



SCHOOL OF ECONOMICS AND MANAGEMENT

BUSN79 - Business Administration: Degree Project in Accounting and Finance

How is reduced corporate income tax rate reflected in the tax avoidance of MNEs and domestic companies in US?

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Abstract

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Key Words: Corporate income tax, Tax avoidance, Tax rate cut, Domestic companies, MNEs

Purpose: The purpose of this study is to investigate whether listed non-financial companies tax avoidance behavior is impacted by the US corporate income tax reform, and whether a difference exist between how domestic and MNEs change their tax avoidance.

Methodology: A deductive, quantitative, Difference-In-Difference panel data study, based on Dobbins and Jacob (2016) and Wan and Zhu (2011)

Theoretical perspectives: The study's scientific perspective is epistemology. The study lays on positivistic foundation, deductive approach and is of quantitative nature.

Foundation: Basis for this thesis have been a sample of 242 companies listed in S&P 1000 US in years 2017 and 2019, which we obtained by Thomson Reuters Eikon.

Conclusion: Two hypothesis were accepted. 1 MNEs had lower ETR relative to Domestic companies prior the US corporate income tax reform 2 Companies in US significantly decrease their tax avoidance one year after the tax reform. However, as the tax avoidance is calculated as ratio of the tax rate, domestic companies increased their tax avoidance while the MNEs reduced. Three hypotheses were not accepted. The Difference-In-Difference test with interaction term did not provide statistically significant support for the hypothesis that interaction variables Profitability, Intangible assets intensity and Leverage influence MNEs tax avoidance relative to Domestic companies in the selected sample.

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Abbreviation list

ALP	Arm's Length Principle
BEAT	Base Erosion and Anti Abuse Tax
BEPS –	Base Erosion and Profit Shifting
CEO	Chief Executive Officer
CSR	Corporate Social Responsibility
DiD	Difference-in-Difference
ESG	Environmental, Social and Governance
ETR	Effective tax rate
Int.	Intangible
IRS	Internal Revenue Service
LTD	Long-Term Debt
MNE	Multinational Enterprise
NOL	Net Operating Loss
OECD	Organisation for Economic Cooperation and Development
ROA	Return on Assets
R&D	Research and Development
TP	Transfer Pricing
US	United States
TPC	Tax Policy Center

1 Introduction

1.1 Background

The number multinational enterprises (MNE) in the current paradigm of post-industrialism, information and digitalization is greater than ever before. The MNEs have often been appointed by media as being guilty of tax avoidance, implying that the income tax payments by the MNEs are not ethically just as companies are avoiding taxes (Back, 2013). In the well-known cases of Enron and WorldCom, these MNEs were found to pay near zero income in a high tax legislation, while in the global scale the corporation is profitable and shareholders benefitting of the profit in form of dividends (Sikka, 2005). More recently, global companies such as Uber has been accused of tax planning and avoidance using the several zero tax investment opportunities as described by Abbas et al. (2012). Furthermore, Gobham and Jansky (2017) explain that the losers in the global tax planning are the lower- and middle-income countries, and across sub-Saharan Africa, South Asia, and Latin America and the Caribbean. Although tax avoidance is usually seen as something negative, tax avoidance has also been inferred to be affecting firm valuation positively (Zhang, Cheong & Rajah 2017).

Prior research explains that like individual tax compliance, the corporate tax compliance is a function of tax rates, the probability of detection and punishment of misstatements, penalties, and management risk-aversion (Allingham & Sandmo, 1972). As cash taxes are a significant part of the cash outflow in the companies, the taxation has powerful impact on the corporate decisions (Dyreng, Hanlon & Maydew, 2008). Tax planning is thus be part of company management duties with ultimate goal to minimize the effective cash taxes at company-wide level (Slemrod, 2004).

Effective tax planning reduces the present value of tax payments and increases the after-tax rate of return to investors in a firm (Rego, 2003, Slemrod, 2004). The shifting of income from high tax to low tax country is a commonly used method of tax avoidance. This reduces the income tax payable of the MNE in the high tax legislation, resulting in benefits for shareholders. Shareholders gain either higher dividends or increases in the share price through improved company valuation

(Kovermann, 2018). Domestic organisations do not have the possibility to conduct this type of income shifting, thus contributing to public good in form of tax payments in higher degree than the foreign companies. Against this background, international investors get richer at the expense of the society of the country wherefrom the income is shifted away.

To study the phenomenon, some measure of tax is necessary. Previous research rely on effective tax rates (ETR). Several ETR measures exists and are calculated by dividing some sort of tax liability by the pre-tax profit to capture the tax rate per dollar of income (Hanlon & Heitzman, 2010). This is then compared to the current corporate tax rate to infer the extent of tax avoidance (Zeng, 2019).

Existing studies argue that MNEs benefit from scale economics in tax planning, providing evidence that firms with extensive foreign operations have lower ETR (Rego, 2003). Among MNEs, counterintuitively, higher portion of foreign income is associated with higher ETR in US and as worldwide ETR (ibid.). Other authors however demonstrate that MNEs ETR lies above the ETR of domestic companies for nearly three decades, thus MNEs not benefitting from the multinationalism (Dyreng, Hanlon, Maydew & Thornlock, 2017). This again is contested by Chyz, Luna and Smith (2015) claiming that including implicit taxation, other things equal, the MNEs are better off, and their real tax rate is lower than in domestic companies. Simone et al (2019) further divides implicit taxation into their respective sources for both MNEs and domestics, confirming Chyz et al (2015) results. Prior research is thus not unanimous.

As a consequence of the abovementioned aspects, tax avoidance is a phenomenon affecting most of the worldwide economies. Tax authorities in many high tax jurisdictions are worried about the loss of real economic activity due to differences in tax rates (Bartelsman, Beetsma, 2003). This fear is strengthened as there seem to exist a ‘tax rate competition’ (Abbas, Klemm, Bedi & Park, 2012) as some countries use low tax rate as a stimulus to attract foreign investments by MNEs (ibid.). The fear of tax base erosion has led to several international actions taken to diminish the cross-country profit shifting (Dyreng, Hanlon & Maydew, 2008; Marques & Pinho, 2016). Examples of these actions are Tax Reform Act in USA in 1986, Base Erosion and Profit Shifting

(BEPS) project in OECD (Organisation for Economic Co-operation and Development) since 2013 (OECD, 2020) and Base Erosion Anti-Abuse Tax since (BEAT) in US since 2017 (Simone, Mills & Stomberg, 2019). The process of implementation is however lengthy, and many of the world's economies are not yet part of OECD, hence the project is still leaving some space for tax avoidance in form of income shifting.

1.2 Problem formulation

In 2018 Belgium, Italy, Hungary and USA reduced their tax rate (KPMG). Of these countries all except Hungary originally had above the worldwide average tax rate, which in both 2017 and 2018 lied in 23% (tax foundation). Of the remaining three, USA held the position of having world fourth highest corporate income tax. While Hungary made the most drastic move, cutting its corporate tax rate to half (Table 1), the next most drastic, and unexpected, move was by the US. As US initially had the nearly highest corporate tax rates in the world and it reduced it to lower than worldwide average, relative cut of 40% is measured. This is having direct impact on the retained profit on companies taxed in US, further, it also affects deferred tax liabilities and assets, which are to be translated to reflect the new lower tax rate. Given the scale benefit in tax planning indicated by Rego (2003) and the ultimate aim of tax management being minimizing worldwide tax rate (Slemrod, 2004) it is expectable that tax rate cut of this magnitude has effects on corporate tax planning, especially in multinational corporations. This due to tax rate cut reduces the incentive of MNEs to engage in profit shifting to diminish worldwide-tax rate. The post cut US tax rate is competitive with the other legislations.

In addition to the tax rate, the reform also changed the basis of corporate taxation of US. Prior to tax reform, US applied worldwide taxation. With the reform it moved to hybrid taxation, a form of taxation in between worldwide and territorial taxation. While worldwide taxation implies that profit both from domestic and foreign sources are taxed but allow for tax credits to offset the foreign income taxes, the territorial taxation instead means that only domestic-source income is taxed. Following the tax reform US eliminated the tax on repatriated dividends. This means income can be accrued abroad with lower tax rate and brought back to US without tax. To offset this, two new taxes were introduced, creating a worldwide minimum tax on intangible assets, essentially to

reduce incentive for moving intangible capital abroad. Moreover, the reform added back a tax for passive income accruing in US owned foreign affiliates. (Tax Policy Center, 2020)

As a consequence, the tax rate cut as part of tax reform ‘Tax Cuts and Jobs Act’ legislation enacted on 22 December 2017 (P.L. 115-97, PWC) is of interest to study. The tax rate cut is both of unexpected nature and of significant size, and for that reason it is reasonable to expect this event to have significant impact in tax avoidance.

In the light of the prior theory, it is not clear whether MNEs currently do possess tax advantageous position compared to domestic companies. The prior studies rely on old data and is not in consensus. Thus, our study aims to clarify, whether MNEs did hold tax advantage in a year prior the tax reform, 2017, and has this advantage eroded year after the reform, 2019, giving the companies one year for tax planning activities. Further the study aims to test if performance indicators, such as return on asset and intangibles intensity do affect the result. Furthermore, the study controls for several non-relevant accounting measures.

Country	<i>Belgium</i>	<i>Italy</i>	<i>Hungary</i>	<i>US</i>	<i>Germany (2008)*</i>
Tax rate 2017	34%	31,4%	19%	35% (40%)	39%
Tax rate cut	5%	7,4%	10%	14%	10%
Tax rate 2018	29%	24%	9%	21% (27%)	29%
Relative tax rate cut	14%	24%	53%	40% (33%)	25,6%

Table 1 - Tax rate cut in Belgium, Italy, Hungary and USA in 2018

Source: KPMG, Dobbins & Jacobs (2016)*

Prior studies of change in tax avoidance due to tax rate cuts of this magnitude were not identified. One prior study in Germany has nonetheless compared relative tax rate cut of 25% (from 39% to 29%) impact on investments, also observing the change in ETR. The results indicate that tax rate cut affects ETR and investments of domestic owned companies in higher degree especially if they are relying more on internally generated funds. Yet, the compared groups of the study were domestic owned companies versus foreign owned subsidiaries (Dobbins and Jacob, 2016), while our study compares only companies with ultimate parent in US, further dividing these to domestic only and MNEs. Thus, while the method of the aforementioned is a source of inspiration to us, the results are not entirely comparable.

Prior studies in tax rate cut have estimated the effect of rate cut on other financial measures, such as leverage and capital structure (Overesch & Voeller, 2010), finding that smaller companies respond more into the change in tax benefit of debt. Given the tax rate cut reduces the tax benefit of debt, we control whether similar findings can be found related to leverage and size in our sample.

There are three main challenges to studying the effect of corporate taxes on tax avoidance. Firstly, the it is complicated to get complete data over all the affected companies. Secondly, the tax rate cut is a major policy shock affecting tax avoidance, but it is difficult to eliminate other possible effects. Thirdly, tax avoidance is international phenomenon and for the purpose to study international effects, a research in tax avoidance must identify internationality. By studying an unexpected event, affecting both domestic and MNEs we can capture the potential effect on tax avoidance behaviour in MNEs relative to purely domestic companies. Thereby we contribute to the existing research by broadening the perspective and hopefully contributing with new insights to improve understanding of the tax avoidance phenomenon.

1.3 Aim

The aim of this paper is to find evidence for whether decrease of corporate tax rate in US in 2018 have had effect on tax avoidance in US companies. Moreover, the paper identifies whether the effect is similar in both MNEs and domestic companies.

1.4 Delimitation

Due to limitations in the database of choice, Thomson Reuters Eikon, the companies analysed in this study are gathered from the stock index S&P1000. The concept of tax avoidance is not a definition with an exact measure. To study tax avoidance requires choosing between existing measures or creating new ones. Although no measure is perfect, this analysis of tax avoidance is based on pre-existing measures previously used and tested in this research area.

Further limitations in this study is the accuracy of the corporate tax rates of each individual company. The US corporate tax rate consist of state tax and federal tax. While this study assumes all companies facing the same average combined tax rate, in reality each company have their own combination of tax rate, based on the state their headquarters are located in.

The study compares only two years tax measures. Additional validity could have been gained by expanding the studied time frame to four years. The study method could have ensured no differences between domestic and MNE companies with respect to observable firm characteristics through matching. Due to small sample size, this was not done. Thus, there are differences between the groups, and this affects the reliability of the study.

1.5 Outline

The structure of this paper is as follows: Section 2; presents a brief literature review, describes the tests, determining variables and the hypotheses to be tested. Section 3; lays out the sample selection, data definitions and descriptive statistics. Section 4; presents univariate statistics. In section 5 we provide the results of multivariate analysis of determinants of tax avoidance prior and after the tax rate change. Section 6; concludes the paper.

2 Theory and prior research

This section starts off by providing a brief presentation of different tax avoidance tactics companies make use of. In the following, previous research and their relevant findings are presented to provide an overview of existing literature on the subject of tax avoidance.

2.1 General concepts in tax avoidance

2.1.1 Tax avoidance tactics

The most prevalent form of tax avoidance is income shifting. This is possible through creating a corporate structure that helps to avoid paying output VAT (Sikka, 2005), moving intangible assets abroad to low tax jurisdiction or expensing the high tax entity with related royalties and thus decreasing the tax base of it. Another technique for tax avoidance is that companies may delay the taxation by investing in tax favoured activities such as municipal bonds, and investments that are subject to accelerated depreciation for tax purposes (Dyrenge, Hanlon, Maydew, Thornock, 2017).

MNEs may additionally choose to park their profit in low tax jurisdiction and only move the profit over to the high tax entity when it is beneficial, as in case of making losses and thus not needing to pay taxes (Chyz et al. 2015). Similarly, the MNEs may benefit from ‘thin capitalization’ which implies taking a loan in a low tax and interest country, and then using intercompany loan to move the interest expenses to a high tax country. Followed by this MNE can benefit from the interest rate deduction on income tax in the high tax country (Dyrenge et al, 2008).

While domestic companies do not enjoy the full variety of tax avoidance options that MNEs do, there are methods to be used even for domestic companies to lower the taxable profit. They can use tax credits, net operating loss (NOL) deductions of affiliates (Desai and Dharmapala, 2009), or accruals (Artsberg, 1996), or avoid payroll tax by providing remuneration in other forms than money (Sikka, 2005). Furthermore, domestic companies can like MNEs benefit from the unlinking of commercial and tax accounting, meaning that companies make commercial profit, but parts of the profit remain untaxed due to various exceptions (Artsberg, 1996). The difference between tax avoidance of MNEs and domestic companies is that tax avoidance in domestic companies are intentionally offered by tax code, there is no such intentionality in regards the tax avoidance of MNEs – those are result of differences in the tax codes of countries.

2.1.2 Transfer pricing and US tax reform

Transfer pricing is seen as an act of organizing intra-firm transactions in such a manner that most of the profit is made in a low tax jurisdiction lowering the worldwide effective tax rate of the MNE (Richardson, Taylor, Lanis, 2013). The Arm lengths principle is a central concept in transfer pricing. It implies that all goods and services must be sold with the price that would be agreed with two parties in transaction of independent parties. This is to avoid companies to misprice products in intragroup sales to transfer untaxed profits. This is the general agreement in most countries and part of the tax law. For example, in US this is defined in Internal Revenue Code (IRS) section 482. The Arm Lengths Price is however difficult to set for several types of services and goods due to their rarity on the market. Followed by this, in lack of Arm's length price companies may avoid taxation with mispricing.

2.1.3 US tax reform and tax avoidance

A specific form of tax avoidance used to apply for US corporation prior the tax reform of 2018. Arranging MNE so that income is generated abroad and permanently reinvested in the foreign subsidiary led to that income is not to be recorded nor taxed (Graham, Hanlon and Shevlin, 2011). However, with the tax law changes effective from 1.1.2018 US moved from worldwide system on taxation to hybrid between territorial and worldwide system of taxation (PWC, Pomerleau, 2019). While worldwide taxation implied all income were to be taxed in US, fully territorial taxation would imply that only US domestic income would be taxed in US. The hybrid in between instead means that some income is to be taxed, but some are tax exempt. Followed by the reform, four provisions were introduced, where of first eliminated the tax on repatriated dividend. As this implicitly increased the reward for income shifting, second and third provision introduced two additional taxes to set worldwide minimum tax on intangible tax, so that companies would not have incentive to move intangible assets away from US. The fourth and last provision is base erosion and anti-abuse tax (BEAT), which levy a tax on otherwise deductible payments between US based MNE and related foreign subsidiary (Tax Policy Center, 2020).

2.2 Literature review

An extensive literature on MNEs tax planning has explored whether corporations avoid taxes by shifting income from high tax to low tax jurisdiction. Some of the studies focus solely on international companies while others compare the international with domestic companies. The literature review begins with going through general studies of tax avoidance, then reviewing the studies on transfer pricing as a means of tax avoidance.

2.2.1 Tax avoidance

Taxes significantly influence corporate economic decisions as they are a major component of a firm's cash outflows (Dyreng, Hanlon, & Maydew, 2008). Prior research states that tax compliance (and its antonym tax avoidance) are determined by tax rates, the probability of detection and punishment, penalties, and risk-aversion (Allingham & Sandmo, 1972). Furthermore, separation between ownership and control affects the final tax decisions. The managers are acting as agents to reduce the tax liability as long as the incremental benefit doing so exceeds the cost, to fulfil their profit maximation duties. The Board of directors must employ control mechanisms and incentives to minimize the risk of manager making tax decisions that based on their own private interests (Slemrod, 2004, Jensen and Meckling, 1976).

Following the importance of principal agent relation, several tax studies have analysed the effect of incentives on tax avoidance in the foundation of principal-agent theory, finding the tax avoidance increasing as the tax department is treated as profit centre instead of cost centre (Crocker & Slemrod, 2005). Armstrong (2015) instead finds that both outside board representatives and financial sophistication in form of CEO equity incentives, do have negative association with tax avoidance. Desai and Dharmapala (2007) find evidence that tax avoidance is not simply a transfer of resources from state to shareholders. Tax avoidance also impacts firm value, by acting as a function of governance. This implies that in a case of good governance, tax avoidance increases firm value, while in the hands of bad management, tax avoidance is reducing the firm value. In line with this, a study on the shareholder-manager relation by Khurana, Moser and Raman (2018) confirm that in companies with highly skilled management, tax avoidance increases the firm value for shareholders.

The principal agent relation can be extended to cover the moral ethics of the agent. Addison and Mueller (2015) discursive study circles around question, whether forms without spirit are behind the tax avoidance, the dark side of accounting profession. Additional philosophical study focuses on individual's morality in relation to tax avoidance (West, 2016). West (2016) discusses how focus on 'substance over form' will assist in diminishing the phenomena of tax avoidance. More traditional quantitative studies in CSR arena are also plenty. For example, Watson (2015), consider CSR as determinant for tax avoidance. He argues that greater CSR performance is associated with less tax avoidance in companies with good earnings performance. On the other hand, firms with lower current and future profits tend to engage more in tax avoidance activities. This means earnings performance has a moderating effect on the level on tax avoidance in existence of CSR reporting. In similar vein, Hasan, Hoi, Wu, Chang (2017) demonstrates a negative relation between Social Capital, civic norms and corporate tax avoidance. The presence of social capital and civic norms reduces tax avoidance. The differences between effective tax rates and book-tax differences were lower in companies with stronger civic norms and social networks. The relation was significant even when controlled for religious adherence, which could have affected the tax choices of managers in the companies. Similarly, Lanis, Richardson and Taylor (2019) determine that companies with higher moral ethics tend to be less aggressive what it comes to transfer pricing. This means companies with high scores in moral ethics avoid taxes in less grade than companies with lower score in moral ethics.

While the above studies were conducted in one country only, Gonzales, Martinez-Ferrero, Garcia-Meca (2018) increase the studied countries to 28. Their results show that while CSR activity generally is related with less tax avoidance, the relation is opposite in the family owned companies. While family owned companies show higher social and environmental performance, they also avoid more taxes, (Gonzalez et al, 2018). This result is contradictory to that family owned firms generally avoid taxes in less degree than other firms (Chen et al, 2010). Gonzales et al (2018) findings are inconsistent with Zeng (2019) and Mao (2019) both finding that CSR reporting is associated with lower ETR, and as such positively associated with tax avoidance. Zeng (2019) does include interesting macroeconomic factor as control variable. As country-level governance is low, the high CSR is related with lower levels of tax avoidance. Additional moderating effect on the relation between CSR and tax avoidance was investigated by Lanis and Richardson (2018).

They find evidence that presence of outside directors amplifies the negative relation between CSR performance and tax aggressiveness.

Moving from CSR to other determinants of tax avoidance, size, profitability and multinationality have been in limelight as studying tax avoidance. Rego (2003) declares that MNEs do possess economies of scale for tax planning, yet larger companies having higher ETR. Firms with greater pre-tax income, on the other hand, have lower effective tax rates, the negative relation being consistent with the anticipation that more profitable companies do have higher incentive and resources to employ tax planning. Rego (2003) provides detailed analysis for that MNEs are able to avoid income taxes that domestic-only companies cannot, leading to lower ETR for the MNEs. Finér and Ylönen (2015) do provide examples of the forms of that tax avoidance can, demonstrating seven different tax avoidance techniques in their case study. Finér and Ylönen (2015) are additionally critical to remaining tax avoidance studies, arguing that the date used is not reliable enough. The usual ETR measure is not capturing the tax avoidance that is mainly based on using tax incentives and creatively interpreting the international tax law. Their case study demonstrates, how large profitable mining company with Canadian ultimate parent manage to keep low worldwide taxation. This was obtained due to benefitting from loopholes in tax law and using complicated company structure, which allowed moving profits untaxed.

An additional stream of tax avoidance studies focuses on the long-term measures in contrast to yearly observations of tax avoidance. While yearly tax avoidance may include nonrecurring items, studying the data over longer period smoothens the effect of these one-off transactions and thus give more reliable picture of the situation. Dyreng, Hanlow and Maydew (2008) create a format to study long term tax avoidance by including balance sheet items that would not be possible to be included in short term tax avoidance studies, thus creating more trustworthy results. Dyreng et al (2018) proves that while many companies may show evidence of tax avoidance in one year, only one fourth of the companies manage to avoid taxes in ten consecutive years. Dyreng, Hanlow Maydew Thornock (2017) continue studying the long-term tax avoidance by extending data studied to 25 years period. They claim that ETR has decreased at same pace for both domestic and international companies in the US. Contrary to findings of Dyreng et al (2017), Chyz et al. (2014) finds that ETR is decreasing faster for MNEs compared to domestic companies. This is due the

effect of implicit taxes, which implies taxation that is not paid to state. Hence implicit taxation is not part of the corporate nor federal taxes in the financial statements. Instead it is included to the costs for the year. Implicit taxation, especially in form of tax credits, is according to Chyz et al (2014) thus giving the MNEs unfair advantage. Also inspired by Dyreng et al (2017), Drake, Hamilton and Lusch (2020) identify that sources for diminishing ETR are implicit taxes. Their results suggest that in domestic companies the observed avoidance of tax is not result of intentional tax avoidance but history of losses and changes to tax laws.

Finally, some jurisdictions have country specific issues that gain special attention as it comes to tax avoidance. The US taxation has been studied in respect to its former tax ruling, stating that in US headquartered MNEs all international income is to be taxed either directly or at repatriation (Mutti, 2006). This ruling has been bypassed by creating hybrid organizations', which act as individual subsidiaries in a low tax legislation, while considered as a branch for US taxation. This has allowed the foreign corporations to generate income in foreign affiliates without taxing the income in US (Mutti, 2006). Many studies regarding tax avoidance control for tax havens, countries with low or non-existing corporate tax rate. According to Kutera (2018) General Electric managed to reduce their ETR to 6,7 %, instead of nominal tax rate of 35 %, followed by use of tax havens. Furthermore, some of the companies have as many as 258 offshore companies in the tax havens, in most cases not having any operations but existing for tax purposes (Kutera, 2018).

2.2.2 Transfer pricing

Transfer pricing is a form of tax avoidance only available for MNEs. As this is one of the most used tax avoidance methods, this chapter goes through prior studies related to this specific method of tax avoidance. As stated before, transfer pricing is seen as an act of organizing intra-firm transactions in such a manner that most of the profit is made in a low tax legislation lowering the worldwide effective tax rate of the MNE (Richardson, Taylor & Lanis, 2013).

Tax avoidance resulting from intra-firm transactions is established to be both statistically and economically significant in OECD (Bartelsman and Beetsma, 2003). Tightening the transfer pricing framework does however effectively reduce the profit shifting, though consideration need to be given to both regulation strictness and reinforcement method (Marques and Pinho, 2016).

The study in European countries moreover highlighted that the brought forward tax losses is an incentive for profit shifting.

In contrast to most transfer pricing studies, Klassen, Lisowsky and Mescall (2017), interview tax directors, rather than use databases or sending a survey. Klassen et.al (2017) identify that the companies focusing on tax minimization in their transfer pricing planning tend to be private, international, engage in more R&D and spend more budget on tax planning. Furthermore, features of companies shifting income out of US were studied by Mills and Stomberg (2019). Their study finds that income shifting in form of intercompany gross payments is done by smaller companies in high-tech industry. Using IRS data to develop a firm year measure of income shifting, Mills and Stomberg (2019) illustrate that contrary to general belief of MNEs shifting income out of the country, there are actually more intercompany payments flowing into US rather than out of the country.

To facilitate tax authorities in allocating funds in right type of tax audits, Richardson, Taylor and Lanis (2013) studied the potential determinants of transfer pricing. Their study indicates that determinants of transfer pricing: size, profitability, leverage, intangible assets and degree of multinationalism. The direction of the impact is listed in the below table. (Table 2). This means tax authorities can, at least in Australia, add more focus on the companies with above features while investigating potential tax fraud cases.

The determinants are tested in different contexts Dinca and Fitriana (2019), Waworuntu and Hadisapurtra (2016) and Nguyen, Nguyen and Doan (2018) and the results are presented in the Figure 2. Some of these replication studies were however published in journals of low academic ranking, hence of doubtful reliability.

Determinants/Author	TAXH	INTAN	SIZE	PROF	LEV	MULTIN	OUTSB
Richardson et al (2013)	none	+	+	+	+	+	
Dinca & Fitriana (2019)		none					-
Waworuntu & Hadisapurtra (2016)		-	+	-	+	-	
Nguyen et al (2018)		-	+	-	+	+	

Table 2- Results of studies of major determinants for transfer pricing aggressiveness

In light of above studies, knowledge of transfer pricing is of relevance in tax avoidance study, it being the main tool of MNEs to impact their worldwide ETR. However, some transfer pricing agreements are of long-term nature, and can thus not affect with even two years notice of the tax rate cut. Followed by this, not full effect of potentially reduced transfer pricing aggressiveness can be expected to be reflected in studied tax avoidance measures.

2.3 Hypothesis development

The tax rate cut as part of tax reform legislation enacted on 22 December 2017 (P.L. 115-97, PWC) the impact of this reform on tax avoidance is of our interest to study. Followed by the tax rate cut US corporate tax rate is lower than global average, and slightly over average as including the federal tax rate present in many of the US states.

The tax rate cut of this magnitude has direct impact on profitability, as the tax cost is reduced. As the tax rate was of sudden nature, companies could not prepare for this. International companies do have greater opportunities and incentives in shifting income from high-tax legislations to low-tax legislations as they can exploit variations in tax rules in different countries (Slemrod, 2001, Rego, 2003). As the reduced income tax is reflected in increased post tax revenues, reducing international tax rate is beneficial for any MNE and acts as incentive for income shifting. Applying this knowledge to US, given that US prior to tax rate reform had the fourth largest corporate income tax, it is assumable that the MNEs pre-tax cut reduced the income tax via shifting income to foreign subsidiaries with lower taxation. Thus, MNEs should have had, pre-reform, lower ETR than domestic companies. To test this, we form the following hypothesis.

Hypothesis 1: The internationality is associated with lower ETR prior to tax reform – the international companies have lower ETR in 2017

Following the tax rate cut, MNEs that in the past shifted income to other countries have reduced incentive to do so. The cost of shifting may exceed the benefit, as the tax rate differentials are reduced. This should be reflected in reduced income shifting and reduced tax avoidance. The domestic companies studied in our study do not face the same lost incentive to shift income as MNEs, as they never had it in the first place. Domestic companies however can use other forms

techniques of tax avoidance. As the tax rate is reduced, the incentive to use these techniques is diminished. Thus, it is assumed that change in observed tax avoidance do result in reduced tax avoidance in domestic companies.

A prior study of similar characteristics, drastic tax rate cut, by Dobbins and Jacob (2016), found that a nominal tax cut was effectively smaller for foreign owned multinational firms than for companies with domestic ultimate parent. The domestic companies benefitted of the reform more than foreign owned companies, by substituting tax payments with real investments. This applied especially to smaller companies with better investment and growth potential. Applying the above findings to our study, we form our second hypothesis.

Hypothesis 2: Tax avoidance diminish in both domestic and MNEs following the tax rate cut but more in the MNEs than in domestic companies

The prior research suggest that several aspects can affect MNEs and domestic companies differently. Therefore, we form separate hypothesis to test whether these variables significantly affect the ETR in the observed companies.

According to Manzon and Plesko (2002) profitable firms make better use of tax deductions, credits and exemptions leading to greater book tax differences while Rego (2003) argue that higher profits give both higher resources and incentives for tax avoidance and shows evidence for multinational corporations with greater pre-tax income to have lower ETR. Mackie (1999) claims that profitability is prerequisite for being able to take advantage of NOL carryovers. Mutti and Grubert (2007) show evidence that larger MNEs engage in schemes for transferring profits to low tax jurisdiction and then expense large royalty fees to high-tax entities to further lower the worldwide ETR. Klassen et al (2017) show positive correlation between ETR and profitability.

Hypothesis 3: The profitability in MNEs has negative association with ETR – the companies with higher pre-tax income have lower ETR

MNEs avoid taxes more via transfer pricing when they possess higher degree of intangible assets (Richardson et al, 2013). This is due to difficulty of applying a 'fair' price on intangibles and thus companies may misprice these assets and thus avoid taxes. The OECD Model Tax Convention and the OECD Transfer Pricing guidelines recommend the use of the 'arm's length principle', however it is difficult to apply this on intangible assets which often do not have comparable outside the firm (Bartelsman & Beetsma, 2003). Furthermore, Richardson et al (2013) explains that tax benefits of intangibles vary between jurisdictions, hence transfer of intangible assets may lead to tax avoidance. Klassen et al (2017) infer negative correlation with ETR and intangibles, alike Simone et al. (2019) finding intangible assets facilitating income shifting. Therefore we form our fourth hypothesis in following way.

Hypothesis 4: The intangible intensity in MNEs is negatively associated with ETR – MNEs with higher intangible intensity will have lower ETR

The financing structure of affiliates affects the tax burden of MNEs. In high tax countries debt financing is more attractive than in other countries (Bartelsman & Beetsma, 2003; Rego, 2003; Dyreng et al, 2008). Vandebussche and Tan (2005) find evidence that debt financing is associated with lower ETR in Belgium, while Waworuntu and Hadisaputra (2016) infer the same for Indonesia. Thus, the use of debt as a source of capital effectively a means of diminishing tax liabilities. Prior studies in tax rate cut have estimated the effect of rate cut on other financial measures, such as leverage and capital structure (Overesch & Voeller, 2010), finding that smaller companies respond more into the change in tax benefit of debt. Furthermore, thin capitalization, engagement in cross-border intercompany loans and related party loans are techniques available for and actively used by MNEs to increase leverage in the high tax country (De Simone et al, 2019).

Hypothesis 5: The leverage in MNEs is associated with lower ETR – the MNEs with larger leverage do have lower ETR

3 Method

In this chapter the research design is explained, followed by presentation of sampling and data collection. Thereafter the variables studied are explained and further connected to the regression model. An additional regression model for interaction test is thereafter explained. Finally, the study validity and reliability are discussed.

3.1 Research design

As a decision to how the study is to be shaped, this paper selects an exploratory research design approach, which answers to ‘why’ something occurs rather than explaining ‘what’ occurs, as in descriptive design. Research design functions as a plan on how to achieve the wanted results in most efficient way.

This study applied longitudinal panel design, collecting data for same sample for two point in time for two different groups before and after an intervention, a tax rate cut. This allows for investigating relationship between several variables and comparing change on dependent variable for each group separately, and the difference in between these changes.

The longitudinal design is often associated with the methodological approach of collecting either primary or secondary data, in either nominal, ordinal, interval or ratio measurement scales. This study is based on historic secondary data in ratio and nominal scale with matched observations, so that sample quantity in panels remains equal in both observations. Unlike usual simple longitudinal design, the dataset is divided in to two groups, however just like in simple longitudinal design, all the observations are affected by intervention. Table 3 explains how the longitudinal cross-sectional research design uses non-random grouping, pre-test, both groups intervened by the tax rate cut, hence fits our study aim.

Method of allocation to groups	Pre-test	Intervention	Post-test
non-random	observation of Y	‘treatment’	observation of Y
non-random	observation of Y	‘treatment’	observation of Y

Table 3 - The longitudinal cross-sectional research design

de Vaus (2001)

The test approach used in this study is called a Difference-in-Difference model (DiD) based on Dobbins and Jacob (2016) and Wan and Zhu (2011). According to Roberts and Whited (2012) a DiD model is used to capture treatment effects from changes in the surrounding environment. In the case of our sample of companies the treatment will in this case be the tax reduction of 2018. The DiD approach aims at simulating a controlled experiment despite using observation data. The way this is done is by computing difference-in-difference estimates and comparing the results between two groups to capture the treatment effects. In this study, that translates to comparing the change in ETR/current tax rate resulting from the tax reduction between domestic and multinational companies, implying that all companies do get the treatment. Usually two-dimensional Difference-test would be enough to capture effect of treatment as all observations are treated. However, as it is argued that there is difference between the studied groups, DiD method can be used.

According to Roberts and Whited (2012), a DiD model mitigates some problems of endogeneity, which is referring to correlation between independent variables and the error term. An example of an endogeneity problem is the problem of omitted variables, meaning an important variable is excluded from the regression model. This is captured by the error term, however, if the excluded variable correlates with included variables so will the error term. Running a regression, the error term is assumed to not correlate resulting in an incorrect model. The DiD model mitigates these issues by comparing two groups at two different points in time, thereby capturing effects of a control group.

3.2 Sampling and Data Collection

The data used and analysed in this paper was obtained using Thomson Reuters Eikon. Financial data from year-end 2017 and 2019 was collected to capture data representing both post and prior the investigated tax reduction which took place in 2018. Since the study focus on tax reduction in USA only financial information from American companies were collected. Due to limitations in the database, financial data could only be presented and exported for a maximum of 5000 companies. To overcome this limitation the conducted study is limited to companies on the S&P 1000 index. This results in a sample consisting of specially chosen companies; hence this study is

based on a non-probability data sample. This might impact the level of generalization in the test results (Bryman & Bell, 2015). Despite this limitation the choice to continue use of Thomson Reuters Eikon was made due to the fact that the database automatically sorts away companies missing relevant data needed for the study. Using Eikon the number of companies was reduced from 1006 to 330 for 2017 and 508 for 2019.

Steps	2017	2019
Initial Sample (S&P 1000)	1006	1006
Less: Non-profitable companies and observations with missing data in studied variables	- 676	- 498
Remaining	330	508
Less: Companies not listed both years & Banks	- 88	- 266
Final dataset	242	242

Table 4 – Data sorting process

Following this step, remaining companies were sorted to ensure the same companies were included for both 2017 and 2019. Prior studies on tax avoidance excluded the banking sector due to different tax regulation applying for this sector, hence, we chose to remove them in our study as well. Worth mentioning as well is the fact only companies with a pre-tax profit >0 were included in our data sample. Since, companies making losses do not pay any tax there would be no way to measure their ETR, hence is why they were excluded.

Prior analysis, the data was analysed for potential outliers and influential values. Outliers causes either very high or very low values on residual and impacts the regression line. Causes of outliers can be omitting interaction effects or incorrect data. The data included outliers in regard to some observations of ETR. The ETR should only take values between 0 and 1 as it describes the tax percentage (Zeng, 2019). Due to not being able to obtain tax accounting values for the profit of the year, the ETR observed is a combination of commercial accounting and tax accounting results. ETRs above 1 can be the result of tax fines that a firm must pay with respect to profits of previous years (Vandenbussche & Tan, 2005). Therefore the ETR observations may take values of >1 and <0 . The cleaning of outliers was done by truncation adjusting the extreme values of >1 and <0 , so

they will not have impact on the regression. Values less 0 were replaced by 0 and values over 1 replaced with 1. This was the last step in the data collection and preparation for the study.

As a result of following this procedure the remaining companies together represents a panel dataset consisting of 243 companies. A panel dataset is a set of data containing both cross-sectional and time series elements. This translates into a possibility of using the data to test for more complex research problems compared to if the dataset only had pure time series or cross-sectional data. When dealing with panel data one can have two types of datasets, balanced and unbalanced. This study uses a balanced panel dataset which means that it contains the same number of cross-sectional units for each point in time (Brooks, 2014).

3.3 Preparation of variables

3.3.1 Dependent variables

This study uses three measures of effective tax rate (ETR) as dependent variables. The ETR measures used are all described in the article by Hanlon and Heitzman (2010).

GAAP ETR is the first measure and it is calculated by dividing the total income tax expense by pre-tax income (Hanlon & Heitzman, 2010). This measure captures tax deferring strategies such as accelerated depreciations since it takes into account both current and deferred taxes (Dyreng, 2008). However, the cash effective events such as employee stock options are not reflected in GAAP ETR, (Dyreng, 2018)

$$GAAP\ ETR = \frac{\textit{Worldwide total income tax expense}}{\textit{Worldwide pre - tax accounting income}}$$

The second measure, cash ETR does not get altered by tax deferring strategies. This ETR is calculated by dividing cash taxes paid by pre-tax income. In this way, cash ETR is not influenced by changes in tax accounting accruals (Hanlon & Heitzman, 2010). In the other hand, for short period cash taxes is imperfect measure as it includes payments to and refunds from IRS upon settling tax disputes. However, the measure account for cash effective events not reflected in GAAP ETR, such as employee stock options (Dyreng, 2018)

$$\text{Cash ETR} = \frac{\text{Worldwide cash taxes paid}}{\text{Worldwide pre - tax accounting income}}$$

3.3.2 Variables

The regression model tests and controls for several firm-level control variables. Additionally, the model tests for some variables, as per hypothesis. The control and test variables and their characteristics that facilitate income shifting and tax avoidance are described in the next section. We draw on past literature (Richardson et al, 2013, Klassen et al, 2017, Dyreng et al, 2008, Rego, 2003) to identify several firm-level control variables, which include profitability, intangible intensity, firm size, leverage, ESG score (Environmental, Social and Governance) and growth, internationality and year.

Profitability ROA

According to Manzon and Plesko (2002) profitable firms make better use of tax deductions, credits and exemptions leading to greater book tax differences while Rego (2003) argue that higher profits give both higher resources and incentives for tax avoidance and shows evidence for multinational corporations with greater pre-tax income to have lower ETR. Mackie (1999) claims that profitability is prerequisite for being able to take advantage of NOL carryovers. Mutti and Grubert (2007) show evidence that larger MNEs engage in schemes for transferring profits to low tax jurisdiction and then expense large royalty fees to high-tax entities to further lower the worldwide ETR. Klassen et al (2017) show positive correlation between ETR and profitability. Profitability in form of ROA, measured as pre-tax profit on asset is therefor included as test variable in this study.

Intangible intensity

Companies avoid taxes more via transfer pricing as they possess higher degree of intangible assets (Richardson et al, 2013). This is due to difficulty of applying a 'fair' price on intangibles and thus companies may misprice these assets and thus avoid taxes. The OECD Model Tax Convention and the OECD Transfer Pricing guidelines recommend the use of the 'arm's length principle', however it is difficult to apply this on intangible assets which often do not have comparable outside the firm (Bartelsman and Beetsma, 2003). Furthermore, Richardson et al (2013) explains that tax benefits of intangibles vary between jurisdictions, hence transfer of intangible assets may lead to tax avoidance. Richardson et al study has been replicated by several authors, finding opposing results. While Waworuntu and Hadisaputra (2016) and (Nguyen, Nguyen and Doan, 2018) confirm Richardson et al (2013) results, Dinca and Fitriana (2019) reject intangibles driving tax avoidance. Without replicating Richardson et al (2013) Klassen et al (2017) infer negative correlation with ETR and intangibles, alike Simone et al. (2019) finding intangible assets facilitating income shifting. The intangibles intensity is measured as net intangibles (net of amortizations) as a function of assets and is used as a test variable.

Leverage D/A

The financing structure of affiliates affects the tax burden of MNEs. In high tax countries debt financing is more attractive than in other countries (Bartelsman & Beetsma, 2003, Rego, 2003, Dyreng et al, 2008). Vandenbussche and Tan (2005) find evidence that debt financing is associated with lower ETR in Belgium, while Waworuntu and Hadisaputra (2016) infer the same for Indonesia. Thus, the use of debt as a source of capital effectively a means of diminishing tax liabilities. Prior studies in tax rate cut have estimated the effect of rate cut on other financial measures, such as leverage and capital structure (Overesch & Voeller, 2010), finding that smaller companies respond more into the change in tax benefit of debt. Furthermore, thin capitalization, engagement in cross-border intercompany loans and related party loans are techniques available for and actively used by MNEs to increase leverage in the high tax country (De Simone et al, 2019). Leverage is therefore considered as important control variable in this study and is measured as long-term debt divided by total assets.

Growth

Prior studies find that performance growth has mediating effect between tax avoidance and firm value, increasing the firm value as the tax avoidance leads to increase of performance (Zhang, Rasiah, Cheong, 2016). Watson (2015), on the other hand, finds that performance does have moderating effect between CSR reporting and tax avoidance, high performance diminishing the level of tax avoidance in companies that provide CSR reporting. According to Rego (2003) performance growth will increase the incentive to engage in tax planning. The prior research is suggesting that performance leads to incentive for tax avoidance. Performance growth can be measured as growth in assets (Drucker, 1954). Therefore, we have included a growth measure in regard to company size being a two-year growth in total assets.

Firm size

Larger corporations have more business activities and thus have more options to engage in tax planning (Rego, 2003). Followed by the size there is in the other hand lower cost of tax planning per tax transaction (Mills et al 1998). The size is, nonetheless, followed by increasing political cost of tax avoidance. The prior research shows that larger companies do have higher ETR, thus not engaging in tax avoidance in the same extent than smaller companies (Rego, 2003, Vandebussche & Tan (2005). In this study firm size is determined by the natural logarithm of total assets and included as control variable.

ESG score

Hasan, Hoi, Wu, Chang (2017) show negative relation between the Social Capital and civic norms on corporate tax avoidance in counties of USA. Watson (2015) instead find earnings performance having a moderating effect on the level on tax avoidance in existence of CSR reporting. He suggests, CSR performance is associated with less tax avoidance in companies with good earnings performance. Then again in firms with lower current and future profits CSR reporting is associated with higher levels in tax avoidance. Gonzales, Martinez-Ferrero, Garcia-Meca (2018) infer that in family firms CSR performance is positively associated with tax avoidance while CSR performance in general is negatively associated with tax avoidance. Zeng (2019), however, use data of 35 countries and infer that on average CSR is positively related to tax avoidance. While Zeng does include country-level governance as a control variable, he finds that if the country-level is low the high CSR is related with lower levels of tax avoidance. Furthermore, Lanis, Richardson and Taylor

(2019) adds on the CSR themed transfer pricing and tax avoidance studies by reporting that companies with higher moral ethics tend to be less aggressive what it comes to transfer pricing, meaning they avoid taxes in less grade than companies with lower score in moral ethics. For the above reasons ESG score is considered as important control variable for this study. The measure is retrieved from Thomson Reuters Eikon and is an overall score based on sustainability engagement reported by the companies themselves.

Year

The year which the above variables refer to. This is either 0 for the year before US corporate tax reform, 2017, or 1 for the year after the US corporate tax reform, 2019.

Group

Measured as MNE in case the company reports foreign source income tax in Eikon for the years 2017 and 2019, otherwise Domestic (0 = Domestic and 1 = MNE)

DD estimator

When performing a DiD regression analysis, coefficient of interest is called the DD-estimator. This dummy variable is the product of two other dummy's representing, in our study, both different points in time and different company groups. By analysing the DD-estimator we capture the change in ETR from 2017 to 2019 in MNEs relative to domestic companies. This allows for a more in-depth analysis compared to studying only one group over time or just comparing the two groups to each other at one point in time.

In our regression the DD-estimator is called Year*Group and is the product of the dummy variables Year (0 = 2017, 1 = 2019) and Group (0 = Domestic and 1 = MNE).

3.4 Final specification of the regression

The research approach and prior theory are combined in the regression specification. The model consists of several variables, wherefor the result is included in the term β_1 , which represents the DD estimator and captures the effect of tax cut on MNE relative to domestic companies. The

second most important variable, β_2 , captures the differences between MNE and domestic companies while β_3 captures the trend shared by MNE and domestic companies. β_0 is the constant. To capture the time effect, p is used as the post-treatment indicator which is equal to one in the year after the tax change and zero in the year before the tax change. To capture the permanent differences between groups, d is used, 1 for MNEs and 0 for domestics.

The basic Difference-In-Difference model is thus as below:

$$ETR = \beta_0 + \beta_1 * Year * Group + \beta_2 * Year + \beta_3 * Group$$

Additionally, several control variables are included to the regression: $\delta_1 * Intangibles$, $\delta_2 * Leverage$ D/E, $\delta_3 * ROA$, $\delta_4 * CSR$ score, $\delta_5 * Size$. As a last variable, the regression includes the error term, u , capturing the residuals in the regression.

The final model specification is thus:

$$ETR = \beta_0 + \beta_1 * Year * Group + \beta_2 * Year + \beta_3 * Group + \delta_1 * Intangibles + \delta_2 * Leverage + \delta_3 * ROA + \delta_4 * ESGScore + \delta_5 * Size + u$$

The regression significance test is based on assumption that both groups diminish their ETR. Therefore we use one-sided t-test for the main regression analyses. The output statistics are based on two-sided test and these are converted into one sided significance.

3.5 Extended DiD regression using ROA as a test variable

The prior theory indicates that tax avoidance may differ between MNEs and domestic companies. Therefore, additional tests on these interaction terms were conducted. The variables tested were ROA, Intangible intensity and Leverage.

The initial DiD were adjusted to capture the interaction term by modifying the model to include three additional variables to capture the interaction on the tested variable. The additional variables are capturing the effect of the tested variable on the tax avoidance. For example, as tested variable

is ROA, the additional variables are as follows: $\beta_4*Group*ROA$, $\beta_5*Year*ROA$, and $\beta_6*Group*Year*ROA$. We investigate whether the coefficient of the interaction term $\beta_6*Group*Year*ROA$ is significantly different from 0.

The regression for ROA is thus:

$$ETR = \beta_0 + \beta_1*Year*Group + \beta_2*Year + \beta_3*Group + \beta_4*Group*ROA + \beta_5*Year*ROA + \beta_6*Group*Year*ROA + \delta_1*Intangibles + \delta_2*Leverage + \delta_3*ROA + \delta_4*ESGScore + \delta_5*Size + u$$

The regression model for Intangibles is as follows:

$$ETR = \beta_0 + \beta_1*Year*Group + \beta_2*Year + \beta_3*Group + \beta_4*Group*Intangibles + \beta_5*Year*Intangibles + \beta_6*Group*Year*Intangibles + \delta_1*Intangibles + \delta_2*Leverage + \delta_3*ROA + \delta_4*ESGScore + \delta_5*Size + u$$

Finally, the regression model for Leverage is as below:

$$ETR = \beta_0 + \beta_1*Year*Group + \beta_2*Year + \beta_3*Group + \beta_4*Group*Leverage + \beta_5*Year*Leverage + \beta_6*Group*Year*Leverage + \delta_1*Intangibles + \delta_2*Leverage + \delta_3*ROA + \delta_4*ESGScore + \delta_5*Size + u$$

3.6 Validity and reliability of the model

Validity as a concept assess whether the study is valid, while reliability considers whether the study is repeatable. These aspects can further be divided into internal and external and assessed in research design and measure level. The next section considers the research design validity and methodological validity and reliability of the study both internal and external sense.

Validity ensures that the indicator used to measure a concept actually does it in a valid manner. Internal validity of research design refers to whether research design can sustain the causal conclusions that is claimed for it (de Vaus, 2001). Potential issues with internal validity of the model measures is specification error. In regards the dependent variable, a severe measurement error may lay in the way the ETR is calculated based on two different sets of accounting data. While the cash taxes paid is based on tax accounting, the profit that this related to is derived from accounting data. However, using such a measure is praxis in tax avoidance studies as no better measure is available. When it comes to the independent variables, this study omitted several factors

that could have affected the dependent variable, such as: maturation, economic trends, company liquidations. Endogeneity problems related to specification error implies that one of the independent variables is correlated with the error term, as important explanatory variables are omitted. In this paper, there is potential endogeneity of tax avoidance activity. For example, firms that are performing worse for other reasons may be more likely to engage in tax avoidance (Desai and Dharmapala, 2009). However, as this study sample includes profitable companies only and these are additionally controlled for profitability, thus relative performance is not concern for endogeneity issues. Another common way to deal with endogeneity in research based on observational data is to lag independent explanatory variables in an effort to minimise their correlation with the error term. However, research on the topic has provided evidence that this method rarely solves endogeneity problems in a dataset (Bellemare et al, 2015). Hence, we have decided not to lag our explanatory variables for this study.

Internal validity was assured in the measures included in the study as the study is using historic panel data obtained from secondary sources, Eikon, at single time point, consisting of established financial measures. Thus, the panel conditioning, instrumentation and measurement errors are regarded as not causing validity issues.

The external validity of research design refers to the extent to which results from a study can be generalized, most common threat being use of unrepresentative samples. In this paper the sample used reflected the population. Furthermore, validity in this study can be assessed on level of construct validity. Construct validity describes how well the results fit with theoretical expectations. If measures to test theories are poorly chosen, the conclusions drawn upon the test results are not valid. This study's research aim and hypotheses are based on findings of existing research and literature. The results not confirm prior research in statistical significance level; however, we argue that construct validity is obtained, and the insignificance is due to small sample size and short time period studied (de Vaus, 2001).

Reliability of the research measures refers to the repeatability of the results (de Vaus, 2001). Potential sources of issue with reliability are measurement errors (de Vaus, 2001), high confidence interval in central tendency and multicollinearity (Edling and Hedström, 2003). The measurement

errors can further be divided into three groups: random, constant and correlated. Of these errors random error does not affect the normal distribution while the constant and correlated errors do have effect on the statistical validity (de Vaus, 2001). Again, as the data is obtained from reliable sources, or constructed from these using established methods as in case of leverage and intangible ratios, neither constant nor correlated errors should exist. Confidence interval of central tendency was assessed at statistical data analysis, like with multicollinearity, and these measures meet established expectations for reasonable reliability. While some multicollinearity does exist, according Edling and Hedström (2003) to this do not affect the predictive ability of the model. Regarding the sorting and removal of company data not meeting the study criteria, this was to a larger extent done directly in the database to minimize influence of the human factor. Final sorting was done manually using Microsoft excel following a structured working process to reduce the risk of data being wrongfully deleted. However, fault resulting from the human factor involved in this process might have implications for the research result.

Other aspects that needs to be highlighted in regards internal validity is the use of a DiD regression approach. Normally, the basis of a Difference-in-Difference regression assumes comparison of change in dependent variable in two groups with only one of them receiving the studied intervention. This is not the case in this particular study. Since the aim is to compare the tax reductions influence on domestic and multinational companies, both groups in our test is target for the intervention, meaning no untreated control group exists. However, since empirical evidence suggests there should be a difference in reaction to the tax reduction between these two groups, a DiD approach will manage to capture this difference and thereby it remains the most appropriate statistical test for this study.

4 Empirical results and analysis

This chapter presents the results of the statistical tests. Starting by introducing descriptive statistics of the data material and responding to hypothesis 1. Following this, our DiD regression results are presented, analysed and discussed in the light of prior research in order to address and answer the stated hypotheses 2. The chapter ends with further DiD regression test with interaction term to address the hypothesis 3, 4 and 5.

4.1 Descriptive statistics

The first step in the analysis is a review of descriptive statistics, which allow numerical description of the variables (Saunders et al., 2016). Therefore, in order to provide a comprehensive overview of the variables included in the DiD model, tables 5, 6 and 7 provides descriptive statistics of the data material.

This section first provides statistics on the studied points in time, prior and post the tax rate cut. Following this, the statistics are broken down into presenting numbers on the data material divided on both time and data groups. This approach does not only provide valuable insights on the data material, it also presents an opportunity to identify information of relevance to the analysis of test results.

Variable	Total Mean	Std.Dev	2017 Mean	Std.Dev	2019 Mean	Std.Dev
GAAP ETR	.2543	.1343	.2991	.1272	.2095	.1262
Cash ETR	.2533	.1808	.2713	.1769	.2354	.1837
ESG-Score	34.9094	14.9652	33.1852	14.3474	36.6336	15.3956
Int/Assets	.1004	.0932	.0974	.0935	.1033	.0929
LTD/Assets	.2444	.2913	.2420	.2712	.2468	.3107
G-Assets_2Y	.2447	.4528	.1974	.3419	.2920	.5381
ROA	.0954	.0678	.0991	.0698	.0918	.0657
n=242						

Table 5 – Descriptive statistics divided by years

Dividing the data material into prior and post the tax rate cut presents how the included variables changed during the time of interest. Obviously, a tax rate cut will lead to lower tax rates among

companies, which can be observed in the table above. In our sample the tax cut has had largest impact on the GAAP ETR measure. Average Cash ETR was also reduced but not as much. These numbers are based on the entire sample including both purely domestic companies as well as MNEs.

Hypothesis 1: The internationality is associated with lower ETR prior to tax reform – the international companies have lower ETR in 2017

To derive more relevant statistic for the purpose of answering the hypothesis 1 the sample requires further division. Tables 6 and 7 below contains descriptive statistics for all variables included in the DiD test, divided on both year and company type. Additionally, a t-test of comparison of means was conducted to test for statistical significance.

Domestic Variable	2017		2019	
	Mean	Std.Dev	Mean	Std.Dev
GAAP ETR	.3105	.1530	.1935	.1017
Cash ETR	.2830	.2240	.2011	.1775
ESG-Score	26.5295	9.3919	30.3325	12.2387
Int/Assets	.0773	.0982	.0801	.0916
LTD/Assets	.2472	.4073	.2427	.4941
G-Assets_2Y	.3012	.5090	.4246	.8843
ROA	.1054	.0930	.0944	.0775
n=63				

Table 6 – Descriptive statistics, Domestic companies

MNE Variable	2017		2019	
	Mean	Std.Dev	Mean	Std.Dev
GAAP ETR	.2951	.1170	.2151	.1335
Cash ETR	.2671	.1575	.2474	.1848
ESG-Score	35.5278	15.0593	38.8513	15.8033
Int/Assets	.1044	.0910	.1115	.0923
LTD/Assets	.2401	.2043	.2483	.2137
G-Assets_2Y	.1609	.2506	.2453	.3330
ROA	.0969	.0597	.0909	.0613
n=179				

Table 7 – Descriptive statistics, MNEs

In 2017, one year before the tax cut, domestic companies had higher average GAAP ETR and Cash ETR than MNEs. When testing this with a t-test, we find that the difference in Cash ETR is statistically significant. The average difference in GAAP ETR shows no statistical significance. This confirms our first hypotheses, indicating that a difference between domestic companies and MNEs exist prior the tax cut. These results are in line with a finding made by Rego (2003), indicating that MNEs tend to avoid more taxes than purely domestic companies.

One year post the tax cut, in 2019, both groups show reduced average GAAP ETR, with domestic companies presenting the largest reduction and now have lower average GAAP ETR than MNEs. Looking to the second tax measure, Cash ETR, in 2019 a reduction in Cash ETR rates are shown in both groups. Once again, domestic companies present a larger reduction and a lower average rate compared to MNEs.

Studying the proxy for *firm size* it can be stated that both groups on average contains companies of similar size. Neither of the studied groups show any major change in size post the tax cut.

Moving focus towards the *ESG Score*, the statistics show that both domestic and MNEs have improved their overall social responsibility work. However, MNEs perform superior on average compared to domestic companies.

No major change in this measure can be noticed in either of the groups in regards *Intangible assets / Total assets*. However, MNEs have on average a larger portion of intangible assets than domestic companies.

As with previous variable the statistics, *Leverage*, show no major change over time. The average leverage levels are approximately the same for both company groups.

What it comes to, *Growth*, both groups present a larger growth in 2019. However, in both time periods, domestic companies have a growth nearly double the growth presented by MNEs.

The final variable included in our model is *Return on Assets*. Both groups present a slight decrease in ROA from 2017 to 2019. The average returns are nearly equal for both groups, however the domestic companies do have slightly larger average in 2017.

Pearson correlation coefficients

2017	ESG Score	Tot-Assets LN	Int-Assets Ratio	LTD/ Assets	Growth Assets 2Y	ROA
ESG Score	1					
Tot-Assets LN	.305**	1				
Int-Assets Ratio	-.005	-.033	1			
LTD-Assets Ratio	.102	.175**	.191**	1		
Growth Assets 2Y	-.088	-.191**	.270**	-.129*	1	
ROA	.038	-.249**	-.146*	.140*	-.121	1

Table 8 – Pearson Correlation on independent variables 2017

** . Correlation is significant at the 0.01 level

* . Correlation is significant at the 0.05 level

2019	ESG Score	Tot-Assets LN	Int-Assets Ratio	LTD/ Assets	Growth Assets 2Y	ROA
ESG Score	1					
Tot-Assets LN	.282**	1				
Int-Assets Ratio	.063	-.019	1			
LTD-Assets Ratio	.132*	.183**	.201**	1		
Growth Assets 2Y	-.075	.076	.162*	.004	1	
ROA	.010	-.262**	-.078	.229**	-.123	1

Table 9 – Pearson Correlation on independent variables 2019

** . Correlation is significant at the 0.01 level

* . Correlation is significant at the 0.05 level

Multicollinearity is a problem that can have negative impact on the results in a regression test (Edling, 2003). Multicollinearity means that two or more control variables are correlating with each other, making it more difficult to isolate their separate prediction value on the dependent variable, overall weakening the regression model. To control for this, a Pearson correlation test was conducted on the independent variables revealing several significant correlations among our independent variables (see table 8 & 9), both post and prior the tax cut. This will weaken the predictive strength in our regression. However, to properly assess multicollinearity one cannot only assess the significance without taking the strength of the correlation into consideration.

Although, several significant correlations between independent variables exist in our data sample as shown in above tables, none of them can be considered particularly strong given the fact they are fairly close to zero, indicating a weak correlation (Bryman & Bell, 2011). Because of this, the variables are included in the regression model without undergoing any treatment. Hence, we do not expect the correlations to largely interfere with our regression model.

4.2 Results and interpretation

Hypothesis 2: Tax avoidance diminish in both domestic and MNEs following the tax rate cut but more in the MNEs than in domestic companies

DiD Regression	GAAP ETR			Cash ETR		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
S&P1000						
Group	-0.015	0.019	0.409	-0.016	0.026	0.546
Year	-0.117	0.023	0.000	-0.082	0.032	0.011
Year*Group	0.037	0.026	0.159	0.062	0.037	0.096

Table 10 – Difference-in-Difference Regression results

To answer Hypothesis 2 a Difference-in-Difference regression analysis is done to compare change in GAAP ETR and Cash ETR, in domestic relative MNEs one year followed by the US tax reform. Followed by this descriptive analysis are conducted to assess the percentage of tax avoidance in the two groups, and whether the change in ETR essentially lead to diminished tax avoidance. Furthermore, we estimate whether the tax avoidance relative to tax rate of the year is changed, and whether MNEs reduce tax avoidance more than domestic companies one year after the tax reform.

Difference-in-difference regression analysis of Cash ETR and GAAP ETR is shown in table 10. According to our hypothesis GAAP ETR and Cash ETR should significantly decrease following the tax reform in US, but less for MNEs compared to domestics. As it can be seen from the table 10 the difference-in-difference estimator for Cash ETR, the unstandardized beta coefficient is significant at 5 % confidence interval and positive (p-value 0,0505 for one tailed test). That means that relative to domestics, MNEs will have higher Cash ETR one year after a corporate income tax reform.

Looking at our second measure of tax, GAAP ETR, in table 10 it can be seen that the difference-in-difference estimator for the GAAP ETR the unstandardized beta coefficient is significant at 10 % confidence interval (p-value 0,0815 for one tailed test), and it is positive. This means that relative to domestic companies, MNEs have higher GAAP ETR one year following the corporate income tax reform. The test estimated robust standard errors.

The above results stating MNE have higher ETR 1 year after the tax reform may be consist of several reasons. MNEs have operations in subsidiaries in other countries with higher tax rate, and they are unable to change the corporate structure in short run to take advantage of the reduced US tax rate. As it comes to Cash ETR, this may indicate that MNEs have paid taxes related to prior years, as these are reflected in the Cash ETR figure. The results do show that MNEs after tax rate reform have higher ETR relative to domestic companies, being in line with Dyreng et al (2008) longitudinal study in effective tax rates. The outcome is also confirming Dobbins and Jacob (2016) result indicating that domestic companies benefit more of income tax rate cut.

Prior research by Zeng (2019) explains that tax avoidance is the difference between corporate tax rate and ETR. Therefore, to deduct response to our second hypothesis, ETR must be compared to the actual tax rate of the year. From the descriptive data, the below table is therefore created, demonstrating the % of tax companies avoided with the observed mean ETR for each group in each year. Prior the reform, Tax avoidance in MNEs is higher than in Domestic, while one year after the reform Domestic tax avoidance is higher than in MNEs. Moreover, the data shows that Tax avoidance in MNEs decreased as % of tax rate in both GAAP ETR and Cash ETR, by 6 and 25 respectively. Measured as % of tax rate Cash ETR the domestic tax avoidance as well. However, in domestic companies the tax avoidance measured as % of tax rate increased in GAAP ETR by 6.

	MNE	Domestic		MNE	Domestic
GAAP ETR 2017	30	31	Cash ETR 2017	27	28
Tax rate 2017	40	40	Tax rate 2017	40	40
Tax avoidance	10	9	Tax avoidance	13	12
as % of tax rate	26%	22%	as % of tax rate	33%	29%
GAAP ETR 2019	22	19	Cash ETR 2019	25	20
Tax rate 2019	27	27	Tax rate 2019	27	27
Tax avoidance	5	8	Tax avoidance	2	7
Tax avoidance as % of	20%	28%	Tax avoidance as % of	8%	26%
tax rate			tax rate		
Change in tax avoidance	-6	+6	Change in tax avoidance	-25	-4
(percentage)			(percentage)		

Table 11 – Change in Tax Avoidance for Domestic & MNEs

Based on analysis of the descriptive data combined with the regression results the second hypothesis can be confirmed. The MNEs reduce tax avoidance more than domestic companies following the corporate income tax reform.

Interestingly, depending on the ETR rate observed domestic companies either diminish or increase their tax avoidance. Thus, it is clear that the method of obtaining ETR is of importance as interpreting the results. The question is, which of the ETR measures provide more reliable base for calculating tax avoidance. GAAP ETR is based on the total income tax for the year, including the deferred taxes, while Cash ETR considers the actual amount of taxes paid. The cash ETR therefor includes timing difference related to tax disputes, implying prior years taxes are included into the measure. However, this measure includes important cash effective events such as employee stock options, which GAAP ETR systematically ignores and therefor is of importance.

According to Dyreng et al (2008) Cash ETR is better suited to capture tax avoidance on long term, hence the tax avoidance captured by GAAP ETR is of more importance.

Conclusively, according to our sample data the US tax reform MNEs decreased their tax avoidance, relative to the corporate tax rate, domestic companies instead increased their tax avoidance.

DiD Regression	GAAP ETR			Cash ETR		
	Coefficient	Std.Error	p-value	Coefficient	Std.Error	p-value
S&P1000						
Year*Group	0.037	0.026	0.165	0.063	0.037	0.0890*
Group	-0.018	0.019	0.350	-0.026	0.027	0.329
Year	-0.116	0.023	0.000*	-0.084	0.032	0.009
Tot Assets LN	0.006	0.006	0.327	-0.023	0.009	0.009
ESG Score	0.000	0.000	0.502	0.001	0.001	0.053
Int.Assets/Assets	0.036	0.067	0.590	0.021	0.093	0.821
LT Debt/Assets	-0.008	0.022	0.713	0.027	0.030	0.377
Growth Assets 2Y	-0.015	0.013	0.265	-0.021	0.019	0.261
ROA	0.015	0.093	0.327	-0.568	0.130	0.000*

Table 12 – DiD regression including control variables

The basic DiD regression was additionally conducted with several control variables and their significance will be discussed next.

ESG score

ESG score is a measurement of corporate social responsibility and ethics. The prior research suggest that corporate social responsibility actions can be used as marketing purpose (Zang, 2019), while Mao (2019) deduct that CSR reporting is negatively, influencing ETR and thus leading to increased tax avoidance. This can be understood as such that companies gaining good ESG scores are engaging in tax avoidance more than those who do not score well. Some researchers find opposing evidence, claiming corporate social responsibility performance is negatively associated with tax avoidance, good ESG score implying less tax avoidance (Gonzales et al, 2018, Hasan et al, 2017). This is confirmed by Lanis et al (2019). Our results partially support the latter findings, there seem to be negative relation with ESG and tax avoidance.

Table 12 shows that for ESG score in Cash ETR, the unstandardized beta coefficient is significant at 10 % level (p-value 0,053) and positive. Thus, for Cash ETR our results are in line with above mentioned studies, indicating that engaging in more CSR influences ETR. And as a result of that companies engage in less tax avoidance. This could also imply that there is a trend to improve ESG score in marketing purposes, unrelated to tax avoidance, and the tax avoidance is result of other corporate actions, especially the tax rate reform. For GAAP ETR the ESG score is not significant at 10 % level (p-value 0,502 for). As the GAAP ETR is a preferred measure of the two dependent variables, thus, our support for ESG score influencing ETR is not very strong.

Intangible Assets/Assets

Intangible assets intensity is associated with tax avoidance according to prior research (Richardson et al, 2013, Simone et al. 2019, Klassen et al, 2017). This means MNEs are using intangibles as means for avoiding tax via transfer pricing. Table 12 shows that for Intangible Assets /Assets in Cash ETR the unstandardized beta coefficient is not significant at 10 % confidence interval (p-value 0,821). The coefficient for GAAP ETR is neither significant (p-value 0,590).

Leverage – Long-term Debt/Assets

Leverage has subvention in tax. Therefore, in high tax countries debt financing is more attractive than in other countries (Bartelsman & Beetsma, 2003, Rego, 2003, Dyreng et al, 2008). Prior studies find that MNEs have more debt in their high taxed subsidiaries to take advantage of the subventions (De Simone et al, 2019). Following the tax rate cut, the subvention is decreased.

The table 12 shows that for long term debt/assets in Cash ETR the unstandardized beta coefficient is not significant at 10 % confidence interval (p-value 0,377). The coefficient for GAAP ETR is neither significant (p-value 0,713). This means neither of the ETR measures is influenced by the long-term debt/assets variable one year after the US tax reform. The prior research is hence not confirmed.

Size – Total Assets LN

Prior research states that firm size is associated with higher ETR due to political cost which implies that the reducing ETR via tax planning would damage the company reputation (Rego, 2003). This means we expect size to influence ETR positively and therefor look at the one-tailed p-value. The results in table 12 shows that for the Tot Assets LN in Cash ETR, the coefficient is significant at 1% level, (p-value 0,009) and is negative. This would imply size affects ETR negatively. However, as we expected the size to influence ETR positively, the regression results are not in line with prior research. This could be due to the choice of measure of size. Using some other measure of size, such as number of employees, might reflected the size better, especially in knowledge intensive branches depending on people, which are not part of assets in the balance sheet (Carlson, 2014). The reason for results not showing the expected positive influence could also be due to the

influence of other variables, such as profitability, which in interaction with size ought to result in diminished ETR, as per prior research from Rego (2003).

In regards the GAAP ETR table 12 shows that the coefficient for the Tot Assets LN is insignificant (p-value 0,327). Again, as the GAAP ETR is a preferred measure of the two dependent variables, thus, our support for Size influencing ETR is not very strong.

Growth of assets

The growth is related to tax avoidance as companies with higher growth have incentive to report and pay less taxes. Growth may also mean that the company is new in a market and thus can be in the growth stage, with history of losses. As such, the growth as per prior theory is associated with lower ETR (Rego, 2003). The table 12 shows that for the Growth of Assets 2 years in Cash ETR the unstandardized beta coefficient is not significant at 10 % level (p-value 0,261). For GAAP ETR the result is also not significant (p-value 0,265). This means growth do not influence in ETR in the chosen sample. The results are not confirming prior research. The reason could be the choice of the growth measure, as we are using growth in asset instead of growth of sales. Alike the size variable, the size itself could also been measured in some other manner. The measure could reflect the impact of people in knowledge intensive branches (Carlson, 2014).

ROA – Pre-tax Profit/Assets

Profitability is a major incentive for engaging in tax avoidance (Rego, 2003). The profitable companies can also take advantage of all the possible tax deductions that tax regulations allow, hence profitable companies have more options for tax avoidance (Carlson, 2014). Table 12 shows that for ROA in Cash ETR the unstandardized beta coefficient is significant at 1 % confidence interval (p-value 0,00). The ROA thus is influencing the Cash ETR in both domestic companies and MNEs one year following the tax rate reform. Thus, our results are in line with prior research.

The coefficient for GAAP ETR is however not significant (p-value 0,327). Again, as the GAAP ETR is a preferred measure of the two dependent variables, thus, our support for ROA influencing ETR is not very strong.

4.3 Regression analytics and interaction testing

The prior theory indicates that tax avoidance may differ between MNEs and domestic companies. Therefore, additional tests on these interaction terms were conducted. The interaction tests are conducted to show if any significant differences exist between MNEs and domestic companies for the tested variables. The variables tested were, Profitability, Intangible intensity and Leverage. The DiD were adjusted to capture the interaction term by modifying the model to include three additional variables, for each tested variable, to capture the interaction on the tested variable.

In the following, the hypothesis related to the test variables are re-expressed, the results are shown in table format and then discussed through with references to prior theory.

Hypothesis 3: The profitability in MNEs has negative association with ETR – the companies with higher pre-tax income have lower ETR

ROA Interaction	GAAP ETR			Cash ETR		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
Year*Group	0.030	0.044	0.496	0.080	0.060	0.183
Group	-0.007	0.031	0.834	-0.019	0.043	0.670
Year	-0.101	0.036	0.005	-0.047	0.049	0.339
Tot Assets LN	0.006	0.006	0.341	-0.023	0.009	0.008
ESG Score	0.000	0.000	0.486	0.001	0.001	0.065
Int Assets Ratio	0.038	0.067	0.575	0.030	0.093	0.745
LTD Assets Ratio	-0.010	0.023	0.673	0.023	0.032	0.476
Growth Assets 2Y	-0.015	0.014	0.268	-0.023	0.019	0.229
ROA	0.127	0.180	0.480	-0.299	0.249	0.231
YearROA	-0.139	0.276	0.615	-0.349	0.381	0.361
GroupROA	-0.107	0.241	0.658	-0.055	0.334	0.870
Year*GroupROA	0.057	0.356	0.874	-0.232	0.493	0.639

Table 13 – ROA Interaction regression

Profitability of MNE is positively associated with lower ETR, as profitable companies have the means for tax planning, and incentive to do so (Rego, 2003). Manzon and Plesko (2002) explain that profitable international firms make better use of tax deductions, credits and exemptions leading to greater book tax differences. The profitable companies can also fully utilize special tax

deductions, which unprofitable companies cannot, as some tax deductions can only be utilized as there is taxable income from which to deduct it.

In table 13 it can be seen that the interaction term Year*GroupROA for GAAP ETR is not significantly different from 0 (p-value 0,874). For Cash ETR the result is neither significant (p-value 0,639). Therefore, the hypothesis 4 can be rejected. The DiD regression with interaction term suggests that profitability is not significantly influencing the ETR in MNEs relative to domestic companies. This is interesting as ROA is significant at 1% level as control variable in the second model in chapter 4.2. However, these results must be translated taking into account that in this study profitable only companies were included, while the prior studies might have used differing selection criteria, including the nonprofitable companies. As explained above, the non-profitable companies do not have the capacity to take advantage of tax rulings that require taxable profit. Thus, results could be different if including observations with losses.

Hypothesis 4: The intangible intensity in MNEs is negatively associated with ETR – MNEs with higher intangible intensity will have lower ETR

Int. Interaction	GAAP ETR			Cash ETR		
	Coefficient	Std.Error	p-value	Coefficient	Std.Error	p-value
Year*Group	0.04	0.04	0.23	0.05	0.05	0.32
Group	-0.01	0.03	0.64	0.00	0.04	0.93
Year	-0.10	0.03	0.00	-0.05	0.04	0.22
Tot Assets LN	0.01	0.01	0.28	-0.02	0.01	0.01
ESG Score	0.00	0.00	0.50	0.00	0.00	0.06
Int.Assets/Assets	0.22	0.17	0.20	0.38	0.24	0.11
LTD/Assets	-0.01	0.02	0.75	0.03	0.03	0.35
Growth Assets 2Y	-0.02	0.01	0.23	-0.02	0.02	0.20
ROA	0.02	0.09	0.81	-0.56	0.13	0.00
YearINT	-0.20	0.24	0.40	-0.41	0.33	0.22
GroupINT	-0.11	0.20	0.58	-0.32	0.27	0.24
Year*GroupINT	-0.005	0.281	0.985	0.236	0.39	0.545

Table 14 – Int. Interaction regression

MNEs avoid taxes more via transfer pricing when they possess higher degree of intangible assets (Richardson et al, 2013). This is due to difficulty of applying a ‘fair’ price on intangibles and thus

companies may misprice these assets and thus avoid taxes. To test whether the Intangible assets impact ETR of MNEs relative to domestic companies a DiD regression with interaction was administrated. In table 14 it can be seen that the interaction term Year*GroupINT is not significantly different from 0 (p-value 0,985) for GAAP ETR. For Cash ETR the result is insignificant as well (p-value 0.545). Therefore, the hypothesis 5 can be rejected. The DiD regression with interaction term suggests that intangibles are not significantly influencing the ETR in MNEs relative to domestic companies. This could be due to the second and third provision introduced in the US tax reform. The second and third provision includes two additional taxes to set worldwide minimum tax on intangible tax, so that companies would not have incentive to move intangible assets away from US. This can have affected the tax planning in the companies in the way law makers intended, diminishing tax avoidance in US (CPT).

Hypothesis 5: The leverage in MNEs is associated with lower ETR – the MNEs with larger leverage do have lower ETR

Leverage Interaction	GAAP ETR			Cash ETR		
	Coefficient	Std.Error	p-value	Coefficient	Std.Error	p-value
Year*Group	0,04	0,03	0,23	0,07	0,05	0,14
Group	-0,03	0,02	0,23	-0,05	0,03	0,19
Year	-0,12	0,03	0,00	-0,09	0,04	0,02
Tot Assets LN	0,01	0,01	0,46	-0,01	0,01	0,14
ESG Score	0	0	0,484	0,001	0,001	0,143
Int.Assets/Assets	0,02	0,07	0,77	0,06	0,10	0,52
LTD/Assets	-0,04	0,04	0,38	-0,05	0,06	0,36
Growth_Assets_2Y	-0,02	0,01	0,25	-0,02	0,02	0,43
YearLEV	0,03	0,05	0,63	0,03	0,07	0,64
GroupLEV	0,05	0,06	0,42	0,09	0,09	0,31
Year*GroupLEV	-0,02	0,08	0,86	-0,04	0,12	0,76

Table 15 – Leverage Interaction regression

Thin capitalization, engagement in cross-border intercompany loans and related party loans are techniques available for and actively used by MNEs to increase leverage in the high tax country (De Simone et al, 2019). This is due to the leverage functioning as tax shield and the financing structure of affiliates affects the tax burden of MNEs. In studies of MNEs it is concluded that in high tax countries debt financing is more attractive than in other countries (Bartelsman & Beetsma,

2003, Rego, 2003, Dyreng et al, 2008). For example, Vandebussche and Tan (2005) find evidence that debt financing is associated with lower ETR in Belgium, while Waworuntu and Hadisaputra (2016) infer the same for Indonesia. Our DiD interaction tested whether MNEs ETR is influenced by leverage relative to domestic companies. The results can be seen in the table 15.

In table 15 it can be seen that the interaction term Year*GroupLEV for GAAP ETR is not significantly different from 0 (p-value 0,435). For the Cash ETR the result is also insignificant (p-value 0,386). Therefore, the hypothesis 6 can be rejected. The DiD regression with interaction term suggests that firm leverage is not significantly influencing the ETR in MNEs relative to domestic companies. The test results may be differing from prior theory due to lower than usual interest rates on borrowed funds. This could also be due to corporate tax planning – that companies effectively changed their leverage as it no longer served the purpose as tax shield. The tests estimated robust standard errors.

5 Conclusion

5.1 Result discussion

This thesis aimed at finding evidence for whether decrease of corporate tax rate in US in 2018 have had effect on tax avoidance in US companies. Moreover, the paper address whether the effect is similar in both MNEs and domestic companies.

Creating hypotheses based on findings of prior research we used a DiD regression approach to test for them. Furthermore, a set of distinctive factors only affecting MNEs, as per prior research, were tested with additional DiD interaction model.

Our first hypothesis set out to find if any difference in ETR existed in our sample before the tax reform. Findings of previous studies has indicated that MNEs tend to engage in tax avoiding activities to a larger extent than domestic companies resulting in lower measures of ETR. In the light of prior research, MNEs possess greater opportunities of reducing their taxes, for example by transferring intangible assets or profit to a country with lower tax rate. To see if our sample is comparable to prior research, we examined the descriptive data and conducted a t- test on our data material. After studying the statistics, we find that this is the case. The MNEs included in our study had lower average ETR measures compared to the domestic companies before the tax reform. Since the US tax rate where among the highest in the world prior to the reform, the result is not unforeseen. The profits made in countries with much lower tax rates will have an impact on the MNEs US ETR. Having conducted a t-test to assess whether the difference in average ETR is statistically significant we can conclude that this is the case for Cash ETR. The difference, however, is not statistically significant for GAAP ETR. We are thereby fractionally able to confirm our first hypothesis, providing evidence that before the tax cut, MNEs avoided more taxes than domestic companies.

To test our second hypothesis, whether MNEs decrease tax avoidance more than domestic companies followed by the US tax reform, we performed a DiD regression and further examined the descriptive data. The results indicate that the US tax reform had contrasting impact on the studied groups. The DiD result shows that with statistical significance, MNEs ETR is higher relative to Domestic companies one year after the tax reform. Furthermore, by examining the

descriptive data, we can see that for MNEs, the tax reform resulted in lower tax avoidance. Interestingly, the corporate tax rate cut allowed domestic companies to lower their ETR relative to corporate tax rate in such a fashion that they actually increase their tax avoidance compared to prior year. Thus, in line with our hypothesis and the findings of previous research, we find that the tax avoidance reduced more in MNEs compared to domestic companies. These findings further emphasize that a difference between the groups exist, not only in terms of conscious tax avoidance but also in terms of how they are affected by tax reductions. However, prior research suggests that MNEs relative to domestics are affected differently by the tax law. MNEs face lower implicit taxes relative to domestic companies, and the implicit taxes of MNEs has been falling over time. This, while implicit taxes in domestic companies have been rising (Chyz et al, 2015). As implicit taxes are not reflected in the ETR, analysis in this study have not accounted for the tax avoidance net of implicit taxes.

The regression analysis further emphasized that the control variables; profitability, intangible intensity, firm size, leverage, ESG score and growth were not significantly affecting GAAP ETR. However, the results derived were in line with prior research in regards ESG-score and ROA, as studying their influence into Cash ETR. The both variables had significant influence on the Cash ETR. Interestingly, Cash ETR was significantly influenced by the control variable size, but in negative direction, thus opposing the prior research from Rego (2003). This shows that results may vary depending on which ETR measure is being used, further highlighting the complexity of studying tax avoidance.

When it comes to the testing of hypothesis 3, 4 and 5; whether profitability, intangible intensity or leverage do influence ETR in the MNEs relative to domestics, the study finds no significant difference. We are thereby not able to establish that any of these variables influence MNEs ETR more than domestic companies ETR in the chosen sample. These results do therefor not reflect the prior research findings. This may be due to the US tax reform affecting the variables in a way that the prior findings are not comparable to this new situation. For example, the US tax reform do affect the taxation of intangible assets, levying it a worldwide minimum tax. Therefor transferring intangibles to a location with less taxation is no longer as beneficial tax planning action for the US MNEs, as prior the US tax reform. The result may be also be insignificant due to imperfections in

the regression model. Results might have been different when conducting the tests on larger sample size, for longer time period.

Finally, as questioning ourselves what our study contributed, we refer to authors that have studied the same phenomena:

what are plausible implications of the event that we analysed? Tax avoidance is likely to be an ongoing issue that will not be settled and then disappear. Instead we anticipate this to be an example of those inquiries or policy-making processes that “are never-ending, fraught by struggles that at no time seem to end or that only temporarily see closure. (Gottweis, 2012: 213) (in Addison, Mueller, 2015:34)

5.2 Self-reflection and implication for future research

The study found a significant difference in how MNEs relative to domestic change their ETR followed by tax rate cut. The study also identified that as a ratio of tax avoidance / corporate tax rate do increase for Domestic companies and decreases for MNEs followed by the US tax rate reform. The model of the study however had several impediments, the variables were not having full normal distribution. The transformation of variables was tested but not found to improve the model accuracy. Therefore, it is suggested that future studies in this topic area do include unprofitable companies, longer time frame, bigger sample, several countries, control for NOL and deferred tax and control for macro-economic factors that may impact the results. Controlling the above will increase the structure validity of the research and therefore add on the reliability of the study results. Additionally, Finér & Ylönen (2015) suggest that studies on tax avoidance based on databases are not reliable due to lack of data and differences on how numbers are calculated, instead a case study design would be recommended. Although this might be true, it could be difficult to perform a case study on tax avoidance and generate generalizable results within the time frame given for this assignment. Therefore, we believe that the chosen method was best suited to answer our hypotheses.

6 References

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