that MNCs and foreign corporations have better management etc. than their domestic counterparts, thereby underestimating the extent of profit shifting (Balsvik et al., 2009). Further discussion on this topic is presented in section 4.2

and in the appendix. The variance inflation factor does not indicate serious issues with multicollinearity under multivariate regressions. The White-test shows heteroskedasticity is present, resulting in the use of robust standard errors in the regressions.

6. Results

This section contains our empirical results. First, we will discuss our findings on the profitability differential between MNCs and DCCs. Second, results for the treatment effect of the interest barrier rule will be presented and discussed. The interest barrier rule's main motivation is to reduce profit shifting through artificially high interest rates/ over-leveraging on intra-group lending between tax jurisdictions (OECD, 2016), but it seems to only affect a low percentage of firms (see section 5.3.2). Finally, results for the effect of the cut in corporate tax rate are presented.

6.1. Tax Avoidance

Our estimation on tax avoidance/ profitability differential between MNCs and DCCs divides into four parts. Beginning with our main results for the period 2006 – 2015. A second test will segment between the pre-/ and post-2011 era. The study conducted by Langli and Saudagaran (2004) and Balsvik et al. (2009) will be replicated, and results compared. For testing the robustness of our results, we will use alternative profitability measures in line with the literature, and by changing some controls from continuous to discrete.

6.1.1 Empirical results

Results are consistent with the literature on Norwegian companies that tax avoidance appears to be evident, with the MNC-coefficient both economically and statistically significant.

Table 10. *Main Results on profitability differential*

This table shows the regression results with TI_SALES (taxable income/ sales) as the dependent variable. MNC, our variable of interest, is a dummy which equals 1 for observations being multinational. DEBT_TA is leverage, FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK. AGE is the observation's age in years. The time-period is from 2006 to 2015. The POLS-column shows the pooled ordinary least squares results,

the RE-column shows the random effects results and the FE-column shows the fixed effects results. Industry effects are excluded for RE and FE. All methods take time effects into consideration, i.e. year dummies. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are * p<0.10, ** p<0.05, *** p<0.01. Full results are shown in the appendix.

	POLS	**RE**	**FE**
MNC	−.0110***	−.0081***	−.0057***
	(.001)	(.001)	(.001)
DEBT_TA	−.2730***	−.2270***	−.2240***
	(.002)	(.002)	(.003)
FIXASS_TA	.0603***	.0960***	−.1020***
	(.002)	(.002)	(.004)
SIZE	−.0000***	−.0000***	.0000
	(.000)	(.000)	(.000)
AGE	.0002***	.0000	−.0026
	(.000)	(.002)	(.002)
Year effects	*Yes*	*Yes*	*Yes*
Industry effects	*Yes*	*No*	*No*
Constant	.2220***	.2260***	.3220***
	(.001)	(.001)	(.016)
Observations	724 087	724 087	724 087
Adjusted R^2	.193	--	.036

The MNC-coefficient under POLS-estimation measures both time-invariant and time-variant effects of MNC-status. The FE-estimation measures only changes in the MNC-coefficient, since time-invariant effects are omitted. The MNC-coefficient is as expected negative and significant to the 0.01-level under both POLS and FE. Under POLS-estimation the MNC-coefficient is negative 1.1%, while under FE it is negative 0.57%. DEBT_TA (leverage) is statistically significant and very negative under both models as expected. The effect of fixed assets (FIXASS_TA) is more ambiguous. It is significantly positive under POLS-estimation, but significantly negative under FE-estimation. Theory would suggest that it can have a negative impact on taxable income, since fixed assets are subject to taxable depreciations, but it is difficult to assess a total effect on taxable

income. Size (MNOK in sales) is practically zero under both estimation models, but significant under POLS-estimation.

From Graph 1 the average deviation between MNCs and DCCs seems to reduce over the years. To see if this is not due to e.g. MNCs moving into more profitable industries etc., we split the time-period between 2006-2010 and 2011-2015. Our results are reported in the table below.

Table 11. *Profitability differential before/ after 2011*
This table shows the regression results with TI_SALES (taxable income/ sales) as the dependent variable. MNC, our variable of interest, is a dummy which equals 1 for observations being multinational. DEBT_TA is leverage, FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK. AGE is the observation's age in years. The POLS-column shows the pooled ordinary least squares results, the RE-column shows the random effects results and the FE-column shows the fixed effects results. Columns noted with <2011 shows the results for the years from 2006 to 2010. Columns noted with >2010 shows the results for the years from 2011 to 2015. Industry effects are excluded for FE. All methods take time effects into consideration, i.e. year dummies. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are * *p<0.10,* ** *p<0.05,* *** *p<0.01. Full results are shown in the appendix.*

	POLS$_{<2011}$	**POLS$_{>2010}$**	**FE$_{<2011}$**	**FE$_{>2010}$**
MNC	−.0148***	−.0086***	−.0060**	−.0053***
	(.001)	(.001)	(.003)	(.002)
DEBT_TA	−.2680***	−.2780***	−.2310***	−.2340***
	(.002)	(.002)	(.004)	(.004)
FIXASS_TA	.0521***	.0664***	−.1460***	−.1280***
	(.002)	(.002)	(.007)	(.006)
SIZE	−.0000	−.0000***	.0000	.0000
	(.000)	(.000)	(.000)	(.000)
AGE	.0005***	−.0001*	.0000	−.0030***
	(.000)	(.000)	(.001)	(.000)
Year effects	*Yes*	*Yes*	*Yes*	*Yes*
Industry effects	*Yes*	*Yes*	*No*	*No*
Constant	.2200***	.2110***	.2980***	.3390***
	(.002)	(.002)	(.014)	(.003)
Observations	335 502	388 585	335 502	388 585

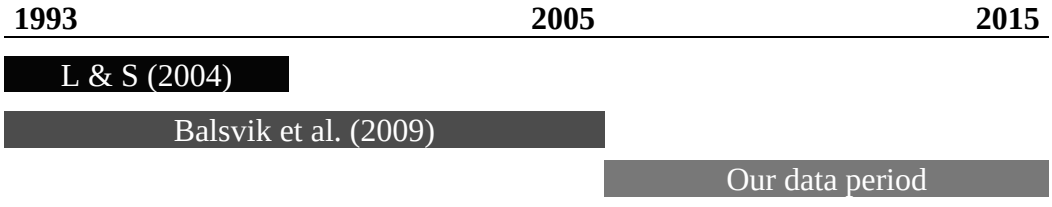
Adjusted R^2	.176	.205	.043	.030

All MNC-coefficients for the POLS-regressions are statistically significant. For the FE-regression, the time-period post-2010 is significant to the 0.01-level, but only to the 0.05-level pre-2011. The POLS coefficients show a drop from −1.48 to −.859, an absolute change of 42%. The FE coefficients show a drop from −.598 to −.529, an absolute change of 11.5%. While it is unclear exactly how much of a reduction happens, it is safe to say that given our TI_SALES measure, MNCs becomes more profitable relative to their DCC counterparts.

Our regression model differs from previous studies on Norwegian data by setting the control variables for size and age as continuous variables, instead of creating dummies for quintiles and quartiles. To achieve comparability between our results and that of Langli and Saudagaran (2004) and Balsvik et al. (2009), we change the controls for size and age from continuous to discrete groups, quintiles and quartiles respectively. Langli and Saudagaran (2004) looks solely on the retail, manufacturing and wholesale industries. Thus, the other industries are omitted from the test.

The different time-periods each study looks on is illustrated in the table below.

Table 12. *Data periods per paper*
This table shows which time periods Langli & Saudagaran (2004) (L&S 2004) and Balsvik et al. (2009) looked at.



Our results indicate that tax avoidance is substantially lower than reported by Balsvik et al. (2009) and Langli and Saudagaran (2004). Langli and Saudagaran looks at data from 1993 to 1996, and Balsvik et al. from 1993 to 2005. Clearly, the economic landscape shifts with time. But showing that the profitability differential is lower now than before, might appear counterintuitive. Increased

regulation on tax avoidance (BEPS-project), and leakages to the media can perhaps explain the decreasing difference in profitability between MNCs and DCC. But further studies are needed in order to explain it.

Table 13. *Comparison to Langli & Saudagaran and Balsvik et al.*
This table compares our results with Langli & Saugaran (2004) and Balsvik et al. (2009). The dependent variable is TI_SALES (taxable income/ sale). MNC, our variable of interest, is a dummy which equals 1 for observations being multinational († is FCC, not MNC). RW is an industry dummy variable for firms in the retail and wholesale industries, and zero for firms in the manufacturing industry. DEBT_TA is leverage, FIXASS_TA is the ratio of fixed assets, SIZE_2 is a dummy variable equal 1 if the observation has sales in the second lowest quintile. SIZE_3 is a dummy variable equal 1 if the observation has sales in the third quintile. SIZE_4 is a dummy variable equal 1 if the observation has sales in the fourth quintile. SIZE_5 is a dummy variable if the firm has sales in the fifth quintile. AGE_2 is a dummy variable equal to 1 if the observation's age is in the second lowest quartile. AGE_3 is a dummy variable equal to 1 if the observation's age is in the third quartile. AGE_4 is a dummy variable equal to 4 if the observation's age is in the fourth quartile. The time-period is from 2006 to 2015. The POLS-column shows the pooled ordinary least squares results, the RE-column shows the random effects results and the FE-column shows the fixed effects results. Industry effects are excluded for RE and FE. All methods take time effects into consideration, i.e. year dummies. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$. Full results are shown in the appendix.

	Langli & Saudagaran (2004)	Balsvik et al. (2009)		Our results	
	1993 - 1996	**1993 – 2005**		**2006 – 2015**	
	POLS	POLS	FE	POLS	FE
MNC	−.0257*** †	−.0149***	−.0164***	−.0058***	−.0070***
	--	(.001)	(.003)	(.001)	(.002)
RW	−.0013	−.0034***		−.0116***	
	--	(.001)		(.001)	
DEBT_TA	−.1409***	−.1414***	−.0968***	−.1750***	−.1700***
	--	(.002)	(.002)	(.002)	(.004)
FIXAS_TA	.0701***	.0817***	−.0133***	.0274***	−.0655***
	--	(.002)	(.003)	(.003)	(.007)
SIZE_2	−.0447***	−.0299***	.0014	−.0837***	.0526***

	--	(.001)	(.002)	(.005)	(.009)
SIZE_3	−.0509***	−.0329***	.0039***	−.0909***	.0923***
	--	(.001)	(.002)	(.006)	(.009)
SIZE_4	−.0559***	−.0384***	.0057***	−.0917***	.1220***
	--	(.001)	(.002)	(.005)	(.010)
SIZE_5	−.0588***	−.0436***	.0077***	−.0968***	.1430***
	--	(.001)	(.003)	(.005)	(.010)
AGE_2	.0192***	.0163***	−.0019***	.0187***	.0024*
	--	(.001)	(.001)	(.001)	(.002)
AGE_3	.0304***	.0270***	−.0028***	.0212***	.0010
	--	(.001)	(.001)	(.001)	(.002)
AGE_4	.0394***	.0353***	−.0022	.0243***	−.0005
	--	(.001)	(.002)	(.001)	(.003)
Year effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Constant	.0889***	.0677***	.0794***	.2040***	.03400***
	--	(.001)	(.002)	(.005)	(.009)
Observations	78 872	290 513	290 513	201 947	201 947
Adjusted R^2	.105	.074	.029	.085	.066

$FCC_{i,t}$ = Langli & Saudagaran (2004) used foreign controlled corporation, not multinational corporation, as their categorical variable of interest. FCC is a dummy variable for firm *i* in year *t* which equals 1 if the firm is controlled by foreign owner and 0 otherwise.

$RW_{i,t}$ = categorical variable for firm *i* in year *t* which equals 1 for firms in the retail and wholesale industry and 0 for firms in the manufacturing industry.

$AGEj_{i,t}$ = categorical variables for firm *i* in year *t* based on the age of the firm. Age is calculated as in Equation (7). $AGEj = 1$ for firms in quartile *j* and 0 otherwise; $j = 1$ (4) corresponds to the youngest (oldest) sample firms.

$SIZEk_{i,t}$ = categorical variables for firm *i* in year *t* based on the size of the firm. Size is calculated as in Equation (7). $SIZEk = 1$ for firms in quintile *k* and 0 otherwise; $k = 1$ (5) corresponds to the smallest (largest) sample firms.

6.1.2 Robustness tests

In order to test the robustness of our results we follow the approach by Balsvik et al. (2009), by including alternative profitability measures in our regression. Instead of looking at taxable income over sales, we put total assets and equity in the denominators. Klassen et al. (1993) scales taxable income by book value of equity and Grubert et al. (1993) scales it by total assets, so both measures are familiar in the literature.

Table 14. *Regression results on alternative profitability measures*

This table shows the regression results under alternative profitability measures, TI_TA (taxable income/ total assets) and TI_EQ (taxable income/ book value of equity). The POLS-column shows the results from the pooled ordinary least squares regression, with the dependent variable being TI_TA or TI_EQ, respectively. MNC, our variable of interest, is a dummy which equals 1 for observations being multinational. DEBT_TA is leverage, FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK. AGE is the observation's age in years. The time-period is from 2006 to 2015. The POLS-column shows the pooled ordinary least squares results, the RE-column shows the random effects results and the FE-column shows the fixed effects results. Industry effects are excluded for RE and FE. All methods take time effects into consideration, i.e. year dummies. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$. Full results are shown in the appendix.

	POLS		**FE**	
	TI_TA	TI_EQ	TI_TA	TI_EQ
MNC	−.0323***	−.2310*	−.0155***	−.5580**
	(.001)	(.128)	(.002)	(.248)
DEBT_TA	−.2530***	.0075	−.3400***	−.8120
	(.002)	(.320)	(.004)	(.873)
FIXASS_TA	−.0454***	−.7570***	−.1140***	−.9120**
	(.001)	(.250)	(.004)	(.406)
SIZE_MNOK	.0000***	.0000	.0000	.0002
	(.000)	(.000)	(.000)	(.000)
AGE	−.0006***	−.0045	.0009	.0020
	(.000)	(.003)	(.001)	(.0136)
Year effects	*Yes*	*Yes*	*Yes*	*Yes*
Industry effects	*Yes*	*Yes*	*No*	*No*

Constant	.2830*** (.001)	1.0340** (.416)	.3380*** (.010)	1.1770*** (.286)
Observations	724 087	723 990	724 087	723 990
Adjusted R^2	.117	.000	.082	.000

Regression with TI_EQ as the dependent variable is done on fewer observations than TI_TA, since firms with equity equal 0 are omitted from the test. The results of using TI_EQ as the dependent variable are highly negative, but less statistically significant than TI_SALES and TI_TA. Overall, using TI_EQ seems to give poor results. Treating TI_TA as the dependent variable yields statistically significant results at the .01-level under both POLS- and FE-estimation methods. The coefficients are around three times larger (in absolute terms) than when using TI_SALES as the endogenous variable. Most importantly, both methods (TI_EQ and TI_TA) yield a negative MNC-coefficient, giving us reason to believe that MNCs have on average a lower profitability in taxable income, see Table 10.

In Table 15 we group size in quintiles and age in quartiles. Both MNC-coefficients are reduced, but both are negative and statistically significant. The MNC-coefficients are significant at the .05-level for POLS-estimation, and .01-level for FE-estimation. Controls for age and size are all significant at the .01-level except for FE-estimation on the oldest firms. The reason we choose to treat age and size as continuous variables in our main results, is that we lose information by grouping them, since only the group characteristics are used.

Table 15. *Size/ age treated as discrete variables*
This table shows the regression results with the dependent variable being TI_SALES (taxable income/ sale). MNC, our variable of interest, is a dummy which equals 1 for observations being multinational. DEBT_TA is leverage, FIXASS_TA is the ratio of fixed assets, SIZE_2 is a dummy variable equal 1 if the observation has sales in the second lowest quintile. SIZE_3 is a dummy variable equal 1 if the observation has sales in the third quintile. SIZE_4 is a dummy variable equal 1 if the observation has sales in the fourth quintile. SIZE_5 is a dummy variable if the firm has sales in the fifth quintile. AGE_2 is a dummy variable equal to 1 if the observation's age is in the second lowest quartile. AGE_3 is a dummy variable equal to 1 if the observation's age is in the third quartile. AGE_4 is a dummy variable equal to 4 if the observation's age is in the fourth

quartile. The time-period is from 2006 to 2015. The POLS-column shows the pooled ordinary least squares results, the RE-column shows the random effects results and the FE-column shows the fixed effects results. Industry effects are excluded for RE and FE. All methods take time effects into consideration, i.e. year dummies. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are * *p<0.10,* ** *p<0.05,* *** *p<0.01. Full results are shown in the appendix.*

	POLS	**RE**	**FE**
MNC	−.0024**	−.0065***	−.0048***
	(.001)	(.001)	(.001)
DEBT_TA	−.2690***	−.2280***	−.2220***
	(.002)	(.002)	(.003)
FIXASS_TA	.0480***	−.0899***	−.0856***
	(.002)	(.002)	(.004)
SIZE_2	.0067***	.0038*	.1020***
	(.001)	(.002)	(.003)
SIZE_3	−.0305***	−.0162***	.1480***
	(.001)	(.002)	(.004)
SIZE_4	−.0392***	−.0247***	.1760***
	(.001)	(.002)	(.004)
SIZE_5	−.0464***	−.0340***	.1970***
	(.001)	(.002)	(.004)
AGE_2	.0131***	.0100***	.0086***
	(.001)	(.001)	(.001)
AGE_3	.0098***	.0015	.0065***
	(.001)	(.001)	(.002)
AGE_4	.0116***	−.0041	.0022
	(.001)	(.001)	(.003)
Year effects	*Yes*	*Yes*	*Yes*
Industry effects	*Yes*	*No*	*No*
Constant	.2400***	.2370***	.1660***
	(.002)	(.002)	(.003)
Observations	724 087	724 087	724 087
Adjusted R^2	.197	--	.050

Robustness tests indicate that the MNC-coefficient is statistically negative under both methods. The profitability differential that the MNC-coefficient captures, which partly is attributed to tax avoidance, provides evidence that there is still a significant difference between DCCs and MNCs. Interestingly, the MNC-coefficient is less negative than prior studies (Balsvik et al., 2009; Langli & Saudagaran, 2004).

6.2. Interest barrier rule

Results on the effect of the interest barrier rule is divided into two parts. First, results for the overall effect of the interest barrier rule and to what extent it has affected MNCs and DCCs are given in the section below. The tests are consistent with the methods discussed in section 5.3, with the treatment and control groups selected in 2012, with the year observations in 2013 removed. In the second section, we run the same tests on treatment and control groups selected in 2013. These results will serve as a robustness test for the overall treatment effect of the interest barrier rule.

6.2.1 Empirical results

The main results from the DiD-test on the treatment effect of the interest barrier rule are displayed below.

Table 16. *Main results on interest barrier rule*
This table shows the regression results with TI_SALES (taxable income/ sales) as the dependent variable. TREATMENT is a dummy variable equal 1 if the observation is in the treatment group. AFTER is a dummy variable equal 1 if the observation is after the treatment (interest barrier rule) was introduced, year > 2013. TREAT × AFTER is the interaction term between the two dummy variables TREATMENT and AFTER. FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK. The POLS-column shows the pooled ordinary least squares results and the RE-column shows the random effects results. Year-effects are excluded due to collinearity. The sample time-period is from 2011 to 2015, with observations in year 2013 removed. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.

	POLS	**RE**
TREATMENT	−.0146	−.0116
	(.017)	(.021)

AFTER	.0514***	.0526***
	(.019)	(.016)
TREAT × AFTER	.0605**	.0499**
	(.024)	(.021)
FIXASS_TA	.2470***	.1710***
	(.017)	(.026)
SIZE	−.0000***	−.0000**
	(.000)	(.000)
Constant	.0022	.0400*
	(.016)	(.021)
Observations	3 412	3 412
Adjusted R^2	.083	--

The treatment effect is captured by the interaction term TREAT × AFTER, which yield both statistically and economically significant results. They are statistically significant to the 0.05-level. FIXASS_TA is significant (0.05) under both POLS- and RE estimation.

The positive change in TI_SALES after the treatment can be attributed to the interest barrier rule. Our results are similar to that of Finnanger and Leland (2017).

Table 17 below shows the effect on the different segments, MNCs and DCCs. Regulators were particularly motivated by combatting multinational tax avoidance, but we cannot see that MNCs are more affected than DCCs. We fail to get statistically significant results for MNCs under both POLS- and RE-estimation. While we get significant (0.05) results for the DCC-segment under POLS-estimation. Fewer observations in the sample reduces the precision of the estimates, which can lead to more non-significant results (Figueiredo Filho et al., 2013). Qualitatively however, the coefficients are positive under all estimation techniques and subgroups. Also, DCCs seems to be more affected by the interest barrier rule than MNCs.

Table 17. *Interest barrier rule for MNC vs. DCC*

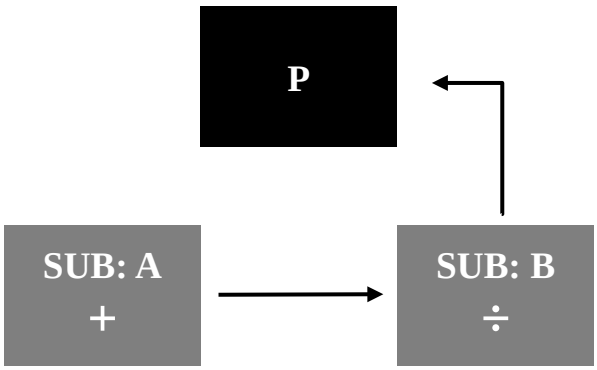
This table shows the regression results with TI_SALES (taxable income/ sales) as the dependent variable. The MNC-column shows the results for the observations determined MNCs, and the DCC-columns shows the results for the observations who are not MNCs. The sub-columns POLS and RE shows the pooled ordinary least squares and random effects results respectively. TREATMENT is a dummy variable equal 1 if the observation is in the treatment group. AFTER is a dummy variable equal 1 if the observation is after the treatment (interest barrier rule) was introduced, year > 2013. TREAT × AFTER is the interaction term between the two dummy variables TREATMENT and AFTER. FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK. Year-effects are excluded due to collinearity. The sample time-period is from 2011 to 2015, with observations in year 2013 removed. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.

	MNC		**DCC**	
	POLS	RE	POLS	RE
TREATMENT	−.0163	.0011	−.0140	−.0131
	(.026)	(.031)	(.023)	(.027)
AFTER	.0460	.0383	.0529**	.0517***
	(.034)	(.032)	(.022)	(.019)
TREAT × AFTER	.0606	.0521	.0624**	.0569**
	(.040)	(.036)	(.031)	(.030)
FIXASS_TA	.3020***	.2530***	.1990***	.1490***
	(.026)	(.038)	(.023)	(.030)
SIZE	−.0000**	−.0000*	−.0000**	−.0000*
	(.000)	(.000)	(.000)	(.000)
Constant	−.0234	−.0075	.0355*	.0580**
	(.024)	(.031)	(.021)	(.025)
Observations	1 345	1 345	2 067	2 067
Adjusted R^2	.129	--	.050	--

It is important to mention that the interest barrier rule can be beneficial to the Norwegian society, as DCCs can also engage in tax avoidance behavior by over-leveraging, see Figure 1. For example, if *subsidiary A* has a profit, and *subsidiary B* is over-charged for a group-internal loan by the *Parent company*. Under the Norwegian Tax Act (§10-2), *A* can reduce its tax bill by sending a group

contribution to *B*, which can net the group contribution with its loss. Since the interest barrier rule hinders certain group deductions (see 4.2), some of this domestic tax avoidance practice can be reduced. Thus, significant results for DCCs are also expected.

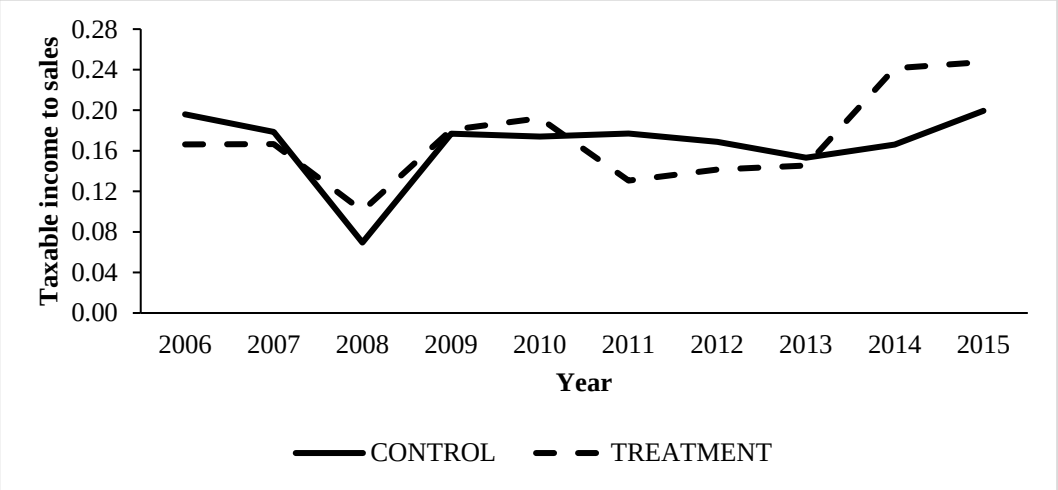
Figure 1. *Domestic tax avoidance through over-leveraging*
The figure illustrates one way for DCC to reduce their group taxable income by over-leveraging a subsidiary. This tax avoidance strategy is less attractive due to the interest barrier regulation. P is parent company, SUB: A denotes subsidiary company 1 and SUB: B denotes subsidiary company B. + denotes that the company has a taxable profit and ÷ that the company has a taxable profit.



6.2.2 Robustness tests

To test the robustness of our results, we run an identical test with the treatment and control groups selected in 2013 as opposed to 2012. Conceptually, the interest barrier rule was revealed late in 2013, which gives firms little time to adapt to the forthcoming rule. But the major drawback for using the groups selected in 2013 instead of 2012, is that the common trend assumption is not satisfied to the same extent. Graph 7 shows the paths of the two groups.

Graph 7. *Mean TI_SALES - group of 2013*
This graph shows the average TI_SALES (taxable income/ sales) for the control group and treatment group respectively. The treatment and control group are selected in year 2013, as opposed to Graph 4, where the selection was done for year 2012.



The common trend assumption is satisfied from 2006 to 2010, but in 2011 the treatment group experiences a drop in average TI_SALES, whereas the control group does not. Descriptively, the treatment effect seems to be greater than for the 2012-group. But for practical purposes, we deem the common trend assumption not to be violated, although the 2012-group satisfies the criterion to a higher degree.

Table 18. *Results on the 2013-group*

This table shows the regression results with TI_SALES (taxable income/ sales) as the dependent variable. TREATMENT is a dummy variable equal 1 if the observation is in the treatment group. AFTER is a dummy variable equal 1 if the observation is after the treatment (interest barrier rule) was introduced, year > 2013. TREAT × AFTER is the interaction term between the two dummy variables TREATMENT and AFTER. FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK. The POLS-column shows the pooled ordinary least squares results and the RE-column shows the random effects results. Year-effects are excluded due to collinearity. The sample time-period is from 2012 to 2015. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.

	POLS	**RE**
TREATMENT	−.0146	−.0264
	(.017)	(.021)
AFTER	.0229	.0204
	(.017)	(.014)
TREAT × AFTER	.0777***	.0784***
	(.023)	(.019)
FIXASS_TA	0.275***	.2030***

	(.017)	(.028)
SIZE	−.0000***	−.0000**
	(.000)	(.000)
Constant	−.00976	.0327
	(.016)	(.022)
Observations	3 511	3 511
Adjusted R^2	.089	--

The treatment effect is indeed higher for the 2013-group, and significant to the .01-level. Overall, we can conclude that the treatment effect is positive, which is expected, independent of choosing the 2012 or 2013-group.

Table 19 runs the same test on the two subgroups, MNC and DCC. Like Table 17, DCCs appear to be more affected by the rule than MNCs. The treatment effect, given by the TREAT × AFTER – coefficient, is both more statistically and economically significant for the DCCs, comparing with the MNCs.

Table 19. *Results on 2013-group MNC vs. DCC*

*This table shows the regression results with TI_SALES (taxable income/ sales) as the dependent variable. The MNC-column shows the results for the observations determined MNCs, and the DCC-columns shows the results for the observations who are not MNCs. The sub-columns POLS and RE shows the pooled ordinary least squares and random effects results respectively. TREATMENT is a dummy variable equal 1 if the observation is in the treatment group. AFTER is a dummy variable equal 1 if the observation is after the treatment (interest barrier rule) was introduced, year > 2013. TREAT × AFTER is the interaction term between the two dummy variables TREATMENT and AFTER. FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK. Year-effects are excluded due to collinearity. The sample time-period is from 2012 to 2015. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are * p<0.10, ** p<0.05, *** p<0.01.*

	MNC		**DCC**	
	POLS	RE	POLS	RE
TREATMENT	−.0162	−.0173	−.0204	−.0261
	(.028)	(.0338)	(.021)	(.026)
AFTER	.0219	.0141	.0237	.0318**
	(.033)	(.030)	(.020)	(.015)
TREAT × AFTER	.0710*	.0725**	.0832***	.0764***

	(.040)	(.035)	(.030)	(.025)
FIXASS_TA	.3030***	−.255***	.2630***	.221***
	(.028)	(.039)	(.022)	(.031)
SIZE	−.0000***	−.0000***	−.0000	.0000
	(.000)	(.000)	(.000)	(.000)
Constant	−.0094	.0207	−.0076	.0110
	(.027)	(.033)	(.020)	(.025)
Observations	1 261	1 261	2 250	2 250
Adjusted R^2	.120	--	.070	--

To conclude, we do find statistical evidence that the interest barrier rule has a positive effect in reducing the profitability differential between the control- and treatment group. This holds when running the test on groups selected in 2012 and 2013. Interestingly, DCCs appear to be more affected by the rule than MNCs, contrary to the intentions of the regulators.

6.3. Tax avoidance under corporate tax cut

Here we report the results of the impact corporate tax cuts has on the profitability differential. We follow the methodology outlined in section 4.3. The results do not exclude year-effects; hence we are cautious of attributing potential effects to the corporate tax cuts. First, the main results are presented in section 6.3.1, while robustness tests are conducted in section 6.3.2.

6.3.1 Empirical results

Table 20. *Main results effect on profitability differential due to tax reduction*
This table shows the regression results with TI_SALES (taxable income/ sales) as the dependent variable. MNC is a dummy variable equal to 1 if the observation is multinational. AFTER is a dummy variable equal 1 if the year is after the tax cut, i.e. year > 2013. AFTER × MNC is the interaction term between the dummy variables MNC and AFTER. DEBT_TA is leverage, FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK, and AGE is the observation's age in years. Industry effects are included in POLS-estimation. The sample time-period is from 2012 to 2015. Firms affected by the interest barrier rule are excluded from the sample. Standard errors are robust for

*heteroskedasticity and reported in parentheses. Significance levels are * p<0.10, ** p<0.05, *** p<0.01. Full results are included in the appendix.*

	POLS	**RE**	**FE**
MNC	−.0069***	−.0063***	−.0062**
	(.002)	(.002)	(.003)
AFTER	−.0050**	−.0057***	.0112***
	(.001)	(.001)	(.001)
AFTER × MNC	−.0007	.0036	.0020
	(.003)	(.003)	(.003)
DEBT_TA	−.2810***	−.2360***	−.2390***
	(.002)	(.003)	(.005)
FIXASS_TA	.0625***	.1710***	−.1420***
	(.002)	(.003)	(.007)
SIZE	−.0000***	.0000***	.0000
	(.000)	(.000)	(.000)
AGE	−.0001**	−.0001***	−.0115***
	(.000)	(.000)	(.001)
Industry effects	*Yes*	*No*	*No*
Constant	.2140***	.204***	.4600***
	(.002)	(.002)	(.010)
Observations	313 352	313 352	313 352
Adjusted R^2	.206	--	.030

The "treatment"-effect is represented by the AFTER × MNC – coefficient. Table 20 shows we fail to get any significant results, both statistically and economically. Given we have such a high number of observations, failing to get any significant results is evidence of tax cuts having no effect whatsoever on multinational tax avoidance/the profitability differential. Year-effects are however omitted due to collinearity and cannot be separated.

6.3.2 Robustness tests

Using TI_TA as the dependent variable we get the same conclusion as with TI_SALES, i.e. tax cuts result in no statistically significant effect on tax avoidance.

Table 21. *Alternative profitability measures*

This table shows the regression results with TI_TA (taxable income/ total assets) as the dependent variable. MNC is a dummy variable equal to 1 if the observation is multinational. AFTER is a dummy variable equal 1 if the year is after the tax cut, i.e. year > 2013. AFTER × MNC is the interaction term between the dummy variables MNC and AFTER. DEBT_TA is leverage, FIXASS_TA is the ratio of fixed assets, SIZE is sales in MNOK, and AGE is the observation's age in years. Industry effects are included in POLS-estimation. The sample time-period is from 2012 to 2015. Firms affected by the interest barrier rule are excluded from the sample. Standard errors are robust for heteroskedasticity and reported in parentheses. Significance levels are * *p<0.10,* ** *p<0.05,* *** *p<0.01. Full results are included in the appendix.*

	POLS	**RE**	**FE**
MNC	−.0261***	−.0178***	−.0085***
	(.002)	(.002)	(.003)
AFTER	.0033***	−.0065***	.0122***
	(.001)	(.001)	(.001)
AFTER × MNC	−.0048	−.0031	−.0048*
	(.003)	(.003)	(.003)
DEBT_TA	−.2410***	−.2900***	−.4140***
	(.003)	(.005)	(.009)
FIXASS_TA	−.0478***	−.0129***	−.1420***
	(.002)	(.003)	(.008)
SIZE	.0000***	.0000***	.0000
	(.000)	(.000)	(.000)
AGE	−.0008***	−.0013***	−.0161***
	(.000)	(.000)	(.001)
Industry effects	*Yes*	*No*	*No*
Constant	.2520***	.2560***	.5560***
	(.002)	(.002)	(.010)
Observations	313 352	313 352	313 352
Adjusted R^2	.112	--	.077

The marginal tax cut of 1% appears to have no effect on tax avoidance behavior. However, it is not possible to exclude time effects due to collinearity, thus we cannot conclude what the effect actually is.

7. Conclusion

This study updates the empirical evidence on the profitability differential (taxable income/ sales) between MNCs and DCCs in Norway. Replicating and extending the studies of Langli and Saudagaran (2004) and Balsvik et al. (2009); the profitability differential between MNCs and DCCs remains both economically and statistically negative. Our results are robust when using alternative profitability measures. Surprisingly, we find that the negative profitability differential is reduced since the previous studies. Although still evident, multinational tax avoidance appears to be lower (in relative terms) today than what was previously showed.

Additionally, this thesis provides new insight on the effect of tax policy changes in Norway. The interest barrier rule shows affected firms reporting a significantly higher taxable income profitability after its occurrence. However, DCCs are more affected than MNCs. Results are robust when testing on different treatment-/ control groups. That DCCs are more affected than MNCs is contrary to the regulator's intentions, which was to reduce multinational tax avoidance. Very few firms are affected by the rule, thus limiting the economic consequences of the regulation.

Finally, we test to see if lowering the corporate tax rate has any effect on the profitability of MNCs. We found no evidence of the 2014 tax cut reducing multinational tax avoidance. Hence, our results are consistent with Brandstetter (2014), who found similar results with the German tax cut in 2008.

There are several arising questions which we recommend for future research. Regarding to overall multinational tax avoidance, it will be highly interesting to identify which factors/ circumstances are reducing the negative profitability differential between DCCs and MNCs, compared to earlier studies (Balsvik et al., 2009; Langli & Saudagaran, 2004). Also, future research on whether the profitability differential between DCCs and MNCs is a suitable proxy for measuring multinational tax avoidance is warranted.

Changes to the interest barrier rule are expected in 2019 (Finansdepartementet, 2018), which includes external interest expenses as well as intra-group expenses. How this will affect the tax profitability of affected firms, as well as highly

levered industries (real estate etc.), will be an interesting topic to investigate. The corporate tax rate is additionally reduced to 23% in 2018, a substantial reduction with regards to the tax cut in 2014. In order to provide stronger evidence on how tax cuts effect multinational tax avoidance, we recommend rerunning the test on a newer dataset which includes the additional tax reductions.

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9. Appendix

Hausman test

The framework of the Hausman-test

$$H = \frac{(\beta_{FE}^{*} - \beta_{RE}^{*})^2}{Var(\beta_{FE}) - Var(\beta_{RE})} \sim \chi^2$$

$$H_0: Cov(\alpha_i, \vec{x_{i,t}}) = 0$$
$$H_1: Cov(\alpha_i, \vec{x_{i,t}}) \neq 0$$

The Hausman-test checks if the difference in the coefficients between a RE model (which can suffer under unobserved heterogeneity if the effect is not random) is statistically different than the FE model (which does not suffer under unobserved heterogeneity, since this effect is omitted).
Where $\vec{x_{i,t}}$ denotes all independent variables. The results of the Hausman-test are given in Table 2.

A1. *Hausman test results*

	b (1)	**B (2)**	**b-B (3)**	**-- (4)**
MNC	−.0056	−.0081	.0024	.0005
DEBT_TA	−.2240	−.2271	.0027	.0010
FIXASS_TA	−.1020	.0960	−.1979	.0019
SIZE_MNOK	.0000	.0000	.0000	.0000
AGE	−.0026	.0001	−.0026	.0016
YR_{2007}	−.0002	.0006	−.0007	.0016
YR_{2008}	−.0394	−.0409	.0015	.0032
YR_{2009}	−.0141	−.0165	.0024	.0048
YR_{2010}	−.0181	−.0200	.0019	.0064
YR_{2011}	−.0136	−.0161	.0025	.0080
YR_{2012}	−.0065	−.0098	.0034	.0096
YR_{2013}	−.0171	−.0215	.0044	.0113
YR_{2014}	−.0118	−.0169	.0051	.0129
YR_{2015}	−.0142	−.01970	.0055	.0145

$\chi^2(23\ df) = 12106.58$

$Prob > \chi^2 = .0000$

(1) Beta coefficients in the fixed effects model, β_{FE}
(2) Beta coefficients in the random effects model, β_{RE}

(3) Difference between fixed effects betas and random effects betas, $\beta_{FE} - \beta_{RE}$
(4) The square root of the difference variance matrix between fixed effects estimation and random effects estimation,

$$\sqrt{diag[VAR(\beta_{FE}) - VAR(\beta_{RE})]}$$

The null hypothesis is resoundingly rejected, indicating that a FE estimation method is preferred, due to the large difference between the RE and FE model.

Regression results

A2. *Full regression results on profitability differential (Table 10)*

	POLS	**RE**	**FE**
MNC	−.0110***	−.0081***	−.0057***
	(.001)	(.001)	(.001)
Manufacturing	−.0597***		
	(.001)		
Wholesale	−.0599***		
	(.001)		
Retail	−.0851***		
	(.001)		
Transport	−.0616***		
	(.001)		
Hospitality	−.0540***		
	(.002)		
Real estate	.2130***		
	(.001)		
Construction	−.0611***		
	(.001)		
Advisory	.0789***		
	(.001)		
Tech	.0286***		
	(.002)		
Pharma	−.0477***		
	(.003)		
DEBT_TA	−.2730***	−.2270***	−.2240***
	(.002)	(.002)	(.003)
FIXASS_TA	.0603***	.0960***	−.1020***
	(.002)	(.002)	(.004)
SIZE	−.0000***	−.0000***	.0000
	(.000)	(.000)	(.000)
AGE	.0002***	.0001	−.0026
	(.000)	(.001)	(.002)
YR_{2007}	.0008	.0006	−.0001

	(.001)	(.001)	(.002)
YR_{2008}	−.0398***	−.0409***	−.0394***
	(.001)	(.001)	(.004)
YR_{2009}	−.0148***	−.0165***	−.0141***
	(.001)	(.001)	(.005)
YR_{2010}	−.0163***	−.0200***	−.0181***
	(.001)	(.001)	(.007)
YR_{2011}	−.0127***	−.0161***	−.0136
	(.001)	(.001)	(.009)
YR_{2012}	−.0050***	−.010***	−.0065
	(.001)	(.001)	(.010)
YR_{2013}	−.0160***	−.0215***	−.0171
	(.001)	(.001)	(.012)
YR_{2014}	−.0110***	−.0169***	−.0118
	(.001)	(.001)	(.014)
YR_{2015}	−.0131***	−.0197***	−.0142
	(.001)	(.001)	(.015)
Constant	.2220***	.2260***	.3220***
	(.001)	(.001)	(.016)
Observations	724 087	724 087	724 087
Adjusted R^2	.193		.036

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

A3. *Full regression results on profitability differential (Table 11)*

	POLS$_{<2011}$	**POLS$_{>2010}$**	**FE$_{<2011}$**	**FE$_{>2010}$**
MNC	−.0148***	−.0086***	−.0060**	−.0053***
	(.001)	(.001)	(.003)	(.002)
Manufacturing	−.0562***	−.0654***		
	(.001)	(.002)		
Wholesale	−.0585***	−.0621***		
	(.001)	(.001)		
Retail	−.0808***	−.0902***		
	(.001)	(.001)		
Transport	−.0573***	−.0658***		
	(.002)	(.002)		
Hospitality	−.0534***	−.0546***		
	(.002)	(.002)		

Real estate	.1990***	.2240***		
	(.002)	(.002)		
Construction	−.0570***	−.0648***		
	(.001)	(.001)		
Advisory	.0722***	.0840***		
	(.002)	(.002)		
Tech	.0260***	.0309***		
	(.003)	(.003)		
Pharma	−.0547***	−.0412***		
	(.004)	(.004)		
DEBT_TA	−.2680***	−.2780***	−.2310***	−.2340***
	(.002)	(.002)	(.004)	(.004)
FIXASS_TA	.0521***	.0664***	−.1460***	−.1280***
	(.002)	(.002)	(.007)	(.006)
SIZE	−.0000	−.0000***	.0000	.0000
	(.000)	(.000)	(.000)	(.000)
AGE	.0005***	−.0001*	.0000	−.0030***
	(.000)	(.000)	(.001)	(.000)
YR_{2007}	.0009		−.0023	
	(.001)		(.002)	
YR_{2008}	−.0394***		−.0439***	
	(.001)		(.003)	
YR_{2009}	−.0141***		−.0224***	
	(.001)		(.004)	
YR_{2010}	−.0153***		−.0309***	
	(.001)		(.005)	
YR_{2012}		.0076***		.0039***
		(.001)		(.001)
YR_{2013}		−.0035***		−.0079***
		(.001)		(.001)
YR_{2014}		.0013		−.0037***
		(.001)		(.001)
YR_{2015}		−.0007		−.0066***
		(.001)		(.001)
Constant	.2200***	.2110***	.2980***	.3390***
	(.002)	(.002)	(.014)	(.003)
Observations	335 502	388 585	335 502	388 585
Adjusted R^2	.176	.205	.043	.030

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

A4. *Full regression results on profitability differential (Table 13)*

	POLS	**FE**
MNC	−.0058***	−.0070***
	(.001)	(.002)
RW	−.0116***	
	(.001)	
DEBT_TA	−.1750***	−.1700***
	(.002)	(.004)
FIXASS_TA	.0274***	−.0655***
	(.003)	(.007)
SIZE_2	−.0837***	.0526***
	(.005)	(.009)
SIZE_3	−.0909***	.0923***
	(.006)	(.009)
SIZE_4	−.0917***	.1220***
	(.005)	(.010)
SIZE_5	−.0968***	.1430***
	(.005)	(.010)
AGE_2	.0187***	.0024*
	(.001)	(.002)
AGE_3	.0212***	.0010
	(.001)	(.002)
AGE_4	.0243***	−.0005
	(.001)	(.003)
YR_{2007}	.0097***	.0071***
	(.002)	(.001)
YR_{2008}	−.0158***	−.0191***
	(.002)	(.001)
YR_{2009}	−.0196***	−.0226***
	(.002)	(.001)
YR_{2010}	−.0235***	−.0302***
	(.002)	(.001)
YR_{2011}	−.0218***	−.0305***
	(.002)	(.001)
YR_{2012}	−.0137***	−.0267***
	(.002)	(.002)
YR_{2013}	−.0231***	−.0384***
	(.002)	(.002)
YR_{2014}	−.0177***	−.0374***
	(.002)	(.002)
YR_{2015}	−.0186***	−.0406***
	(.002)	(.002)

Constant	.2040***	.0340***
	(.005)	(.009)
Observations	201 947	201 947
Adjusted R^2	.085	.066

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

A5. *Full regression results on profitability differential (Table 14)*

	POLS		**FE**	
	TI_TA	TI_EQ	TI_TA	TI_EQ
MNC	−.0323***	−.2310*	−.0155***	−.5580**
	(.001)	(.128)	(.002)	(.248)
Manufacturing	−.0521***	−1.1350**		
	(.001)	(.531)		
Wholesale	−.0439***	−.3950***		
	(.001)	(.098)		
Retail	−.0710***	−.4510***		
	(.001)	(.107)		
Transport	−.0513***	−.2170		
	(.002)	(.146)		
Hospitality	−.0111***	−.2760		
	(.003)	(.246)		
Real estate	.0144***	−.0672		
	(.001)	(.097)		
Construction	−.0363***	−.4250***		
	(.001)	(.110)		
Advisory	.0522***	.3200***		
	(.001)	(.098)		
Tech	.0288***	−.0114		
	(.002)	(.231)		
Pharma	−.0076*	.0456		
	(.004)	(.192)		
DEBT_TA	−.2530***	.0075	−.3400***	−.8120
	(.002)	(.320)	(.004)	(.873)
FIXASS_TA	−.0454***	−.7570***	−.1140***	−.9120**
	(.001)	(.250)	(.004)	(.406)
SIZE	.0000***	.0000	.0000	.0002
	(.000)	(.000)	(.000)	(.000)
AGE	−.0006***	−.0045	.0009	.0020
	(.000)	(.003)	(.001)	(.0136)
YR_{2007}	.0135***	.1470	.0079***	.2580
	(.001)	(.473)	(.002)	(.533)

YR_{2008}	−.0245***	.0797	−.0356***	.1370
	(.001)	(.465)	(.002)	(.544)
YR_{2009}	−.0333***	.0074	−.0527***	.0788
	(.001)	(.451)	(.003)	(.546)
YR_{2010}	−.0381***	−.1540	−.0658***	−.1370
	(.001)	(.455)	(.005)	(.555)
YR_{2011}	−.0295***	.0085	−.0642***	−.0395
	(.001)	(.448)	(.006)	(.558)
YR_{2012}	−.0259***	−.0315	−.0668***	−.0596
	(.001)	(.447)	(.007)	(.561)
YR_{2013}	−.0352***	.1060	−.0846***	.0321
	(.001)	(.436)	(.008)	(.547)
YR_{2014}	−.0281***	.1560	−.0859***	.0469
	(.001)	(.430)	(.009)	(.545)
YR_{2015}	−.0283***	.3150	−.0927***	.1170
	(.001)	(.434)	(.010)	(.551)
Constant	.2830***	1.0340**	.3380***	1.1770***
	(.001)	(.416)	(.010)	(.286)
Observations	724 087	723 990	724 087	723 990
Adjusted R^2	.117	0.000	0.082	0.000

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

A6. *Full regression results on profitability differential (Table 15)*

	POLS		**FE**
MNC	−.0024**	−.0065***	−.0048***
	(.001)	(.001)	(.001)
Manufacturing	−.0523***		
	(.001)		
Wholesale	−.0533***		
	(.001)		
Retail	−.0789***		
	(.001)		
Transport	−.0582***		
	(.001)		
Hospitality	−.0496***		
	(.002)		

Real estate	.201***		
	(.001)		
Construction	−.0558***		
	(.001)		
Advisory	.0682***		
	(.001)		
Tech	.0262***		
	(.002)		
Pharma	−.0436***		
	(.003)		
DEBT_TA	−.2690***	−.2280***	−.2220***
	(.002)	(.002)	(.003)
FIXASS_TA	.0480***	−.0899***	−.0856***
	(.002)	(.002)	(.004)
SIZE_2	.0067***	.0038*	.1020***
	(.001)	(.002)	(.003)
SIZE_3	−.0305***	−.0162***	.1480***
	(.001)	(.002)	(.004)
SIZE_4	−.0392***	−.0247***	.1760***
	(.001)	(.002)	(.004)
SIZE_5	−.0464***	−.0340***	.1970***
	(.001)	(.002)	(.004)
AGE_2	.0131***	.0100***	.0086***
	(.001)	(.001)	(.001)
AGE_3	.0098***	.0015	.0065***
	(.001)	(.001)	(.002)
AGE_4	.0116***	−.0041	.0022
	(.001)	(.001)	(.003)
YR_{2007}	.0013	.0015	−.0047***
	(.001)	(.001)	(.001)
YR_{2008}	−.0391***	−.0394***	−.0470***
	(.001)	(.001)	(.001)
YR_{2009}	−.0150***	−.0151***	−.0223***
	(.001)	(.001)	(.001)
YR_{2010}	−.0160***	−.0181***	−.0301***
	(.001)	(.001)	(.001)
YR_{2011}	−.0124***	−.0140***	−.0301***
	(.001)	(.001)	(.001)
YR_{2012}	−.0048***	−.0076***	−.0265***

	(.001)	(.001)	(.001)
YR_{2013}	−.0159***	−.0193***	−.0407***
	(.001)	(.001)	(.001)
YR_{2014}	−.0112***	−.0145***	−.0391***
	(.001)	(.001)	(.002)
YR_{2015}	−.0125***	−.0169***	−.0451***
	(.001)	(.001)	(.002)
Constant	.2400***	.237***	.1660***
	(.002)	(.002)	(.003)
Observations	724 087	724 087	724 087
Adjusted R^2	.197	--	.050

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

A7. *Full regression results on tax reduction (Table 20)*

	POLS	**RE**	**FE**
MNC	−.0069***	−.0063**	−.0062**
	(.002)	(.002)	(.003)
AFTER	−.002**	−.0057***	.0112***
	(.001)	(.001)	(.001)
AFTER × MNC	−.0007	.0036	.0020
	(.003)	(.003)	(.003)
Manufacturing	−.0638***		
	(.001)		
Wholesale	−.0621***		
	(.002)		
Retail	−.0889***		
	(.001)		
Transport	−.0645***		
	(.002)		
Hospitality	−.0526***		
	(.002)		
Real estate	.2270***		
	(.002)		
Construction	−.0632***		
	(.001)		
Advisory	.0863***		
	(.002)		
Tech	.0321***		
	(.003)		

Pharma	−.0427***		
	(.004)		
DEBT_TA	−.2810***	−.2360***	−.2390***
	(.002)	(.003)	(.005)
FIXASS_TA	.0625***	.1710***	−.1420***
	(.002)	(.003)	(.007)
SIZE	−.0000***	−.0000***	.0000
	(.000)	(.000)	(.000)
AGE	−.0001**	−.0001**	−.0115***
	(.000)	(.001)	(.001)
Constant	.2140***	.2040***	.4600***
	(.002)	(.002)	(.009)
N	313 352	313 352	313 352
adj. R^2	.206	--	.030

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

A8. *Full regression results on tax reduction (Table 21)*

	POLS	**RE**	**FE**
MNC	−.0261***	−.018***	−.0085***
	(.002)	(.003)	(.003)
AFTER	.0033***	−.0065***	.0122***
	(.001)	(.001)	(.001)
AFTER × MNC	−.0048	−.0031	−.0048*
	(.003)	(.003)	(.003)
Manufacturing	−.0589***		
	(.002)		
Wholesale	−.0521***		
	(.002)		
Retail	−.0719***		
	(.002)		
Transport	−.0504***		
	(.003)		
Hospitality	−.0062		
	(.004)		
Real estate	.01270***		
	(.001)		
Construction	−.03880***		
	(.0017)		
Advisory	.0494***		
	(.002)		

Tech	.0341***		
	(.004)		
Pharma	-.0000		
	(.006)		
DEBT_TA	−.2410***	−.2900***	−.4140***
	(.003)	(.005)	(.009)
FIXASS_TA	−.0478***	−.0129***	−.1420***
	(.002)	(.003)	(.008)
SIZE	.0000***	.0000***	.0000
	(.000)	(.000)	(.000)
AGE	−.0008***	−.0013***	−.0161***
	(.000)	(.000)	(.001)
Constant	.2520***	.2560***	.5560***
	(.002)	(.002)	(.010)
N	313 352	313 352	313 352
adj. R^2	.112	--	.077

Robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01