

# **Essays on Tax Avoidance and Tax-Competitiveness of U.S. and European Firms**

Inauguraldissertation

zur

Erlangung des Doktorgrades

der

Wirtschafts- und Sozialwissenschaftlichen Fakultät

der

Universität zu Köln

2024

vorgelegt von

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Tag der Promotion: 25.06.2024

# Vorwort

Die vorliegende Arbeit entstand während meiner Tätigkeit als wissenschaftlicher Mitarbeiter am Seminar für ABWL und Unternehmensbesteuerung der Universität zu Köln. Sie wurde im März 2024 von der Wirtschafts- und Sozialwissenschaftlichen Fakultät der Universität zu Köln als Dissertation angenommen. Das Entstehen dieser Arbeit wurde durch die qualifizierte Unterstützung zahlreicher Personen geprägt, denen ich an dieser Stelle meinen Dank aussprechen möchte.

Mein herzlichster Dank gilt zunächst meinem Doktorvater, Herrn Prof. Dr. Michael Overesch. Seine hilfsbereite Unterstützung und die vielen konstruktiven Diskussionen während meiner Promotionszeit waren ein wesentlicher Grundstein für das Gelingen dieser Arbeit. Ihm gilt mein besonderer Dank für die großzügigen Freiräume, die es mir ermöglicht haben, meine Arbeit am Lehrstuhl und das Verfassen dieser Arbeit mit meinen Verpflichtungen über diese Arbeit hinaus zu vereinen. Zudem möchte ich mich bei Herrn Prof. Dr. Georg Wamser für die sehr gute Zusammenarbeit im Rahmen des gemeinsamen Projektes bedanken. Darüber hinaus danke ich Herrn Prof. Dr. Carsten Homburg für die Erstellung des Zweitgutachtens und Herrn Prof. Dr. Maximilian Müller für die Übernahme des Vorsitzes der Prüfungskommission.

Bedanken möchte ich mich des Weiteren bei meinen Kolleginnen und Kollegen am Seminar für ABWL und Unternehmensbesteuerung der Universität zu Köln für die freundschaftliche Atmosphäre und die stets gute Zusammenarbeit. Namentlich möchte ich mich bei Herrn Dr. Max Pflitsch bedanken, der mir sowohl fachlich als auch freundschaftlich oftmals zur Seite stand und eine Freundschaft entstanden ist, die uns über den Lehrstuhl hinaus verbindet. Frau Dr. Sina Willkomm und Frau Annabell Boer danke ich für die anregenden Unterhaltungen und die notwendigen Ablenkungen. Bei Frau Tanja Breuer möchte ich mich für die Unterstützung bei den alltäglichen Aufgaben am Lehrstuhl bedanken. Danken möchte ich auch meinen Kolleginnen und Kollegen am RSIT in Tübingen, die die Workshops und Konferenzen immer wieder zu einem besonderen Erlebnis gemacht haben.

Ein besonderer Dank gilt meinen Eltern Birgit und Christoph Reichert sowie meiner Schwester Fabienne Reichert, PhDr., die mich auf meinem gesamten bisherigen Lebensweg bedingungslos unterstützt haben und mir stets den nötigen Rückhalt gegeben haben. Mein abschließender und größter Dank gilt meiner geliebten Frau StBin Laura Reichert. Über die letzten Jahre hast Du mir größtes Verständnis entgegengebracht und mir nicht nur in stressigen Phasen bedingungslos den Rücken freigehalten. Nur durch Deinen uneingeschränkten Rückhalt und Deine stetige Unterstützung hast Du mir den Abschluss dieser Arbeit ermöglicht.

Köln, im Juni 2024

Leon Gerhard Alfred Reichert

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# **Chapter 1**

## Introduction

**Chapter 1**

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## **1.1 Motivation and Object of Research**

In the last decade, policymakers have made extensive efforts to tackle tax avoidance by firms around the globe due to public pressure. As early as 2012, the members of the G20 summit commissioned the Organization for Economic Co-operation and Development (OECD) to develop a plan to curb global base erosion and profit shifting (BEPS), which led to the creation of the BEPS initiative. In 2015 the BEPS initiative introduced a plan with 15 actions to tackle global tax avoidance. Due to several political challenges, the global implementation of the 15 actions has been progressing slowly. However, the European Union (EU) was the primary force behind the implementation of the elements of the BEPS action plan in Europe. Specifically, the Anti-Tax Avoidance Directives (ATAD) I and II had to be implemented by EU members into local law by 2018 and 2019, respectively. These directives introduced interest deduction limitations, general anti-tax avoidance rules (GAAR), controlled foreign corporation rules (CFC-rules), exit taxation rules, and anti-hybrid mismatch rules. Interestingly, in the last decade, besides some minor cuts in the corporate tax rates and the introduction of several tax institutions, such as windfall taxes, there have been no mayor tax reforms in Europe.

In contrast, the Tax Cuts and Jobs Act of 2017 (TCJA) in the U.S. significantly altered the global playing field. The TCJA not only replaced the worldwide tax system with a territorial tax system, but also reduced the corporate tax rate by 14 percentage points. However, the TCJA also introduced anti-tax avoidance provisions similar to the BEPS initiatives. These include the Base Erosion and Anti-Abuse Tax (BEAT), Global Intangible Low-Taxed Income (GILTI), and a limit on interest deductions.

Although, anti-tax provisions were implemented, the main objective of the TCJA was to strengthen the competitiveness of U.S. firms, including what is called ‘tax-competitiveness’. The term or concept of ‘tax-competitiveness’ was first introduced by Collins and Shackelford (1995, 2003). In their studies they analyze the tax-competitiveness of U.S. firms by comparing

the average tax rates of U.S. firms to those of non-U.S. benchmark firms. Firms that have higher tax expenses compared to their competitors, experience a cash outflow and negative economic effects (Donohoe, Jang, and Lisowsky 2022). This puts them at a tax-competitive disadvantage.

The tax-competitiveness of firms is influenced by both internal and external factors. The most significant external factors are the applicable tax laws, with corporate tax rates having the greatest impact on a firm's tax-competitiveness. If a firm is located in a high tax country such as France or Germany, it will naturally have higher tax expenses and therefore a lower tax-competitiveness. Internal factors are influenced by the firm itself. Companies can improve their tax-competitiveness by engaging in tax avoiding, which includes both legal tax planning and illegal tax evasion. According to Jacob, Rohlfing-Bastian, and Sandner (2021), the level of firms' tax avoidance is determined by a function of moral hazard, tax planning costs, and the potential increase in earnings. Further, previous literature has identified various firm characteristics, such as profitability, size, or leverage, as potential determinants of firm tax avoidance. Additionally, previous literature suggests that the top managers of firms have a considerable influence on firms' tax expenses (Dyreng, Hanlon, and Maydew 2010; Belnap, Hoopes, and Wilde 2024). However, the contribution of a particular management approach towards taxes on tax avoidance is scarce. This is where the first essay comes in. The essay analyzes the effect of certain U.S. management approaches on tax avoidance.

Thus, firms can enhance their tax-competitiveness by engaging in tax avoidance. However, tax-competitiveness can be divided into two subgroups: global tax-competitiveness and regional tax-competitiveness. Global tax-competitiveness refers to the competitiveness of firms across regions or countries, such as U.S. versus European competitor-firms. The regional tax-competitiveness refers to the competition within a region, e.g. within a tax jurisdiction or within Europe. The second essay focuses on the global tax-competitiveness of U.S. and European firms after the TCJA, while the third essay examines both the global competitiveness



of U.S. and European firms and the regional competitiveness within the U.S. and within Europe over the past decade.

This thesis aims to provide new insights on the relationship between tax avoidance and tax-competitiveness of firms. Although, there is a wide range of literature on the determinants of firm tax avoidance (e.g., Gupta and Newberry 1997; Rego 2003; Mills and Newberry 2005; Kubick, Lynch, Mayberry, and Omer 2015; Belz, Hagen, and Steffens 2017), these studies do not explore all potential determinants. The first essay provides new insights into the impact of a specific U.S. management approach on firms' tax avoidance and explains a potential determinant for tax differentials between U.S. and European firms. The second essay analyzes the effects of the TCJA on the global tax-competitiveness of U.S. multinational corporations (MNC). Besides an overall effect of the TCJA, the essay also demonstrates how the TCJA changed the relationship of tax avoidance and tax-competitiveness in the U.S. Additionally, the third essay introduces a new method that combines clustering with a matching approach to analyze tax avoidance heterogeneity within the U.S. and within Europe, as well as global tax-competitiveness between U.S. and European competitors over the past decade.

Although the U.S. has introduced GILTI and BEAT as a form of global corporate minimum taxation, it is not as comprehensive as the global minimum corporate taxation of 15% effective in the EU since January 1st, 2024. While the TCJA openly addresses the goal of strengthening the competitiveness of U.S. firms, there was almost no discussion about the potential effects on the competitiveness of European firms during the ATADs and the global minimum taxation in Europe. Thus, the second and third papers are of particular interest to policymakers, as they provide new insights into the effects of tax reforms and the tax-competitiveness of U.S. and European firms.

The first essay, titled "*The Role of Management Approach to Taxes – Evidence from Cross-Country CEO and CFO Changes*", is co-authored by Michael Overesch, Chair of

Business Taxation at the University of Cologne. The paper examines CEO and CFO changes from U.S. to European firms. A propensity score matching (PSM) approach reveals, that European firms experience a significant decrease in their effective tax rates (ETR) after hiring an executive who previously worked in the U.S. This effect is more pronounced when hiring an executive who previously worked for a particular tax-avoidant U.S. firm. The findings suggest that there is a U.S. management approach that places a special emphasis on tax issues and tax avoidance. Additional analyses show at least weak evidence that the European firm's lower ETRs increase after the U.S. executive leaves the firm, suggesting that the effect is not sustainable. My contribution to the essay included data collection and processing, the empirical analyses, developing ideas for analyses, and scientific paper writing. The paper was presented at the *RSIT Conference 2022*, the *WHU Berlin-Vallendar Tax Conference 2023*, the *Mannheim Taxation Conference 2023*, *Autumn Conference of the Tax Section of the German Association of Business Professors (VHB) 2023*, and the *Annual Conference on Taxation of the NTA 2023*.

The second essay, titled “*The Effects of the Tax Cuts and Jobs Act on the Tax-Competitiveness of Multinational Corporations*”, is co-authored by Michael Overesch, Chair of Business Taxation at the University of Cologne, and Georg Wamser, Chair of Public Finance at the University of Tuebingen. A PSM approach is used to exploit the major U.S. tax reform in 2017. We find that before the TCJA, U.S. firms were at a tax-competitive disadvantage compared to their European competitors. However, after the TCJA, U.S. firms gained on average a tax-competitive advantage. Our study also indicates that U.S. MNCs with a high share of domestic activity experienced a more significant gain in tax-competitiveness. Furthermore, our findings suggest that U.S. MNCs that engaged in international tax planning prior to the reform did not alter their behavior. My contribution to the essay included data collection and processing, the empirical analyses, and writing the scientific paper. This paper was presented at the *RSIT 2022 PhD Workshop on “Understanding Multinational Firm Behavior”* and at the *44<sup>th</sup> European Accounting Association Annual Congress in Bergen 2022*.

The third and final essay, “*Heterogeneity in Tax Avoidance within and between the U.S. and Europe in the Last Decade*”, is single-authored and therefore my sole responsibility. This paper investigates the heterogeneity in tax avoidance within the U.S. and within Europe. Additionally, by combining clustering methods and PSM, inferences are made regarding the tax-competitiveness of U.S. and European firms. The study shows that there are six distinct groups of tax avoiders in the U.S. and in Europe, indicating significant heterogeneity and therefore competition within these regions. However, U.S. firms and their direct European competitors differ significantly in their levels of tax avoidance. Most U.S. firms gained a tax-competitive advantage following the implementation of the TCJA. However, some European tax avoiders are still able to sustain a tax-competitive advantage even after the TCJA. This group of European tax avoiders appears to be unaffected by recent anti-tax avoidance policy efforts in Europe. Finally, my findings suggest, that U.S. tax avoiders targeted by anti-tax avoidance provisions in the TCJA experience a decrease in their tax-competitive advantage.

Overall, this thesis sheds new light on the tax avoidance behavior and its impact on the tax-competitiveness of U.S. and European firms. The thesis shows that U.S. managers have a significantly different management approach to tax issues and tax avoidance compared to their European peers. Additionally, while anti-tax avoidance provisions affect high tax avoiders in the U.S., most U.S. firms still maintain a tax-competitive advantage after the TCJA. Only European high tax avoiders are able to maintain a tax-competitive advantage over their direct U.S. competitors. Finally, there is a group of European firms that have been able to maintain significantly low ETRs over the last decade, indicating that they remain largely unaffected by newly introduced anti-tax avoidance directives in Europe.

## **1.2 The Role of the Management Approach to Taxes – Evidence from Cross-Country CEO and CFO Changes**

### **1.2.1 Research Question and Design**

Previous studies indicate that U.S. firms engage more successful in tax avoidance than their international competitors, resulting in significantly lower ETRs (Markle and Shackelford 2012; Overesch, Strueder, and Wamser 2020; Overesch, Reichert, and Wamser 2023). Most studies suggest that tax differentials between U.S. firms and their international competitors may be attributed to differences in tax legislation and the business models. However, some studies indicate that individual top managers have a considerable influence on firms' ETRs (Dyreng et al. 2010; Belnap et al. 2024). Therefore, lower ETRs of U.S. firms may also be attributable to the managers of the firms. However, the role of particular management approaches on ETRs has not been examined yet.

Thus, this essay examines the impact of management approaches to tax issues on the firms' ETRs. The study utilizes CEO and CFO job changes from U.S. to European firms between 2000 and 2020. PSM is utilized to obtain a sample of similar European firms, where the treatment group hires an executive directly from the U.S. and the control group includes European firms that do not hire an executive from the U.S. In a solely U.S. sample, it may not be possible to distinguish a potential manager effect on tax avoidance from other factors, such as U.S. tax legislation. Thus, this approach enables us to analyze the influence of U.S. executives on the ETRs of European firms, allowing for the identification of particular management approaches.

### **1.2.2 Results and Contribution to the Literature**

Our results show a significant decline in the ETRs of European firms after hiring an executive directly from the U.S. Analyses indicate, that this effect is more pronounced, in case the executive previously worked at a particular tax-avoidant U.S. firm. The findings suggest,

that managers take an imprint from their former employer and transfer this particular U.S. management approach cross-country. While previous studies show that executives past work experience may affect financial policies and disclosure quality (e.g., Dittmar and Duchin 2015; Gong, Su, Xue, and Zeng 2023), we are the first to show, that this imprint also applies to tax issues. The decline in the ETRs amounts to approximately 4 percentage points in terms of the average *GAAP ETRs*, corresponding to average annual tax savings of about \$10.5 million per year. However, additional analysis indicates that this management approach is not sustainable in Europe after the U.S. executive leaves the European firm.

Our results are robust to additional tests. They show, that a decrease in the ETRs is not attributable to a general effect of a new executive per se. Further, the findings are robust to manager characteristics such as age, gender or U.S. citizenship. Additional tests reveal, that job changes of European executives to the U.S. do not result in lower ETRs, regardless of the previous European employer's level of tax avoidance.

While previous studies analyze a manager effect on tax avoidance in U.S. firms, we are the first to use a cross-country setting and utilize cross-border job changes. Our findings provide evidence for a U.S. management approach that focuses particularly on tax issues, contributing to the tax differentials between U.S. and European firms.

### **1.3 The Effects of the Tax Cuts and Jobs Act on the Tax-Competitiveness of Multinational Corporations**

#### **1.3.1 Research Question and Design**

The TCJA of 2017 changed the U.S. corporate tax system in a fundamental way. Besides the introduction of a territorial tax system to replace the worldwide tax system, the TCJA introduced a reduction in the corporate tax rate from 35% to 21%. However, at the same time anti-tax avoidance provisions such as GILTI, BEAT, and limitations on interest deductions were introduced to address tax avoidance. One of the main arguments in favor of the tax reform

was the potential disadvantage that U.S. firms faced due to the high U.S. corporate tax rate of 35%. Therefore, a goal of the TCJA was to enhance the competitiveness of U.S. MNCs.

Thus, this study provides an empirical analysis of the effects of the TCJA on the tax avoidance behavior and on the tax-competitive position of U.S. MNCs. The study uses different ETRs as a measure for firms' tax expenses. Firm characteristics are used to employ a one-to-one PSM to generate firm pairs of U.S. and European competitors. Then, the matched sample is used to observe how specific elements of the TCJA affected the tax-competitiveness of U.S. MNCs. In an additional analysis, we utilize subsidiary data to observe changes in the profit shifting behavior of U.S. MNCs after the TCJA, following the approach by Hines and Rice (1994).

### **1.3.2 Results and Contribution to the Literature**

Several studies suggest that prior to the TCJA, U.S. firms were at a competitive disadvantage compared to their international competitors due to the high U.S. corporate tax rate (PriceWaterhouseCoopers 2011; Markle and Shackelford 2012; Overesch et al. 2020). However, Overesch et al. (2020) show, that some U.S. MNCs were able to offset this tax disadvantage by exploiting international tax avoidance. Although previous literature suggests that European firms may also benefit from the TCJA (Gaertner, Hoopes, and Williams 2020; Brusco 2021), our analysis shows that the TCJA improves the tax-competitiveness of U.S. MNCs. On average, U.S. MNCs experience a 7.5 percentage points decrease in their *GAAP ETRs* and gain a 4.2 percentage points tax-competitive advantage over their European peers in terms of their respective *GAAP ETRs*. In addition to the findings by Dyreng, Gaertner, Hoopes, and Vernon (2023), we show that the positive impact of the reform declines with the share of foreign activities of U.S. MNCs. Thereby, our study reveals that depending on the share of foreign activities, the pass-through ratios of the 14 percentage points tax rate cut range from 84% to 21%.

Complementary to findings by Garcia-Bernardo, Janský, and Zucman (2022), additional analysis suggests, that U.S. MNCs profit shifting behavior did not alter due to the TCJA. This provides U.S. MNCs with a competitive advantage in international tax avoidance compared to their European competitors. However, we show that in accordance to prior literature (Donohoe, McGill, and Outslay 2019; Clausing 2020; Dunker, Pflitsch, and Overesch 2021) U.S. MNCs benefit less from the tax reform in case the new anti-tax avoidance provision GILTI is expected to be binding.

## **1.4 Heterogeneity in Tax Avoidance within and between the U.S. and Europe in the Last Decade**

### **1.4.1 Research Question and Design**

In the last decade, there has been one major tax reform in the U.S. and several minor tax reforms in Europe. However, the EU and several countries by themselves have introduced major anti-tax avoidance provisions, most famously the ATADs. The latter aim to curb international tax avoidance by firms based in Europe. Although the TCJA introduced a significant cut in the corporate tax rate in the U.S., it also introduced anti-tax avoidance provisions. In contrast, the EU and European countries have primarily introduced anti-tax avoidance provisions in the last decade. Therefore, it is important to examine how these reforms and provisions have affected the tax avoidance behavior of both U.S. and European firms, as well as their tax-competitiveness within and between the two regions.

This study employs two types of analysis. Firstly, clustering is used to examine the heterogeneity in the level of tax avoidance both within the U.S. and within Europe. Secondly, PSM is utilized to find pairs of similar competitor-firms from the U.S. and Europe. The matched sample and the differentiation based on the tax avoidance behavior is used to observe heterogeneity in tax avoidance within the U.S. and within Europe and to analyze whether competitors across continents fall within the same group of tax avoidance. Additionally, the

change in tax avoidance and tax-competitiveness between U.S. and European firms over the last decade is analyzed. Tax avoidance and tax-competitiveness are measured by the long-term *CASH ETR* over five and three years, respectively. Thereby, the tax-competitiveness refers to the tax differential between competing firms.

#### **1.4.2 Results and Contribution to the Literature**

The clustering results suggest, that there are six groups of tax avoidance in both the U.S. and Europe during the period of 2012 to 2016. The findings also suggest that there is heterogeneity in the level of tax avoidance within both regions, indicating competition in terms of tax expenses within those regions. However, the PSM analysis reveals that U.S. and European tax avoiders are not direct competitors. This finding is interesting, because previous literature mostly disregards heterogeneity in tax avoidance within these regions.

I show, that there is a significant group of over 100 European tax avoiders who remain unaffected by the latest anti-tax avoidance directives and are consistently able to remain high tax avoiders from 2012 to 2022.

Previous studies show, that U.S. firms may be affected by anti-tax avoidance provisions such as GILTI or BEAT, introduced by the TCJA by identifying potential affected firms (Carrizosa, Gaertner, and Lynch 2023; Dunker et al. 2021). However, this study differs from previous literature by directly analyzing targeted firms, specifically U.S. tax avoiders. My analysis suggests that although, U.S. tax avoiders are affected by those provisions, they still have a tax-competitive advantage after the TCJA. Previous studies show, that European firms were at a tax-competitive advantage prior to the TCJA, which turned into a disadvantage after the TCJA (PriceWaterhouseCoopers 2011; Markle and Shackelford 2012; Overesch et al. 2020; Overesch et al. 2023). This study supports those findings. However, it also shows that prior to the TCJA, there were U.S. tax avoiders with a tax-competitive advantage. After the TCJA, most



U.S. firms are in an advantageous position. Additionally, U.S. competitors of European high tax avoiders are at a tax-competitive disadvantage.

Furthermore, while some studies examining the effects of the TCJA on the tax-competitiveness of U.S. firms (Overesch et al. 2023; Dyreng et al. 2023; Carrizosa et al. 2023) have an appropriate control group to determine tax-competitiveness, they all lack differentiation in the home country, specifically heterogeneity in tax avoidance levels. This study expands previous literature by including clustering methods to observe different levels of tax avoidance and compare those groups to their direct competitors. The research design used can be applied in future studies to analyze tax proposals.

Finally, this study provides new insights into the determinants of tax avoidance in the U.S. and in Europe. The findings suggest that tax avoidance is determined by similar factors in both regions. High tax avoiders in both regions tend to be smaller in size and have lower intangibles. However, U.S. firms also exhibit lower return on assets (ROA), higher leverage, lower market power, and potentially higher cash holdings.

Thus, this study not only proposes a new study design and analyzes the current tax-competitiveness of U.S. and European firms but also contributes to the literature by providing new insights into tax avoidance within Europe and within the U.S. and the effectiveness of newly implemented anti-tax avoidance policies. The importance of the latter is significant for policymakers. European policymakers are still debating how to respond to changes in the tax landscape due to the TCJA. Additionally, there is a current debate in the U.S. regarding the provisions under the TCJA that will expire in 2025.

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## **Chapter 2**

The Role of the Management Approach to Taxes –  
Evidence from Cross-Country CEO and CFO Changes

# **The Role of the Management Approach to Taxes – Evidence from Cross-Country CEO and CFO Changes**

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## **Abstract:**

We investigate whether a particular management approach to tax issues can help to explain effective tax levels of firms. We exploit CEO and CFO job changes from U.S. to European firms to identify an association between a management approach of managers from the U.S. and the firm's effective tax rate (ETR). We find a significant decline in the ETRs of European firms after hiring a top executive who had previously worked for a U.S. firm. Moreover, the decline is more pronounced when the new executive from the U.S. previously worked for a particularly tax-avoidant U.S. firm. Several additional tests reveal that our finding cannot be attributed to other management characteristics or a general effect of a new top-manager per se. Finally, we also investigate job changes of executives in the opposite direction, from Europe to U.S. firms but find no association between these hires and the ETRs of U.S. firms. We interpret our findings as evidence for a U.S. management approach that focuses more on tax issues.

**Keywords:** tax avoidance, executive change, effective tax rate, propensity score matching, difference-in-differences analysis

**JEL Classification:** H25, H26, M51

**Acknowledgements:** We gratefully acknowledge funding from the German Research Foundation (DFG), grants OV 120/2-1, and FOR2783. We are also thankful for helpful comments and suggestions by Harald Amberger, Paul Demere (discussant), Nathan Goldman, Kaitlyn Kroeger (discussant), Max Pflitsch, Sepideh Raei (discussant), Nadine Riedel (discussant) and the participants at the RSIT Conference 2022, the WHU Berlin-Vallendar Tax Conference 2023, the Mannheim Taxation Conference 2023, tax section of the German association of business professors (VHB) and the NTA Conference 2023.

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## 2.1 Introduction

The debate about tax avoidance by multinational corporations (MNCs) often focuses on examples of well-known U.S. companies. Particularly, the tax planning of U.S. big-tech firms has been widely discussed. In addition, empirical studies with large comparisons of U.S. companies and their international peers also show lower effective tax rates (ETRs) for U.S. companies (Markle and Shackelford 2012; Overesch, Strueder, and Wamser 2020; Overesch, Reichert, and Wamser 2023). These studies suggest that U.S. firms are more successful at tax avoidance than firms from other regions. Although, the tax differentials might be explained by differences in tax legislations and business models, lower ETRs may also be attributed to the managers of U.S. firms. Previous studies have already shown that individual top managers have a considerable influence on firms' effective tax rates (Dyreng, Hanlon, and Maydew 2010; Belnap, Hoopes, and Wilde 2024). However, the role of a particular U.S. management approach for effective taxes has not been examined. To fill this gap, this study examines the influence of a management approach to tax issues on the firms' ETRs.

For an empirical identification, it is difficult to distinguish between the role of U.S. top managers and other factors like the U.S. tax legislation in a sample of U.S. firms. Therefore, we exploit job changes of top managers from the U.S. to European firms to identify an influence of U.S. executives on ETRs. In particular, we consider a sample of large European firms and their new CEO and CFO appointments between 2000 and 2020. During this period, we observe approximately 50 hires of executives who previously worked in the U.S. We use a propensity score matching (PSM) approach to obtain a sample of European firms that hire an executive from the U.S. and, as a control group, similar European firms that do not hire an executive from the U.S.

We assume that managers take an imprint from their former U.S. employer and thus transfer the U.S. management approach to taxes to Europe. Studies on managerial behavior



suggest that managers are shaped by their experience at their previous employer. For example, Dittmar and Duchin (2015) show that CEOs' and CFOs' past work experience affects financial policies and Schoar and Zuo (2017) find that CEOs early career experience affects their managerial style for various corporate policies. Findings of Gong, Su, Xue, and Zeng (2023) suggest that the past working experience of CEOs impact the disclosure quality.<sup>1</sup>

Indeed, our empirical results suggest a decline of about 4 percentage points in the GAAP ETRs of European firms after hiring a CEO or CFO from the U.S., compared to similar European firms that did not hire an executive from the U.S. This effect corresponds to an average additional tax saving of about \$10.5 million per year after hiring a U.S.-based executive. If a European firm hires a new top executive who has previously worked at a European firm, there is no significant effect on the tax avoidance and the ETRs. The findings suggest that managers of U.S. firms have a different approach to taxes that is associated with higher tax avoidance, and therefore, lower ETRs.

Additional analysis shows that the effect of a reduced ETR among European firms only materializes in cases where the new top manager had previously worked for a U.S. corporation that avoided taxes at an above-average level. In contrast, we find no effect on the ETRs for those European firms that have hired a new top manager who previously worked for a European firm, even if this avoided an above-average amount of tax. These findings support the view that it is a certain management approach to taxes of U.S. managers that matters.

Our findings are also consistent with previous studies on the influence of managers on tax avoidance. Bertrand and Schoar (2003) construct a manager-firm matched panel and find different styles among managers, and that these styles are related to manager performance and compensation. Dyreng et al. (2010) further suggest significant differences in managers' attitudes toward tax avoidance. They show, that individual executives play a significant role in

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<sup>1</sup> Similar, Malmendier, Tate, and Yan (2011) find that CEO early life experiences affect corporate financing decisions.

determining the level of tax avoidance of U.S. firms. While previous studies have focused on U.S. firms and their executives, to our knowledge, we are the first to use an international environment and track executives who operate across borders. Moves of executives from the U.S. to Europe allows us to identify an effect of a different approach to tax issues by U.S. managers.

Moreover, our study is related to a strand of research that explores whether cultural differences between countries have an impact on tax decisions. Tsakumis, Curatola, and Porcano (2007) and Richardson (2008) examine cultural dimensions of tax compliance levels across different countries. They show, that national culture indicators can be utilized to explain tax evasion and compliance of individuals across countries. Yoo and Lee (2019) analyze the effect of national culture on firms' tax avoidance using this setting. They find that the cultural features of the parent company influence not only the group-level tax avoidance but also tax avoidance at subsidiary levels. However, we focus on differences in the managerial approaches between cultural regions as an additional explanation for firms' tax rate differences between different regions. We provide the first study to examine cultural differences among executives and their impact on firms' tax avoidance behavior. Our results suggest that when a new executive from the U.S. is hired, European firms tend to take a more fiscally aggressive position. In additional analysis, we find no comparable effects for new hires of an executive from Europe. Thus, hiring an executive from the same cultural region does not have the same effect on ETRs as the cross-regional move of an executive from the U.S. to Europe.

Moreover, we also consider U.S. citizenship of executives and examine whether the personal cultural ties with the U.S. can also explain the findings. However, our results suggest that the effect is not related to the manager's nationality, but to their previous employment in a U.S. company.

Additional analyses however suggest that the imported management approach to taxes is not very sustainable in European companies. If former U.S. managers are hired by a European firm after she or he has already worked for another firm outside the U.S., we find no significant effects on the ETRs. Moreover, we find weak evidence that the ETRs of European companies are increasing again after the executive from the U.S. has left the company. Finally, we also examine job changes of top executive in the other direction, i.e. from Europe to the U.S. For these hiring's of CEOs or CFOs, who have previously worked in Europe, we are unable to find any significant effect on the ETRs.

We conclude that differences in management cultures between the U.S. and Europe influence managers' attitudes towards and abilities for tax avoidance. However, the results also suggest that these management cultures and the associated imprinting differ.

The remainder of the paper is organized as follows. In section 2.2 we develop testable hypotheses. In section 2.3, we present our data and the research design. Further, we give a short explorative analysis. In section 2.4, we present our main results, section 2.5 provides several additional tests and section 2.6 shows results for the job changes from Europe to the U.S. Finally, section 2.7 concludes.

## **2.2 Related Literature and Hypotheses Development**

Many examples suggest that U.S. MNCs excel in tax planning. For instance, low foreign tax expenses and the tax planning structures through subsidiaries in Ireland or Luxembourg are documented for many U.S. firms like Apple or Alphabet. Additionally, systematic comparisons of large samples of U.S. firms with their European peers also show lower ETRs for U.S. firms (Markle and Shackelford 2012; Overesch et al. 2020; Overesch et al. 2023). These studies suggest that U.S. firms are more successful at tax avoidance than their European peers in the same industry, even with similar firm characteristics. Some of the differences can be attributed to different opportunities due to the business models and different tax regulations. For example,

U.S. corporations benefit from the so-called check-the-box regulations (Overesch et al. 2020) and the major U.S. tax reform in 2017 (Overesch et al. 2023). However, we argue that the approach of U.S. managers to tax issues may also explain the advantage of U.S. corporations. Thus, a different management approach by U.S. managers could result in lower ETRs for U.S. MNCs.

The literature suggests that individual executives can significantly impact firms' level of tax avoidance (Dyreng et al. 2010; Belnap et al. 2024). Moreover, several studies have shown that manager characteristics and manager incentives also affect the firms' tax expenses (e.g., Francis, Hasan, Wu, and Yan 2014; Phillips 2003; Rego and Wilson 2012). However, this study focuses on a potential influence of a certain management approach to taxes. In particular, we investigate whether the lower ETRs of U.S. companies can be attributed, at least to some extent, to a certain U.S. management approach to tax issues.

Lower ETRs of U.S. firms compared to their international peers may suggest a common influence of a certain management approach at U.S. firms. However, for an empirical identification of this potential U.S. management approach, we require variation in order to distinguish between the management approach and other factors like tax legislation. More precisely, we examine the ETRs of European firms after they have hired a new manager who had previously worked for a U.S. firm. To this end, we make use of findings on other issues that managers and their future behavior are very strongly influenced by their previous job experience. For example, Dittmar and Duchin (2015) show that CEOs' and CFOs' past work experience affects financial policies or Gong et al. (2023) find that the past working experience of CEOs impact disclosure quality. Accordingly, we expect that managers also carry over their experience with management approach to tax issues if they change their employer. In order to assess the potential effect of a U.S. management approach, we consider job changes from the

U.S. to European firms. European companies offer a different business environment with a possibly different management approach.

In the corporate landscape, there are frequent changes in the executive ranks, i.e. CEO and CFO. These are usually the most powerful and influential positions in a company. The motivations for a change of manager and the selection process for a manager are manifold. Regardless of the reason for the executive change, there is the possibility to promote own managers, or to hire an outside manager, i.e., a new manager from another company (e.g., Bai and Mkrtchyan 2023). Hiring a manager from another company involves importing special skills, but also new experiences and attitudes. The import of new skills and experiences can improve the firm's performance (e.g. Bertrand and Schoar 2003; Bennedsen, Pérez-González, and Wolfenzon 2020). And even if the main reasons for a new CEO or CFO are unlikely to be tax arguments, we expect the new top manager to have a certain effect on the tax position of the new employee. Considering previous evidence on the influence of managers on firms' tax avoidance behavior, we argue that the import of past experience associated with an outside manager also includes the new manager's attitude regarding tax issues and avoidance. Especially if the new top manager comes from an environment where tax avoidance issues are of particular importance, as is assumed for U.S. firms. This leads to the following first hypothesis:

***H1: If a European firm hires a top executive who previously worked for a U.S. firm, the European firm's ETRs will decrease.***

We suspect that attitudes toward tax avoidance guide the new manager's future decisions regarding tax policy. Consequently, it should matter what management approach regarding taxes the manager experienced at his previous employer. If the management approach to tax issues at the U.S. company, for which the executive had previously worked, matters, this particular experience should influence the executive's future attitude toward tax avoidance.

Thus, it makes a difference whether the new manager previously worked for a company that tend to be less tax-avoidant or worked for a tax-aggressive company. We state hypothesis H2:

*H2: Tax avoidance of a European firm increases particularly if a new top executive is hired who previously worked for a U.S. firm that avoids taxes particularly strongly.*

Although there might be differences in managers' attitudes toward taxes, we primarily suspect an influence of the management approach experienced at the previous U.S. employers. Accordingly, the influence of a top manager on his company should depend on the fact that the manager once worked in a business environment that was more focused on tax avoidance. However, an additional explanation could be the personal cultural background of the manager, rather than a common U.S. management approach to taxes. The personal cultural background might be associated with a different attitude towards taxes and government spending. For example, Tsakumis et al. (2007) and Richardson (2008) examine cultural dimensions of tax compliance levels across different countries. They show, that indicators of national culture can be utilized to explain tax evasion and compliance of individuals across countries. If the personal cultural background of the manager is more relevant, then this leads to a further hypothesis regarding the effects of the hiring of a U.S. manager by a European company. One indicator of long-term personal cultural background may be citizenship. Therefore, we state hypothesis H3:

*H3: If a European firm hires a top executive with U.S. citizenship, the European firm's ETRs will decrease.*

## **2.3 Data and Research Design**

### **2.3.1 Data and Explorative Analysis**

For our investigation of a management approach to taxes of U.S. managers, we exploit job changes of top managers from U.S. firms to European firms. In particular, we look at a sample of large European firms and their new CEO and CFO appointments between 2000 and 2020. We collect data on changes of top executives from the *BoardEx* database. Furthermore,

we consider financial data of firms from the *Compustat* and *Compustat Global* databases. Our base sample consists of firms headquartered in Europe for which consolidated financial data is available in the *Compustat Global* database and for which executive information is available in the *BoardEx* database. Table 2.1 shows our sample selection. Our base sample consists of 2,851 European firms with 20,736 firm years over the period 2000 to 2020.

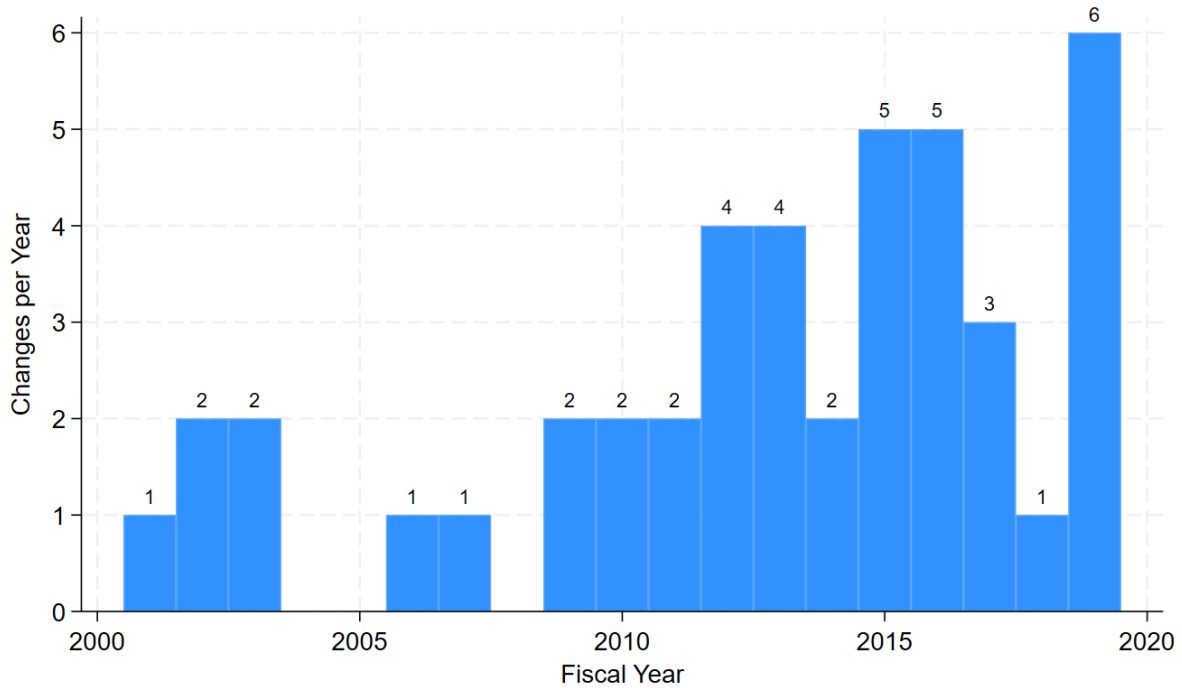
**Table 2.1: Sample Selection**

Description	European Firms	
	Firms	Firm-Years
Non-Miss. Controls	8,968	75,433
Non-Miss. Controls & Executive Data	2,851	20,736
Non-Miss. Controls, Executive Data & GAAP ETR	2,725	18,864
Non-Miss. Controls, Executive Data & CURRENT ETR	2,564	15,549
Non-Miss. Controls & Introduction of executive from U.S.	43	583

Notes: The sample is based on firms headquartered in Europe and where data is available in *Compustat Global* during the period 2000 to 2020.

What is of most interest for our study is the cross-border job change of CEOs and CFOs from the U.S. to Europe. That means the hiring of an executive who previously worked as an executive in a U.S. firm by a European firm. Therefore, we use the *BoardEx* database to obtain information on executives and their changes. We then track executives over time. In our base sample, there are 43 European firms that hired a top executive from the U.S. in the time period 2000 to 2020. We merge the data with our *Compustat Global* data and obtain a unique dataset of financial reporting data and the executive characteristics. Figure 2.1 plots the distribution of the change in executives over time.

**Figure 2.1: Distribution of Introduction of U.S. Executives over Time**



Notes: Depiction of the introduction of executives (CEO and CFO) who previously worked in the U.S. in European firms over time.

Examples of firms in our sample are Unilever and Ferrari. In 2009, the former CFO of Unilever PLC, Jim Lawrence, resigned, after losing the CEO race to Paul Polman. As a result, the British Unilever PLC had to find a new CFO. On January 01<sup>st</sup>, 2010, Dutchman Jean-Marc Huët took over the role of CFO. Huët previously worked as CFO of the American pharmaceutical company Bristol-Myers Squibb. In 2018, the former CEO of Ferrari had complications during an operation and died in the same year. His successor is the British-American Louis Camilleri, who previously worked as CEO of Phillip Morris International.

In our analyses, we use different *ETR* measures as a measures of tax avoidance (Hanlon and Slemrod 2009; Dyreng et al. 2010). We use consolidated financial data to calculate the tax measures.<sup>2</sup> The *GAAP ETR* is defined as the ratio of total tax expense (*Compustat* variable: *txt*) to pre-tax income (*pi*).<sup>3</sup> The *CURRENT ETR* is defined as the ratio of tax expenses in the current

<sup>2</sup> We exclude firm-year observations where the nominator or denominator of the ETR is negative or the ETR is greater than one.

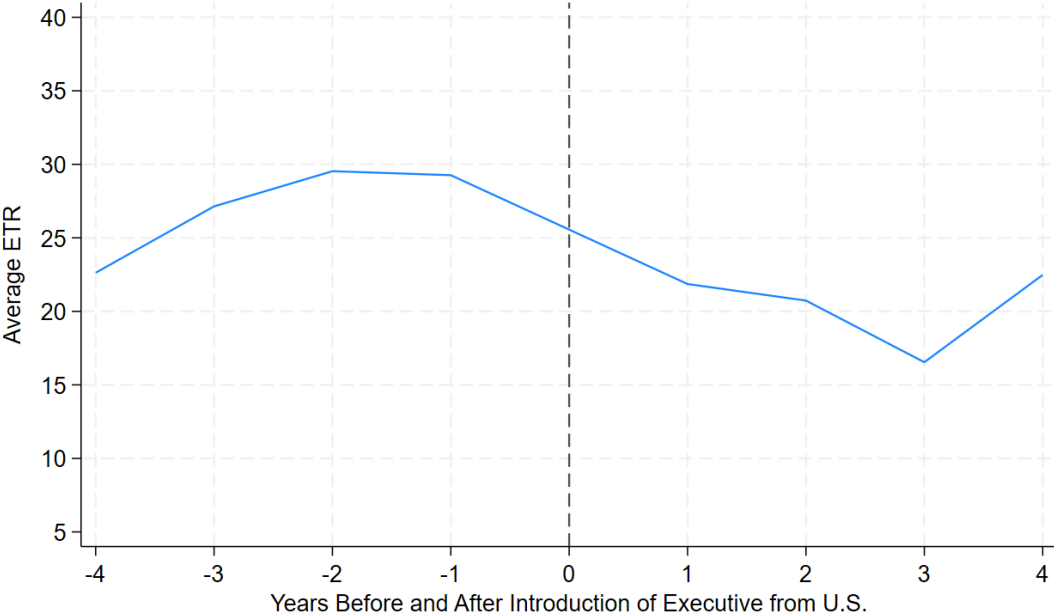
<sup>3</sup> In accordance to prior literature, we adjust the pre-tax income for extraordinary items (*xi*). Further, we replace missing values in the extraordinary item by including zeros.



period ( $txc$ ) to the pre-tax income ( $pi$ ). *CASH ETR* only recognizes taxes paid in the current period and is defined as the ratio of taxes paid ( $txpd$ ) to pre-tax income ( $pi$ ). While the *GAAP ETR* includes current period tax expense and deferred tax expense, *CURRENT ETR* and *CASH ETR* by definition exclude any deferred taxes. In a further test, we also consider the *Book-Tax-Differences (BTD)*.

To provide some initial insight, Figure 2.2 shows the average *GAAP ETR* of European companies four years before and four years after the hiring of a new top executive who previously worked for a U.S. company. We observe a significant decline in average *GAAP ETR* after hiring an executive from the U.S. The average *GAAP ETR* of European multinationals before the change of executive is 27.5%, while it is only 20.5% after the introduction of a new executive from the U.S. This suggests that the introduction of executives influenced by the U.S. management emphasis towards tax avoidance could have an impact on the tax avoidance of European multinationals.

**Figure 2.2: Average GAAP ETR Before and After Introduction of Executive from U.S.**



Notes: Depiction of the average *GAAP ETR* of European firms both four years before and after the introduction of an executive, previously working at an U.S. firm. Executives are defined as the CEO and the CFO. Firms with several introduction of executives from the U.S. over our sample period are excluded.

### 2.3.2 Empirical Approach

In our main analyses, we exploit job changes of executives from the U.S. to Europe. In particular, we consider a difference-in-differences setting and refer to matched samples of European firms. We use PSM to identify similar European firms: firms with the hiring of executives from the U.S. (treatment group) and other firms without a hiring of an executive from the U.S. (control group). For our base sample, we use all available European firms for which we have information in *Compustat Global* and executive data in *BoardEx*. We then perform 1:10 nearest neighbor matching based on propensity scores, i.e., for each European treated company, we match 10 European control companies (where no U.S. executive was introduced), always from the same industry and with very similar company characteristics.

#### Propensity Score Matching

Let us briefly summarize the PSM procedure applied. The indicator variable  $hiredUS_i$  determines whether firm  $i$  hires an executive from the U.S. ( $hiredUS_i = 1$ ) or no U.S. executive was introduced ( $hiredUS_i = 0$ ) during the time period 2000 to 2020. To find firm groups we run a probit regression and estimate the probability  $\hat{p}_i$  that a firm  $i$  introduces an executive from the U.S. We specify the linear probability index as:

$$hiredUS_{i,t} = \beta X_{i,t} + \varepsilon_{i,t} \quad (1)$$

The vector  $X_{i,t}$  in equation (1) indicates several firm- $i$ -specific characteristics. These are profitability ( $ROA_i$ ), firm size ( $SIZE_i$ ), R&D expenses ( $RD_i$ ), leverage ( $LEV_i$ ), and intangible assets ( $INTAN_i$ ).<sup>4</sup>  $ROA$  is defined as the ratio of pre-tax income ( $pi$ ) and the total assets ( $at$ ).  $SIZE$  is the logarithm of total assets,  $RD$  is the ratio of the research and development expenses ( $xrd$ ) to the total assets ( $at$ ), the  $LEV$  is the ratio of total debt ( $dlc + dltd$ ) to total assets ( $at$ ) and finally,  $INTAN$  is intangible assets ( $intan$ ) divided by total assets ( $at$ ). In the

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<sup>4</sup>  $Intan$  and  $xrd$  are set equal to zero for missing data.

Appendix A2.1 there is a detailed variable description. All variables are measured in the last available year before the executive change, so we perform the matching for each firm on the last available year before the executive change.

Using this approach yields two vectors of propensity scores,  $\hat{p}^{hiredUS}$  for all treated firms and  $\hat{p}^{control}$  for all control firms. We use the propensity scores to perform nearest neighbor matching with replacement and oversampling. However, we only match companies from the same industry (*Fama & French 49 industry classification*). In other words, we find the ten nearest neighbors (control firms) for each treated firm. We do not weight the matched firms (for a practical overview of PSM, see Caliendo and Kopeinig (2008)). Therefore, we match to each treated firm up to ten control firms based on the observables  $\mathbf{X}_{i,t}$ . In accordance with the literature (Austin 2011), we further require a difference in propensity scores (caliper) of less than 0.03. This approach generates firm groups  $\{hiredUS_i = 1; hiredUS_1 = 0; hiredUS_2 = 0; \dots; hiredUS_{10} = 0\}$ , where the individual firms are comparable. Table 2.2 presents summary statistics before and after the matching.

**Table 2.2: Summary Statistics**

	Panel A: unmatched, years from 2000 to 2020						Panel B: matched, years from 2000 to 2020					
	Control Firms			Treated Firms			Control Firms			Treated Firms		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
SIZE *	74,842	5.44	2.46	583	8.15	2.73	1,841	7.09	2.20	249	8.18	2.02
ROA *	74,842	0.15	10.69	583	0.13	0.22	1,841	0.09	0.09	249	0.12	0.10
LEV *	74,842	0.14	0.15	583	0.19	0.18	1,841	0.16	0.15	249	0.18	0.15
RD *	74,842	0.02	0.15	583	0.03	0.04	1,841	0.03	0.06	249	0.04	0.04
INTAN *	74,842	0.16	0.19	583	0.26	0.21	1,841	0.29	0.23	249	0.27	0.20
STR	74,842	0.28	0.07	583	0.24	0.08	1,841	0.27	0.06	249	0.23	0.07
GAAP ETR	67,098	0.27	0.16	536	0.24	0.15	1,684	0.27	0.15	228	0.22	0.12
CURRENT ETR	60,662	0.25	0.17	291	0.27	0.18	1,388	0.27	0.16	126	0.25	0.15
CASH ETR	37,951	0.25	0.18	403	0.23	0.16	1,436	0.27	0.17	195	0.21	0.15

Notes: Sample sizes differ usually because of data availability. All variables with “\*\*” are used to calculate the propensity scores. Panel A includes the unmatched sample. Panel B includes the matched sample.

### Effects of New Executive from the U.S.

Based on our matched sample, we examine the effects of hiring new executives by European firms. Our objective is to gain a deeper understanding of the impact of differences in management cultures on corporate tax avoidance behavior. Therefore, we run the following regression for the years 2000 to 2020:

$$TAX_{it} = \alpha_1 hiredUS_i + \alpha_2 POST_t + \alpha_3 POST_t \times hiredUS_i + \rho_1 \mathbf{Z}_{it} + \rho_2 \theta_t + u_{it} \quad (2)$$

Our dependent variable is a tax measure of firm  $i$  in the year  $t$  like for example the *GAAP ETR*. Vector  $\mathbf{Z}_{it}$  includes different time varying firm-level controls and in most regressions the home country corporate income tax rate *STR* for a given year.

Moreover, we consider an indicator variable  $hiredUS_i$  that equals to one in case the European firm  $i$  has hired an executive from the U.S. one-time during our sample period, and zero otherwise. The indicator variable  $POST_t$  equals to one if financial year  $t$  is after the introduction of an executive from the U.S., and zero otherwise. The interaction term  $POST_t \times hiredUS_i$  denotes observations from the European firms that hired an executive from the U.S. for the years during that executive's work there. Consequently, the coefficient we are most interested in is on  $POST_t \times hiredUS_i$ ,  $\alpha_3$ , measuring the impact of the new introduced executive on the ETR of firm  $i$ . In the different specifications we include group-, year- and industry-specific effects. The group fixed effects are used to estimate a possible difference in ETR within a group of similar European firms. Consider that  $\alpha_3$  is effectively estimated by averaging across groups of firms and measures the response of a European treated firm  $i$  relative to a group of European control firm  $M$ .

## 2.4 Results

### 2.4.1 Impact on the Tax Position of European Firms after Hiring Executives from the U.S.

In a first step, we present unconditional comparisons and consider all European firms in our sample. We use the indicator variable  $hired\ US_i$ , which indicates whether firm  $i$  has introduced an executive from the U.S. ( $hired\ US = 1$ ) or not ( $hired\ US = 0$ ). Then, we run regressions similar to equation (2). The coefficient of interest is the effect of the interaction term  $POST \times hired\ US$  on the firms' ETRs.<sup>5</sup> The coefficient indicates the treatment effect after the introduction of an executive from the U.S. compared to other European firms without hiring an executive from the U.S. We also consider firm-level controls and year- and industry-specific effects. The results are shown in Table 2.3.

**Table 2.3: Basic Regression Unmatched**

Variables	GAAP ETR	CURRENT ETR
	1	2
hiredUS	-0.0234* (0.0123)	0.0102 (0.0207)
POST $\times$ hiredUS	-0.0393*** (0.0149)	-0.0673*** (0.0223)
Firm Characteristics	✓	✓
Year FE	✓	✓
Industry FE	✓	✓
N	67,630	60,949
Adj. R <sup>2</sup>	0.0762	0.0958

Notes: Regressions are based on the unmatched sample, where firms are headquartered in Europe; years from 2000 to 2020. Dependent variable is the *GAAP ETR* in column (1) and the *CURRENT ETR* in column (2). Robust standard errors are clustered at the firm level and are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

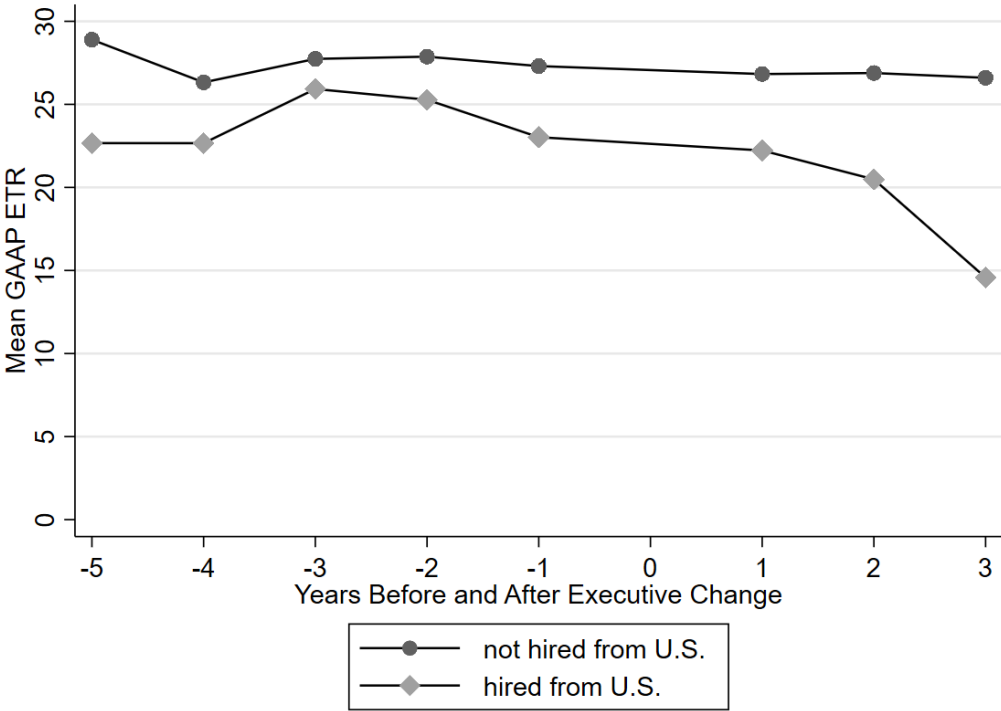
The dependent variable is the *GAAP ETR* in column (1) and the *CURRENT ETR* in column (2). The coefficients on  $POST \times hired\ US$  are negative and statistically significant in both specifications. The findings provide a first indication that ETRs decline after hiring an

<sup>5</sup> Note we cannot consider the indicator variable  $POST$  in the unmatched sample for the control group, as the executive changes occurred in different years, and we cannot assign a specific control firm to certain pre- or post-treatment periods.

executive from the U.S. However, these results could be affected by confounding effects due to firm heterogeneity. We therefore move on with a comparison of more similar firms.

To this end, we consider a matched sample of very similar companies, some of which have hired a top manager from the U.S., while the others have not. Based on PSM as described in section 2.3, we consider 1:10 nearest neighbor matching. We match each European firm that has hired a new executive from the U.S. with up to 10 European control firms without a U.S. executive, each within the same industry and with very similar firm characteristics.

**Figure 2.3: Unconditional Test**



Notes: Unconditional mean *GAAP ETRs* of European firms which introduce an executive from the U.S. (*Treatment Group*) and European firms without the introduction of an executive from the U.S. (*Control Group*) over the years. Excluding first year after the introduction of new executive.

Since we consider a difference-in-differences approach, the identification in our setting requires a parallel trend in the ETRs between the firms with a new executive from the U.S. and the firms in the control group before the hiring of top manager from the U.S. In Figure 2.3 we plot the mean *GAAP ETRs* over time, separately for our *treated* and *control firms*. The Figure

suggests a parallel trend of our sample firms during the time span preceding the hiring of a manager from the U.S.

In Table 2.4, we run regressions following equation (2) based on the matched sample. Our base regressions include 5 years prior to the executive change ( $POST = 0$ ) and 3 years after ( $POST = 1$ ) but excludes the year of the introduction of a new executive from the U.S.<sup>6</sup>

**Table 2.4: Basic Regression after Matching**

Variables	GAAP ETR		CURRENT ETR	CASH ETR
	1	2	3	4
hired US	-0.0127 (0.0177)	-0.0128 (0.0186)	0.0404 (0.0263)	0.0057 (0.0231)
POST	-0.0167 (0.0121)	-0.0198 (0.0177)	0.0422** (0.0211)	0.0247 (0.0197)
POST × hired US	-0.0446** (0.0215)	-0.0432** (0.0216)	-0.0867** (0.0340)	-0.1054*** (0.0297)
SIZE	0.0071* (0.0038)	0.0066 (0.0045)	0.0146*** (0.0055)	0.0091* (0.0048)
ROA	-0.3150*** (0.0720)	-0.3040*** (0.0725)	-0.3538*** (0.0783)	-0.4314*** (0.0712)
LEV	0.0622 (0.0548)	0.0573 (0.0572)	0.0358 (0.0538)	0.0438 (0.0586)
R&D	-0.1712 (0.1543)	-0.1776 (0.1355)	-0.1660 (0.1382)	0.1989 (0.1656)
INTAN	0.0045 (0.0391)	-0.0028 (0.0438)	0.0230 (0.0491)	0.0507 (0.0417)
STR	0.4775*** (0.1087)	0.4574*** (0.1059)	0.3335*** (0.1156)	0.3170** (0.1329)
Year FE	✓	✓	✓	✓
Group FE		✓	✓	✓
Industry FE	✓	✓	✓	✓
N	1,573	1,573	1,237	1,307
Adj. R <sup>2</sup>	0.1422	0.1578	0.1551	0.1681

Notes: Regressions are based on the matched sample, where firms are headquartered in Europe; years from 2000 to 2020, excluding the first year after the introduction of a new executive. Dependent variable is the *GAAP ETR* in columns (1) – (2), the *CURRENT ETR* in column (3), and the *CASH ETR* in column (4). See Appendix A2.1 for further variable description. Robust standard errors are clustered at the firm level and are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

<sup>6</sup> We exclude the years 4 and 5 after the introduction of an executive due to limited data availability. However, in a robustness test, we also include those years, see section 2.5.1.



In columns (1) to (2) of Table 2.4 the dependent variable is the *GAAP ETR*, in column (3) the *CURRENT ETR*, and in column (4) the *CASH ETR*. In columns (2), (3) and (4) we include fixed effects for matching groups and financial years.<sup>7</sup> In column (1) we include industry- and year-fixed effects. The variable of interest is still the interaction *POST* × *hiredUS*. Across all specifications in Table 2.4, the interaction term is negative and statistically significant. The results suggest a significant decline in the *GAAP ETR*, *CURRENT ETR*, and *CASH ETR* of European firms after hiring an executive from the U.S., compared to those European firms without an executive from the U.S. The effect amounts to an approximately 4.3 percentage points decline in the respective *GAAP ETR* and about 8.6 percentage points in terms of the *CURRENT ETR* compared to their peers. The *CASH ETR* declines on average by 10.5 percentage points. The effects correspond to annual tax savings of about \$10.5 million to \$25.7 million if an executive from the U.S. has been hired.<sup>8</sup>

The use of different ETR measures may allow us to distinguish between long-term/permanent and short-term tax shelters. However, for our research question, the distinction between the different ETR measures appears to be unnecessary for our analysis. Therefore, we disregard from the *CURRENT* and *CASH ETR* in the following regressions.

The findings in Table 2.4 confirm our first hypothesis H1. The hiring of an executive from the U.S. by a European firm is associated with a significant decline in ETR measures. The results might be interpreted in a sense that managers from the U.S. may have a particular management approach to tax issues and tax avoidance.

#### **2.4.2 Cross-Sectional Tests of Management Approach to Taxes**

Our results suggest that a hiring of a new executive from the U.S. is associated with declining ETRs of European firms in the aftermath. We argue that this effect can be explained

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<sup>7</sup> Note, that group-fixed effects also nest industry-fixed effects.

<sup>8</sup> Average tax expenditures of firms multiplied by the tax advantage (e.g. \$244.95 million × 0.043).

by a particular U.S. management approach to tax issues, which the new manager carries over from his or her previous employer. We conduct additional cross-sectional tests to further substantiate this thesis. If the manager's attitudes and abilities for tax issues are shaped by the management approach at the former employer, it should matter what management approach to taxes the manager experienced at his or her previous employer. In additional tests, we therefore consider the extent of observable tax avoidance by the former U.S. employer for each executive. That means, we track an executive's career prior to joining the European firm. We introduce two additional indicator variables, *US Avoider* and *US Non-Avoider*, to categorize managers according to the management approach of the former U.S. employer. To do so, we compare the *GAAP ETR* of the prior employed U.S. firm with the U.S. industry average *GAAP ETR* during the time the manager was employed. If the former employer's ETR is below the industry average, we set the variable *US Avoider* equal to one (and *US Non-Avoider* equal to zero); if above, we set *US Avoider* equal to zero (and *US Non-Avoider* equal to one).

Eventually, we repeat our regression analysis of Table 2.4. However, we now split the European firms that have hired an executive from the U.S. according to this classification of the former U.S. employer of the new manager. Thus, we now consider one subgroup of European firms that have hired a new executive from a tax avoiding U.S. company (*US Avoider* = 1), and a second subgroup of European firms that have hired a new manager from a non-tax avoiding U.S. company (*US Non – Avoider* = 1). In our regression analysis, we therefore replace the indicator variable *hired US* by the two new variables. However, we again compare these two groups with a matched sample of similar European firms that have not hired any executive from the U.S. Of main interest are now the interactions  $POST \times US\ Avoider$  and  $POST \times US\ Non-Avoider$ . The regression results are presented in Table 2.5.

The coefficients on  $POST \times US\ Non-Avoider$  are insignificant in all specifications while the coefficients on  $POST \times US\ Avoider$  are negative and significant. The results suggest

that the decline in ETRs of a European firm after hiring an executive from the U.S. is associated with a low ETR of the previous U.S. employer. If a manager previously worked for a U.S. firm that reports a high ETR, no significant effect on the ETR of the new European employer can be observed. The additional findings support the view that managers are influenced by the actual management approach to taxes of the former U.S. firm. Therefore, the results also confirm our hypothesis H2. Moreover, the continuing tax avoidance at the new employer in Europe further supports the existence of a certain approach to tax issues and tax avoidance of managers in the U.S.

**Table 2.5: Tax Avoidance of Previous Employer of U.S. Executives**

Variables	1	2
US Avoider	0.0048 (0.0239)	0.0094 (0.0222)
US Non-Avoider	-0.0157 (0.0159)	-0.0139 (0.0187)
POST	0.0087 (0.0098)	-0.0097 (0.0121)
POST × US Avoider	-0.0499* (0.0257)	-0.0497* (0.0256)
POST × US Non-Avoider	-0.0014 (0.0223)	0.0012 (0.0244)
Firm controls	✓	✓
Year FE	✓	✓
Group FE		✓
Industry FE	✓	✓
N	1,974	1,974
Adj. R <sup>2</sup>	0.1440	0.1586

Notes: Regressions are based on the matched sample, where MNCs are headquartered in Europe; years from 2000 to 2020; excluding the first year after the introduction of a new executive. The dependent variable is the *GAAP ETR* in all specifications. The variable *US Avoider* (*US Non-Avoider*) indicates whether the U.S. firm, in the manager's previous employment engaged in tax avoidance. Robust standard errors are clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

### 2.4.3 Influence of Personal Cultural Background of Managers

Our findings may support a particular tax management approach or even management culture that is prevalent in U.S. firms. However, the personal cultural background of the manager may also be responsible for a declining ETR after the new manager has taken up his position. We therefore analyze whether an executive's personal cultural background also affects tax avoidance at their new employer. In particular, we examine whether an executive has close personal ties to the U.S. culture. As proxy for a strong U.S. cultural background we consider if a new manager has U.S. citizenship.

We introduce a new indicator variable *US Citizenship*, indicating whether the executive's nationality is U.S. American (*US Citizenship* = 1) or not (*US Citizenship* = 0). In our treatment group, there are 21 executives with U.S. citizenship. In addition, we consider an interaction term of the new variable *US Executive* and our variable *POST* indicating financial years after the appointment of a new top-manager. In Table 2.6 we present the additional regression results.

Variables of interest are again the interaction terms. The coefficients of *POST* × *hiredUS* is negative and still statistically significant, while the coefficients of *POST* × *US Citizenship* is insignificant. Thus, we cannot confirm that being an U.S. citizen is associated with an additional reduction of ETRs after joining a European firm. Consequently, we reject our hypothesis H3. Moreover, the results of Table 2.6 again support our hypothesis H1 and the view that the effect on the ETR of the new employer is associated with a track record of the new managers - regardless of their nationality - at U.S. firms where they gained experience with the management approach to taxes.

**Table 2.6: U.S. Management Approach vs. U.S. Citizenship of Managers**

Variables	1	2
hired US	-0.0261 (0.0185)	-0.0199 (0.0208)
US Citizenship	0.0528 (0.0384)	0.0352 (0.0383)
POST	-0.0183 (0.0122)	-0.0183 (0.0179)
POST × hired US	-0.0453** (0.0219)	-0.0445* (0.0227)
POST × US Citizenship	-0.0194 (0.0333)	-0.0234 (0.0340)
Firm controls	✓	✓
Year FE	✓	✓
Group FE		✓
Industry FE	✓	✓
N	1,639	1,639
Adj. R <sup>2</sup>	0.1543	0.1701

Notes: Regressions are based on the matched sample, where MNCs are headquartered in Europe; years from 2000 to 2020, excluding the first year after the introduction of a new executive. The dependent variable is the *GAAP ETR* in all specifications. The variable *USexecutive* equals to one in case an executive has the U.S. citizenship and zero otherwise. The control group is free of U.S. executives. Robust standard errors are clustered at the firm level and are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

#### 2.4.4 Sustainability of the U.S. Management Approach in European Firms

According to our findings, executives transfer their management approach to taxes to their new employer in Europe. This section also explores the sustainability of this new management approach.

In a first test, we add hiring's of executives that did not immediately moved from a U.S. firm, e.g. they had already worked in a firm outside the U.S. before they were hired by our sample firms. More precisely, we now also add executives to our treatment group who were directly hired from a U.S. firm but worked in the U.S. at least for two years at some point in their career.

Regression results based on this larger sample are presented in columns (1) and (2) of Table 2.7. The coefficients on *POST × hired US* are still negative but insignificant across all

specifications. The results suggest that a time lag between working in the U.S. and starting as a new executive of a European firm weakens managers' attitudes toward tax avoidance. The imprint of a managerial approach is not necessarily long-lasting. This finding is also in accordance with results by Dittmar and Duchin (2015) who show that more recent work experience is important for financial policies.

**Table 2.7: Sustainability of U.S. Management Approach to Taxes**

Variables	Sustainability of Management Approach to Taxes		Exit of Executive from the U.S.	
	1	2	3	4
hired US	0.0138 (0.0177)	0.0157 (0.0173)		
POST	0.0035 (0.0088)	-0.0174 (0.0137)		
POST × hired US	-0.0136 (0.0211)	-0.0125 (0.0199)		
US exec left			-0.0618** (0.0243)	-0.0570** (0.0260)
POST2			-0.0040 (0.0095)	0.0221 (0.0144)
POST2 × US exec left			0.0362 (0.0228)	0.0397* (0.0219)
Firm controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Group FE		✓		✓
Industry FE	✓	✓	✓	✓
N	2,049	2,049	1,279	1,279
Adj. R <sup>2</sup>	0.1176	0.1441	0.1124	0.1351

Notes: Regressions are based on the matched sample, where firms are headquartered in Europe; years from 2000 to 2020, excluding the first year after the introduction of a new executive. The dependent variable is the *GAAP ETR* in all specifications. In columns (1) and (2), we include executives who worked in the U.S. at some point in their career. Columns (3) and (4) are based on our basic sample. *POST2* equals one if the fiscal year is within the first 5 years after the executive from the U.S. leaves the European firm. *US exec left* equals to one in case a European firm employed an executive who previously worked in the U.S. Robust standard errors are clustered at the firm level and are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

In a second test, we investigate whether the impact of the U.S. executive on the tax position of European firms is temporary or permanent. We are particularly interested what happens after the executive from the U.S. has left the European firm.

To answer this question, again we consider a matched sample. In this case, we consider companies where a manager from the U.S. has left the company again, and as control group, firms with a change of an executive in the same year. Our matching period is the year before the executive from the U.S. leaves the firm. In addition, we ensure that this time no company in the treatment and control groups choose a new executive from the U.S. However, the companies differ in whether they previously employed an executive with an U.S. career or a purely European career.

We again consider some indicator variables to perform a difference-in-differences approach with the matched sample. First, we introduce an indicator variable *POST2*, which equals one if an observation is from the period of 5 years after the executive left the European firm. Moreover, we consider a variable *US Exec left* that indicates the firms that employed an executive who previously worked for a U.S. firm. However, we are interested in the effect after the executive from the U.S. has left the firm. Consequently, our variable of interest is the interaction term between *POST2 x US Exec left*.

Table 2.7 columns (3) and (4) report the regression results of this additional analysis. In column (3) we include industry- and year-specific effects, and in column (4) we include year- and matching group-specific effects.<sup>9</sup> The coefficient on the plain indicator variable *US Exec left* reflects the ETR difference while a top manager from the U.S. was in office compared to similar European firms without an U.S. executive. In accordance with our previous findings, the difference is negative and statistically significant in all specifications. This result again suggests that an executive from the U.S. is associated with smaller ETRs.

Moreover, the coefficient of *POST2* is insignificant in all specifications, indicating that there is still no effect of an introduction of a new non-U.S. executive in the control group.<sup>10</sup>

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<sup>9</sup> Please keep in mind, that the group-specific effects also nest industry-specific effects.

<sup>10</sup> This finding is in accordance with additional investigations of executive changes within the same region. See section 2.5.4.

Of main interest is the coefficient on the interaction  $POST2 \times US\ exec\ left$ . The coefficient is positive in both specifications and marginally significant in column (4) if matching group-fixed effects are considered. This result provides weak evidence that the change in tax avoidance associated with an executive from the U.S. might be not sustainable. The transfer of the U.S. management approach to taxes to European companies only succeeds as long as the corresponding U.S. top manager is in office.

## 2.5 Robustness Checks and Additional Tests

In additional analyses, we provide several robustness checks and tests that address potential alternative explanations for the declining ETRs of European firms after hiring an executive from the U.S.

### 2.5.1 Robustness Tests

We begin with several robustness tests of our basic regressions in Table 2.4. The results are presented in Table 2.8. Columns (1) and (2) present the same regression as in column (1) of Table 2.4. However, in column (1), we only perform one-to-five matching, meaning that for each European firm that hires a U.S. executive, we match up to five control firms. In column (2), we perform one-to-three matching. The results confirm our initial findings and suggest that our results are robust against different matching specifications.

The year of a new executive's introduction may be influenced by various factors like the big-bath theory or by characteristics of the predecessor executive. Thus, in our basic regression we exclude the year of introduction, to prevent from biased effects. In an additional specification in column (3) of Table 2.8, we however include the year of the introduction of the new executive from the U.S. The coefficient of  $POST \times hired\ US$  is significant and qualitatively similar to our basic results.

Finally, in our basic regression, we have included only observations from the three years after the introduction of an executive from the U.S., because several executives from the U.S.



left the European firm after three years. However, in column (4), we consider up to five years after the introduction of an executive from the U.S. The results are consistent with our previous findings, although the effect on the ETR is slightly more pronounced.

**Table 2.8: Robustness Checks and Additional Tests**

Variables	Robustness Tests				BTD				Manager Characteristics			
	1	2	3	4	5	6	7	8	6	7	8	
hired US	-0.0178 (0.0180)	-0.0120 (0.0195)	-0.0174 (0.0183)	-0.0166 (0.0181)	-43.3593 (109.7718)	0.0017 (0.0228)	-0.0027 (0.0184)	-0.0074 (0.0209)	0.0017 (0.0228)	-0.0027 (0.0184)	-0.0074 (0.0209)	
POST	-0.0026 (0.0171)	0.0032 (0.0198)	-0.0024 (0.0139)	-0.0023 (0.0142)	-51.8095* (28.4923)	0.0124 (0.0191)	0.0071 (0.0144)	0.0107 (0.0152)	0.0124 (0.0191)	0.0071 (0.0144)	0.0107 (0.0152)	
POST × hired US	-0.0440** (0.0208)	-0.0531** (0.0217)	-0.0390** (0.0188)	-0.0505*** (0.0179)	229.4923** (115.5724)	-0.0539** (0.0253)	-0.0485** (0.0228)	-0.0408* (0.0247)	-0.0539** (0.0253)	-0.0485** (0.0228)	-0.0408* (0.0247)	
Firm controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Group FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Industry FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Executive Gender						✓			✓		✓	
Executive Age										✓	✓	
N	1,177	789	1,801	1,912	4,002	592	698	579	592	698	579	
Adj. R <sup>2</sup>	0.1325	0.1568	0.1498	0.1568	0.6697	0.1826	0.1758	0.1661	0.1826	0.1758	0.1661	

Notes: Regressions are based on the matched sample, where firms are headquartered in Europe; years from 2000 to 2020, excluding the first year after the introduction of a new executive in columns (1), (2) and (4) to (8). In columns (1) to (3) and (6) to (8) the dependent variable is the *GAAP ETR*. In column (5) the dependent variable are the *Book-Tax-Differences*. In column (1) we perform one-to-five and in column (2) one-to-three matching. In column (3) we include the first year after the introduction of a new executive, and in column (4) we include up-to five years after the introduction of a U.S. executive. Columns (5) to (8) are based on the basic regression. In column (6), we include a dummy for the gender of the CEO and a dummy for the gender of the CFO. In column (7), we include two dummies for the age of the CEO and the CFO, respectively. Column (8) includes all characteristics of these executives. Robust standard errors are clustered at the firm level and shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

## 2.5.2 High Number of Loss-Years after Hiring a New Manager

The management and accounting literature show that new managers tend to disclose negative valuations immediately after the beginning of their term, and therefore also report above-average losses (so-called big-bath). This could lead to a sample selection, as the ETR measures cannot be properly interpreted in the case of losses, and we have therefore omitted all firm-loss years. (e.g. Drake, Hamilton, and Lusch 2020; Wolff 2021). Consequently, big-bath behavior of new executives could lead to a biased effect for the hiring of a new manager from the U.S. In an additional analysis, we therefore consider *BTD* as an alternative tax measure that allows including financial years with firm losses.<sup>11</sup> A large *BTD* is an indicator that a firm is successfully avoiding taxes or successfully engaging in earnings management (for further discussion see Wolff 2021).<sup>12</sup>

In column (5) of Table 2.8 we consider a regression using *BTD* as the dependent variable. The coefficient on  $POST \times hired\ US$  is positive and statistically significant. The increase in *BTDs* after hiring an executive who has previously worked in the U.S. supports our previous findings. A new manager from the U.S. is associated with more tax avoidance. Even if we include loss-years, our results are robust.

## 2.5.3 Influence of Manager Characteristics

Previous studies suggest that not only individual managers but also certain manager characteristics play a systematic role in determining a firm's tax planning and avoidance (e.g., Phillips 2003; Rego and Wilson 2012; Armstrong, Blouin, and Larcker 2012; Francis et al.

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<sup>11</sup> The *BTD* is defined as:  $BTD = \frac{pi - \frac{txc}{str}}{at}$  where *pi* is the pre-tax income, *txc* are the current tax expense, *str* is the statutory corporate tax rate in the home country and *at* are the total assets. However, there has been some criticism due to systematically different consolidation rules and handling of tax credits between the book and tax account (Hanlon 2003; Gaertner, Laplante, and Lynch 2016).

<sup>12</sup> We are well aware, that some of the studies using *BTDs* also exclude loss-observations (e.g., Blaylock, Shevlin, and Wilson 2012; Hanlon 2005). However, there are some studies that do not exclude loss-observations (e.g., Lisowsky 2010; Seidman 2010; Lennox, Lisowsky, and Pittman 2013). Since we use the *BTDs* only for a cross-check validation, we will not discuss this issue further.

2014). Therefore, we conduct additional robustness checks and control for manager characteristics. In columns (6) to (8) of Table 2.8, we augment our baseline regressions by controls for various manager characteristics. In column (6) we control for the executive's gender, in column (7) we control for the age of the executives, and in (8) we control for all of these characteristics. The coefficients on  $POST \times hiredUS$  are negative and statistically significant in all specifications, and the magnitude is quite similar to the base regression in Table 2.4. Therefore, particular manager characteristics may not be the reason for decreasing ETRs after hiring an executive from the U.S.

#### **2.5.4 Effects of New Managers per se**

New managers are regularly hired to enhance the company's strategy and performance. In further analyses, we investigate whether the lower ETR after hiring a U.S. manager can be attributed to the simple fact that the starting period of each new manager is per se associated with a lower tax rate. We might expect that new managers attempt to improve various aspects of their new firm and thus, also initiate measures to reduce the tax rate. To address this alternative explanation, we consider two alternative compositions of our control firms.

First, we consider as control firms only those European firms that have also hired a new executive in the same period as the firm with the new executive from the U.S. However, the control firms do not hire an executive from the U.S. Thus, we compare European firms, that have all decided to hire a new executive in the same year. But some companies have hired a manager from the U.S., while others have hired a new executive from Europe. Again, we consider the three financial fiscal years following the appointment of a new manager. However, since the control group now only contains companies that also hired a new executive in the same year, the indicator variable  $POST$  is no longer just a time effect, but also reflects all observations directly after the start of a new manager, both from the treatment group (e.g. with the new U.S. manager) and from the control group.

The regression results are presented in columns (1) and (2) of Table 2.9. The coefficients of the indicator variable *POST* are insignificant. This finding suggests that hiring a new executive is per se not associated with a declining ETR. Moreover, the interaction term *POST*  $\times$  *hired US* is again negative and significant. However, the magnitude is slightly smaller in absolute values compared to our baseline regressions. These results again support the view that the hire of new executive from a certain region, the U.S., is associated with a decline in ETRs.

**Table 2.9: Effects of New Manager per se**

Variables	Change-to-Change		Change within Europe		History of European Executive	
	1	2	3	4	5	6
hired US	-0.0226 (0.0174)	-0.0211 (0.0181)	0.0018 (0.0051)	0.0009 (0.0053)		
EU Avoider					-0.0121 (0.0086)	-0.0078 (0.0089)
EU Non-Avoider					0.0014 (0.0085)	0.0016 (0.0088)
POST	-0.0081 (0.0107)	0.0081 (0.0129)	0.0006 (0.0039)	-0.0009 (0.0030)	-0.0057 (0.0041)	-0.0049 (0.0030)
POST $\times$ hired US	-0.0364* (0.0186)	-0.0369** (0.0185)	-0.0035 (0.0072)	-0.0023 (0.0072)		
POST $\times$ EU Avoider					0.0088 (0.0108)	0.0057 (0.0107)
POST $\times$ EU Non-Avoider					0.0095 (0.0109)	0.0075 (0.0109)
Firm controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Group FE		✓		✓		✓
Industry FE	✓	✓	✓	✓	✓	✓
N	1,835	1,835	23,692	23,692	19,854	19,854
Adj. R <sup>2</sup>	0.1241	0.1543	0.0788	0.0980	0.0895	0.1097

Notes: Regressions are based on the matched sample, where firms are headquartered in Europe; years from 2000 to 2020, excluding the first year after the introduction of a new executive. The dependent variable is the *GAAP ETR* in all specifications. In columns (1) and (2), we match treatment firms with control firms where an executive change took place in the same year. In columns (3) to (6) we include only firms headquartered in Europe but exclude firms where executives are introduced from outside Europe. I.e. in our treatment group, there are European firms which introduce a new executive from Europe and our control group is free of executive changes. The variable *EU Avoider* (*EU Non-Avoider*) indicates whether the firm, in the manager's previous employment engaged in tax avoidance. Robust standard errors are clustered at the firm level and shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

In a second set of regressions, we consider a sample of European firms but exclude any hires from outside Europe. That means we consider only new hires of executives from the same geographic region, i.e. from Europe. Although executives influence tax avoidance of their firms, we do not expect any significant effects on average. If there are a lot of changes, the positive and negative impact on tax avoidance by new executives should cancel each other out. Only if hiring new top managers per se is associated with an effect on tax avoidance during the first years in office, we should observe significant effects in a sample of hires from the same region with the same management approach.

In columns (3) and (4) of Table 2.9, our treatment group consists of European firms that have introduced a new executive from Europe once during the time period between 2000 and 2020 (*hired* == 1). Again, we consider up to five fiscal years before the new executive started and three years after they began. The firms of our control group had no executive change during the selected period. Therefore, we can identify an effect of an executive change of European firms considering an interaction term between *POST* × *hired*. The coefficients are insignificant across all specifications in columns (3) and (4) of Table 2.9. Our results again suggest that the hire of a new executive from Europe is not associated with a significant change in the ETRs of European firms.

The results suggest that the decline in the ETRs of European firms after hiring a new top-manager from the U.S. may be attributed to the transfer of a specific management approach to tax issues, rather than being a general consequence of a new top-manager taking office.

### **2.5.5 New Managers from Tax-Avoiding Firms**

Our analysis in section 2.4.2 suggests that declines in the ETRs of European firms mainly occur if the new executive from the U.S. previously worked for a high tax avoiding U.S. firm. However, one could argue that the finding does not reflect a particular U.S. management approach to taxes, but rather a more aggressive management approach to taxes in general. One

could therefore expect that hiring a new manager from another European firm, which also has a very low ETR, would be associated with a similar decline in the ETR of the hiring firm. To test this alternative explanation, we again consider the sample used in columns (3) and (4) of Table 2.9 (only new hires of executive from other European firms) but perform regression like in section 2.4.2. However, we now track the level of tax avoidance of the previous European firm because we now only consider hires from other European firms. Accordingly, we introduce new variables *EU Avoider* and *EU Non – Avoider*, as well as the respective interaction terms with our variable *POST* marking observations from fiscal years after the new executive was hired.

The respective regression results are presented in columns (5) and (6) of Table 2.9. All coefficients of the interaction terms are insignificant. The findings support the view that (i) the hire of a new executive who previously worked in Europe at a tax avoiding firm is not associated with a change in ETRs and (ii) the European management approach to taxes is not as influential as the U.S. management approach to tax issues.

## **2.6 Potential European Management Approach to Taxes**

The findings have shown that the transfer of U.S. managers to Europe is associated with lower ETRs of their new employers in Europe. We interpret the results in a sense that a particular management approach to tax issues prevails in the U.S., which is associated with lower ETRs and thus, more tax avoidance. However, the higher ETRs of European companies in the absence of a manager with a U.S. track record could also suggest that the prevailing management approach in Europe places particular emphasis on high tax payments. However, European managers could also simply consider the issue of tax and tax avoidance to be less relevant.

In additional analyses, we therefore examine whether a hire of managers with a strong European business background is associated with significantly higher ETRs of their U.S.

employer. To do so, we now consider job changes of European managers to the U.S. During the period from 2000 to 2020, we can consider 48 CEOs and CFOs who were hired by U.S. firms from Europe and data in *BoardEx* and *Compustat* are available.

We use the same research approach as before. However, now we compare U.S. firms. We again use the PSM approach described in section 2.3.2 to compare very similar U.S. companies that differ only in having hired an executive from Europe (treatment group) or not (control group). Again, we consider of each sample firm up to five years before hiring a new executive ( $POST = 0$ ) and three fiscal years after hiring ( $POST = 1$ ). Moreover, we introduce an indicator variable *hired EU*, which indicates whether a U.S. firm hired an executive who previously worked in Europe. Again, the dependent variable is the *GAAP ETR*. The variable of interest is the interaction term  $POST \times hired\ EU$ , which reflects a change in the ETRs of U.S. firms after an executive from Europe was hired. The results of this additional regressions are shown in columns (1) and (2) of Table 2.10.

The coefficients of the interaction term  $POST \times hired\ EU$  are insignificant in all specifications in Table 2.10. Column (3) of Table 2.10 shows the results of a specification in which the group of companies with a new manager from Europe is divided once again. Again, as in the previous analyses, this is based on the extent of tax avoidance by the new manager's previous employer, in this case the previous employers in Europe. The indicator variables *EU Avoider* and *EU Non – Avoider* reflect these two different cases. Moreover, we again consider interaction terms of these indicator variables and the well-known time specific indicator *POST*. The respective coefficients of the interaction terms are both insignificant in column (3) of Table 2.10.

The results in Table 2.10 suggest that the move of a European top manager to a U.S. firm is not associated with a change in the ETR of the U.S. firm. The findings suggest that there is another management approach to taxes in Europe. However, the results do not support the



view that managers from Europe are associated with paying significantly more taxes. Rather, the results support the view that European managers only place less relevance on the tax issue.

**Table 2.10: Executive Changes from Europe to U.S. Firms**

Variables	1	2	3
hired EU	0.0055 (0.0168)	0.0042 (0.0162)	
EU Avoider			-0.0562* (0.0309)
EU Non-Avoider			0.0162 (0.0305)
POST	-0.0016 (0.0198)	-0.0201 (0.0181)	0.0050 (0.0239)
POST × hired EU	-0.0005 (0.0260)	0.0053 (0.0311)	
POST × EU Avoider			-0.0008 (0.0397)
POST × EU Non-Avoider			-0.0182 (0.0446)
Firm controls	✓	✓	✓
Year FE	✓	✓	✓
Group FE	✓		✓
Industry FE	✓	✓	✓
N	1,296	1,296	983
Adj. R <sup>2</sup>	0.1204	0.1485	0.1907

Notes: Regressions are based on the matched sample, where firms are headquartered in Europe; years from 2000 to 2020, excluding the first year after the introduction of a new executive. The dependent variable is the *GAAP ETR* in all specifications. We include executives who worked in Europe directly before moving to a U.S. firm. Robust standard errors are clustered at the firm level and shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

## 2.7 Conclusion

Several studies have shown that U.S. MNC are fairly successful in tax planning and tax avoidance. In this study, we have investigated whether a particular management approach to tax issues can explain these findings. For identification we have exploited CEO and CFO job changes from the U.S. to European firms. We also used matching techniques to compare very

similar European companies that differed only in the background of their top managers: some firms having hired a manager from the U.S. and others not.

Our results suggest a significant decline in the ETRs after hiring an executive with a U.S. management background, relative to otherwise comparable European firms. This result could be interpreted as evidence for a management approach of U.S. managers that focuses more on tax issues. Further results support the view that it is a particular management approach regarding tax avoidance that matters. Additional analysis reveals that the decline in the effective tax rate only materializes in cases where the new executive from the U.S. had previously worked for a particularly tax-avoidant U.S. firm. Further tests and robustness checks support the view that the decline in ETRs is associated with the hire of executives from the U.S. Our main findings are robust against different matching techniques and tax measures and cannot be attributed to other manager characteristics or the starting period of a new top manager, regardless of where he or she previously worked. The personal cultural ties of a manager with U.S. citizenship cannot explain our main finding. We conclude from all these findings that the move of a manager from the U.S. to Europe also conveys a certain approach to tax issues. This further suggests a common management approach in the U.S. that puts greater emphasis on tax issues and tax avoidance.

Additional analysis suggests that this particular U.S. management approach does not last very long in the European business environment. We find no significant decline in ETRs if managers have a U.S. management background but have not immediately moved from a U.S. firm. Moreover, we find weak evidence that ETRs of European firms increase again after the U.S. executive has left the European firm.

Finally, we have also investigated job changes in the opposite direction from Europe to U.S. firms. The additional analysis reveals that hires of European executives by U.S. firms are

not associated with a change in ETRs. We infer that the management approach by U.S. managers places a special emphasis on tax issues.

Finally, we conclude from our findings that differences in the management approach to taxes between the U.S. and Europe contribute to differences in ETRs of U.S. and European firms. However, our results also have limitations. This relates in particular to the comparatively low number of changes of top managers between the U.S. and Europe over a long period of more than 20 years. Moreover, future research could attempt to understand why the differences in management approaches exist and persist over relatively long periods of time. In addition, the differences in techniques and strategies for tax planning as well as the reactions of tax administrations are not well understood.

## Appendix

**Table A2.1: Variable Definition**

GAAP ETR	$\text{txt} / (\text{pi} - \text{xi})$ , i.e., income taxes divided by pretax income, adjusted for extraordinary items (set to zero if missing); exclude outliers.
CURRENT ETR	$(\text{txt} - \text{txdi}) / \text{pi}$ , i.e., current taxes divided by pretax income; exclude outliers.
CASH ETR	$\text{txpd} / \text{pi}$ , i.e., taxes paid divided by pretax income; exclude outliers.
BTD (Book-Tax-Differences)	$(\text{pi} - (\text{txc}/\text{str}))/\text{at}$ , i.e., total difference between financial and taxable income, scaled by total assets.
ROA (Return on Assets)	$\text{pi} / \text{at}$ , i.e., pretax income divided by total assets.
SIZE	$\log(\text{at})$ , i.e., logarithm of total assets.
RD (Research & Development)	$\text{xrd} / \text{at}$ , i.e., research and development expense divided by total assets (set to zero if missing $\text{xrd}$ ).
LEV (Leverage)	$(\text{dlc} + \text{dltt}) / \text{at}$ , i.e., total debt divided by total assets.
INTAN (Intangibles)	$\text{intan} / \text{at}$ , i.e., intangibles divided by total assets (set to zero if missing $\text{intan}$ ).
STR (Statutory Tax Rate)	Statutory corporate tax rate of the firm's/subsidiaries home country.
POST	Dummy, which is one for the period after an executive from the U.S. was introduced.
POST2	Dummy, which equals one if the fiscal year is after the executive from the U.S. leaves the European firm.
hiredUS	Dummy, which is one for European firms introducing an executive, that previously worked at an U.S. firm.
hired	Dummy, which is one for certain firms introducing an executive, that previously worked at a firm in a certain country/region.
US executive	Dummy, which equals one if the introduced executive in a treatment firm is U.S. citizen.
US Avoider	Dummy, which is one if the introduced executive previously worked at an U.S. firm, that avoided taxes during the presence of the executive. A U.S. firm avoids taxes in case the average GAAP ETR is lower than the industry average.
US Non-Avoider	Dummy, which is one if the introduced executive previously worked at an U.S. firm, that did not avoid taxes during the presence of the executive. A U.S. firm does not avoid taxes in case the average GAAP ETR is equal to or higher than the industry average.
EU Avoider	Dummy, which is one if the introduced executive previously worked at a European firm, that avoided taxes during the presence of the executive. A European firm avoids taxes in case the average GAAP ETR is lower than the industry average.
EU Non-Avoider	Dummy, which is one if the introduced executive previously worked at a European firm, that did not avoid taxes during the presence of the executive. A European firm does not avoid taxes in case the average GAAP ETR is equal to or higher than the industry average.

Notes: Data are taken from *Compustat* and *Compustat Global*. Executive data is used by combining the *Compustat Global* and *BoardEx* databases.

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## **Chapter 3**

### **The Effects of the Tax Cuts and Jobs Act on the Tax- Competitiveness of Multinational Corporations**

# The Effects of the Tax Cuts and Jobs Act on the Tax-Competitiveness of Multinational Corporations

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## **Abstract:**

We exploit the 2017 U.S. tax reform to learn about the tax-competitiveness of U.S. multinational corporations (MNCs) relative to their international peers. Matching on the propensity score, we compare pairs of similar U.S. and European firms listed on the S&P500 or StoxxEurope600 in a difference-in-differences setting. Our results suggest significantly lower effective tax rates of U.S. MNCs compared to their European competitors after the U.S. tax reform. Additional tests show (i) that U.S. MNCs have gained substantially in what we call tax-competitiveness, (ii) that the reform effect is more pronounced for MNCs with a high share of domestic activity, and (iii) that the tax reform did not change the international tax-planning behavior of U.S. MNCs. We provide evidence that U.S. MNCs already successfully engaged in international tax planning prior to the reform, and this behavior is unchanged after the tax reform.

**Keywords:** effective tax rate, tax reform, tax-competitiveness, tax avoidance, pair matching, difference-in-differences analysis, profit shifting

**JEL Classification:** H25, H26, K34

**Acknowledgements:** We gratefully acknowledge funding from the German Research Foundation (DFG), grants OV 120/2-1, and FOR2783. We also thank the participants at the RSIT 2022 PhD Workshop on “Understanding Multinational Firm Behavior” in Tuebingen, and the participants of the European Accounting Association Conference 2022, for many helpful comments.



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### 3.1 Introduction

In December 2017, the “Tax Cuts and Jobs Act” (TCJA) changed the U.S. corporate income tax in a fundamental way. One key argument many U.S. policymakers made in favor of this major tax reform was that U.S. firms, compared to their international peers, were at a disadvantage because of the high U.S. tax on corporate income. This prompted the substantial corporate tax rate cut from 35% to 21%. Multinational corporations (MNCs) may be particularly affected by the TCJA because of significant changes in the taxation of foreign income. Most importantly, a territorial tax system (TTS) has been introduced to replace the old worldwide system.<sup>13</sup> At the same time, new anti-tax-avoidance rules aim to limit the tax avoidance and profit-shifting behavior of MNCs.

This paper provides an empirical analysis of the consequences of the TCJA for MNCs. Our study focuses on effective tax expenses, and especially effective tax rates (ETRs) measured at the firm (i.e., group) level. We follow a literature that has analyzed the ‘tax-position’ or ‘tax-competitiveness’ of U.S. firms by comparing average tax rates of U.S. firms to non-U.S. benchmark firms (Collins and Shackelford 1995, 2003). A particular goal of our paper is to learn whether the TCJA has indeed improved the tax-competitiveness of U.S. MNCs compared to their direct international competitors.<sup>14</sup> We also analyze how the changes in international taxation have affected the tax avoidance and profit-shifting behavior of U.S. MNCs.

A few previous papers have studied the consequences of the TCJA for U.S. firms. Dyreng, Gaertner, Hoopes, and Vernon (2023) analyze the effect of the TCJA on different ETR measures within U.S. firms. They show for a broad sample of U.S. firms that both domestic and international firms have benefited from the reform, but domestic firms reduced their ETRs to a

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<sup>13</sup> As for the U.S. tax system in practice, the distinction between worldwide and territorial system has never been completely clear. Prior to the TCJA, U.S. MNCs could avoid worldwide taxation by deferring profit repatriations; the new system still features elements of a worldwide tax system such as the GILTI provisions (see below).

<sup>14</sup> See, for example, Collins and Shackelford (2003, 1995) and section 3.2 for the use of the term *tax-competitiveness*.

greater extent than U.S. multinational firms. Garcia-Bernardo, Janský, and Zucman (2022) investigate potential changes in profit-shifting activities of U.S. firms after the TCJA. Their findings suggest that the share of foreign income reported by U.S. firms in tax haven countries remains stable in the aftermath of the tax reform. Our analysis is the first to examine the influence of the TCJA on the tax-competitiveness of U.S. MNCs in comparison to their international peers.

Studies examining the situation before the TCJA suggest that U.S. firms were at a competitive disadvantage compared to their international peers due to the high U.S. corporate tax rate (PriceWaterhouseCoopers 2011; Markle and Shackelford 2012; Overesch, Strueder, and Wamser 2020). Overesch et al. (2020) show, however, that U.S. MNCs were able to largely compensate for this disadvantage through international tax avoidance. Recent papers by Gaertner, Hoopes, and Williams (2020) and Brusco (2021) investigate capital market reactions to the TCJA. Gaertner et al. (2020) find positive returns not only in the U.S. market, suggesting that investors believe that also non-U.S. firms could benefit from the U.S. tax reform. The study by Brusco (2021) suggests that especially profitable firms, and those in concentrated industries, benefited the most from the reform.

To avoid potential confounding effects, we compare similar firms from the U.S. and Europe. The latter group of European firms is chosen in such a way that it constitutes a well-defined benchmark against which we can evaluate the effects of the TCJA in a difference-in-differences setting. We employ a dataset of the largest U.S. MNCs, listed in the *S&P500*, and the largest European firms, listed in the *STOXXEurope600*. Additionally, we use propensity-score matching to compare pairs of similar U.S. and European MNCs. For example, in our matched sample, we compare the U.S. motor company *GM* with German *BMW* or the defense corporation *Lockheed Martin* with the British *BAE Systems*. One goal of this approach is to make sure that matched firms are ultimately international competitors.

Before running difference-in-differences regressions, we show in unconditional tests that the ETRs of matched treated (U.S.) and control (European) firms move in a parallel way until the implementation of the TCJA – an empirical fact that can be ascribed to our matching approach and the absence of major tax reforms in the periods before the TCJA.

Regression analyses of our matched sample suggest substantial reform effects: the average *GAAP ETR* of U.S. MNCs decreases by about 7.5 percentage points (as a result of the reform). Regarding the competitive position, the average *GAAP ETR* of U.S. MNCs is about 4.2 percentage points lower than that of European MNCs after the TCJA. Our results also apply to the *CURRENT ETR* as an alternative tax measure. We interpret this as evidence that the reform succeeds in improving the tax-competitiveness of U.S. MNCs. The competitive tax advantage corresponds to an average annual tax saving of about \$24.5 million per U.S. firm (in our sample).

We then focus on the international activities of U.S. MNCs. We particularly investigate how the move away from worldwide taxation and new anti-abuse provisions have affected the international tax avoidance of U.S. MNCs compared to their direct peers. Compared to the findings by Dyreng et al. (2023) for a broader sample of U.S. firms, our results suggest smaller TCJA effects for our sample of large listed firms. While Dyreng et al. (2023) already showed that U.S. international firms benefited less than purely domestic firms, our analysis shows that the TJCA effect also declines with the share of foreign activities – firms with a strong international focus benefit less. Dividing U.S. firms into groups given the distribution of foreign activities allows us to estimate tax pass-through ratios; that is, how much of the 14 percentage points of the U.S. tax cut is reflected in ETRs. The pass-through ratios range from about 0.84 (84%) (for firms with a small share of foreign business) to only about 0.21 (21%) (for firms with a high share of foreign business).<sup>15</sup>

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<sup>15</sup> Note that full pass-through (i.e. 14 percentage points) would correspond to a pass-through ratio of 1 (100%).

In additional analyses, we investigate potential effects of the new anti-abuse legislation, called GILTI (Global Intangible Low Tax Income). If a firm is affected by the regulation, it is subject to higher U.S. taxes or can adjust their international tax structures (see e.g. Donohoe, McGill, and Outslay 2019; Clausing 2020).<sup>16</sup> We find some evidence that U.S. MNCs benefit less from the TCJA in terms of a lower ETR if GILTI is likely to be binding.

To learn more about income-shifting behavior before and after the reform, we use additional subsidiary-level data of our matched sample of U.S. and European MNCs. Based on the approach of Hines and Rice (1994), our findings suggest that the TCJA has not changed the profit-shifting behavior of U.S. MNCs. Thus, the results indicate that the combination of abolishing the worldwide tax system (WWTS) and the new GILTI regulation did not change the tax-avoidance behavior of U.S. MNCs. What our estimates do show conclusively, however, is that U.S. MNCs are generally more tax-sensitive in their tax-planning behavior compared to their international peers – both before and after the TCJA. Quantitatively, we estimate a tax semi-elasticity of reported profits, which is about twice as high as that of European firms (and the benchmark estimates provided in earlier contributions).<sup>17</sup> This is consistent with and complements the findings in Tørsløv, Wier, and Zucman (2022), based on macroeconomic data and focusing on tax haven countries: U.S. multinationals shift twice as much profit as other multinationals.

Our results complement recent findings by Garcia-Bernardo et al. (2022). Their analysis suggests that the share of profits reported by U.S. firms in typical tax haven countries has remained unchanged after the TCJA. Our analysis supports this view to the extent that U.S. MNCs continue to benefit from their profit-shifting activities in mainly non-haven countries.

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<sup>16</sup> Clausing (2020) provides a simulation of GILTI effects, and expects that profit shifting of U.S. MNCs should decline.

<sup>17</sup> For consensus estimates, see Heckemeyer and Overesch (2017), and Beer, Mooij, and Liu (2020).

In other words, compared to their European peers, U.S. MNCs still have a competitive advantage in terms of international tax avoidance.

In addition to an evaluation of the U.S. tax reform, we contribute to (i) the discussion on the tax-competitiveness of U.S. firms, (ii) our understanding of the consequences of the international tax system, and finally to (iii) the controversy about ‘aggressive’ tax-avoidance behavior of U.S. MNCs. Moreover, our empirical approach can be utilized in future research to evaluate the effects of other tax reforms on the tax-competitive position of MNCs.

The remainder of the paper is organized as follows. In the next section, we present testable hypotheses. In section 3.3, we describe our data and our research design. We then present the results. We first provide a broad and thorough explorative analysis of our dataset. Thereafter, we estimate reform effects using our difference-in-differences setting. In additional analyses, we address questions of international tax avoidance at the subsidiary level. In section 3.5, we discuss the effects of the TCJA on the tax-competitiveness of U.S. MNCs. Section 3.6 concludes.

## **3.2 Consequences of the 2017 Tax Cuts and Jobs Act**

### **TCJA and Effective Tax Rates of U.S. MNCs**

The TCJA was signed into law on December 22<sup>nd</sup>, 2017. Most provisions of this major tax reform came into force in 2018. One of the main objectives of the TCJA has been to improve the competitiveness of U.S. firms (and many tax experts argued before the reform that the old system put U.S. firms at a disadvantage compared to European ones). U.S. companies should benefit from several elements of the TCJA. Most importantly, the bill features a corporate tax rate cut from 35% to 21% and immediate expensing of certain new capital investments.

The TCJA effect could significantly depend on the degree of a firm’s internationalization. One fundamental change, with substantial consequences for the international business activities of U.S. MNCs, is that the WWTS for foreign income was

abolished and replaced by a TTS. The distinction between WWTS and TTS and the associated effects are far from clear, though. First, foreign income was only subject to U.S. taxation if it was repatriated.<sup>18</sup> Several studies suggest that U.S. MNCs had postponed repatriations (see e.g. Desai, Foley, and Hines 2003; Desai, Foley, and Hines 2004; Foley, Hartzell, Titman, and Twite 2007; Azémar 2010). Second, many U.S. firms recognized their foreign income as permanently reinvested earnings, and avoided the disclosure of deferred taxes.

The TCJA also retained elements of a WWTS – in case foreign taxes are fairly low. Effectively, a new rule called GILTI applies if foreign income is subject to a tax level lower than 13.125%. If so, 50% of the foreign income is subject to U.S. taxation if it exceeds a certain return, depending on its qualified business assets. Lyon and McBride (2018) argue that the GILTI regime may at least partly offset the benefits of the new territorial system.

Finally, firms with international activities can now benefit from a special tax regime called FDII (Foreign Derived Intangible Income). Income received by a U.S. firm from sales of goods and services outside the U.S. is then effectively taxed at a lower rate of 13.125%. However, the effective tax expenses of MNCs may also increase if they are subject to another new provision called BEAT (Base Erosion and Anti-Abuse Tax). BEAT aims at limiting the deductibility of intercompany payments to low tax countries. Therefore, the final income tax due is the maximum of the regular tax liability or 5% on the pre-tax income adjusted for international intercompany payments (starting in 2019 with 10% and after 2025 with 12.5%).

In this paper, we analyze in a first step how effective taxes of large U.S. MNCs have been affected by the TCJA. We measure a corporation's tax burden to learn about the TCJA consequences using the *GAAP ETR* that is disclosed in accordance with generally accepted accounting principles in the consolidated financial accounts of each MNC. The *GAAP ETR* is

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<sup>18</sup> However, prior to the TCJA, there were already anti-abuse provisions in place (e.g. Subpart F and Section 956), triggering immediate taxation of certain foreign earnings without actual repatriation.



easily available in the financial reports of MNCs and often referred to in public debate.<sup>19</sup> A particular feature of the *GAAP ETR* is that it is unaffected by tax base rules. For example, in the context of the TCJA, the current tax benefit from the immediate expensing of new capital investment is offset by additional deferred taxes. Alternatively, we therefore consider the *CURRENT ETR* and the *CASH ETR*. These tax measures exclude, by definition, any influence of deferred taxes.

It is well known that many U.S. firms with foreign activities used international tax avoidance schemes to reduce their overall tax burden. Compared to before the reform, we may thus expect that U.S. domestic firms actually benefit more from the TCJA than U.S. MNCs (see also Dyreng et al. (2023), for this argument). The benefits from the significant tax rate cut might be at least partly offset by the new tax provisions for international activities. Moreover, the asymmetric effect of the international tax provisions should rise in the scope of international activities. Therefore, we state our first hypothesis (H1):

***H1:*** *U.S. MNCs with substantial foreign activities benefit relatively less from the U.S. tax reform than U.S. MNCs with smaller foreign activities.*

In additional tests, we also distinguish between ETR measures of purely domestic taxes (*DOMESTIC ETR*) and foreign taxes (*FOREIGN ETR*). The tax-rate cut, expensing of capital investments, and the FDII, should mainly have an effect on the *DOMESTIC ETR*; foreign taxes may be unaffected by the tax reform. Foreign taxes may even increase if international tax avoidance is reduced (see below). We therefore state hypothesis H2:

***H2:*** *Domestic effective taxes of U.S. MNCs decrease after the TCJA, while foreign effective taxes are unaffected or increase.*

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<sup>19</sup> In the accounting literature, the *GAAP ETR* is defined as the ratio of tax expenses (Compustat variable: txt) to pre-tax income (pi). Pre-tax income is adjusted for extraordinary items (xi).

## **Tax-Competitiveness Effects of the U.S. Tax Reform**

We continue with an analysis of how the reform has affected the competitive position of U.S. MNCs. Studies by Collins and Shackelford (1995, 2003) were the first to investigate what they call ‘tax-competitiveness’ of U.S. firms by comparing average tax rates of U.S. MNCs to non-U.S. benchmark firms. Higher taxes of U.S. firms compared to their international peers places U.S. MNCs in a competitive disadvantage because taxes are associated with a cash outflow. For example, Donohoe, Jang, and Lisowsky (2022) confirm negative economic effects for competitors that could not benefit from lower taxes.

Many tax experts argue that U.S. MNCs had a global disadvantage before the TCJA. A number of previous studies also provide conditional and unconditional comparisons of ETRs of U.S. MNCs and foreign companies before the TCJA (for example, PriceWaterhouseCoopers 2011; Markle and Shackelford 2012; Avi-Yonah and Lahav 2012; Overesch et al. 2020). Most closely related to our setting is the study by Overesch et al. (2020), suggesting – prior to the TCJA – higher ETRs of U.S. MNCs in terms of the *GAAP ETR*, but lower *CURRENT* and *CASH ETRs* of U.S. MNCs compared to their European peers. The study also reveals that U.S. MNCs could already benefit from increased tax avoidance, while they suffered from the high statutory corporate tax rate of 35% until 2017 (the high statutory tax rate would naturally reflect in ETRs).

Foreign MNCs may also benefit from the TCJA if they are operating in the United States. In particular, to the extent that U.S. subsidiaries and branches of foreign MNCs are subject to the U.S. corporate income tax. Recent research by Gaertner et al. (2020) examines capital market reactions to the TCJA and finds that investors believe that non-U.S. firms could also benefit from the U.S. tax reform.

To explore the question of whether U.S. firms have gained tax-competitiveness through the TCJA, we move on with a sample of large U.S. MNCs and their European competitors. The

latter allows us to define a benchmark against which we can measure the TCJA effect, and thus, learn about the causal consequences thereof (note that in additional tests, we choose the European controls in a way to ensure that these are, most likely, unaffected by the TCJA). Let us state hypothesis H3:

*H3: U.S. MNCs report lower ETRs than their European competitors after the U.S. Tax Reform.*

### **Effects on Foreign Taxes and International Tax Avoidance**

Subsidiaries or branches of U.S. MNCs are subject to taxation in their respective host countries. As a consequence, U.S. MNCs could benefit from low tax rates or tax haven countries. We therefore place a particular focus on the international aspects of the TCJA. The most important change in the context of international taxation is the switch from a WWTS to a TTS.

Previous studies suggest that the incentive effects through the new TTS may not be large. This is because U.S. firms already avoided U.S. taxes by deferring or recognizing foreign income as permanently reinvested earnings. Furthermore, international activities are subject to certain rules introduced by the TCJA, in particular the GILTI, BEAT and FDII provisions (see above). In particular, GILTI leads to U.S. taxation if U.S. MNCs are successfully avoiding international taxes, and the effective foreign tax level is low. We therefore test hypothesis H4:

*H4: The TCJA effect on ETRs is smaller for those U.S. MNCs that are probably affected by the new GILTI regime.*

An important aspect of international tax avoidance is profit shifting. MNCs use several techniques such as intrafirm interest payments, royalties or transfer pricing, to report taxable profits in low tax locations or even tax havens. While the introduction of the exemption system could incentivize U.S. MNCs to intensify their income shifting, anti-avoidance rules such as GILTI should limit profit-shifting incentives. A simulation by Clausing (2020) suggests a

decline in the profit shifting of U.S. MNCs as a consequence of GILTI. However, an analysis of aggregated country-by-country reporting (CbCR) data by Garcia-Bernardo, Janský, and Tørsløv (2021) rejects the hypothesis that incentives for tax-driven profit allocation are removed. Their findings show that the share of foreign income booked in tax havens by U.S. firms has remained stable between 2015 and 2020. In contrast, a study by Atwood and Johnson (2021) suggests that U.S. MNCs increased their income shifting activities in the first two years after the TCJA.

In additional tests, we utilize *subsidiary-level* data and examine the potential consequences of the TCJA on profit shifting within MNCs. Previous studies examine the relationship between the local tax level and the reported profitability of affiliates (see Hines and Rice 1994; Huizinga and Laeven 2008; Dowd, Landefeld, and Moore 2017). Similar to our previous analysis, we again compare U.S. and European MNCs and state the following hypothesis H5:

**H5:** *U.S. MNCs reduce their profit-shifting activities after the TCJA.*

### **3.3 Data and Research Design**

#### **3.3.1 Data and Explorative Analysis**

Our sample consists of firms headquartered in the U.S. or the EU. We consider firms that were either listed in the *S&P500* or the *StoxxEurope600* at least once during the period 2000 to 2020 and with at least one foreign subsidiary. Our base sample consists of 433 U.S. and 754 European multinational firms (see Table 3.1). We consider consolidated financial data taken from *Compustat* and *Compustat Global*. The main benefit of using consolidated information is the inclusion of all worldwide activities of an MNC, including tax planning in tax havens. These activities are often missing in subsidiary-level datasets (Fuest, Hugger, and Neumeier 2022; Tørsløv et al. 2022). However, we also consider subsidiary-level and non-

consolidated financial information of these respective multinational groups, taken from the *Amadeus* database.

**Table 3.1: Sample Selection**

Description	European Firms		U.S. Firms	
	Firms	Firm-Years	Firms	Firm-Years
Index Firms	991	-	927	-
Included in Compustat and Amadeus	831	15,367	464	8,956
Headquarters in EU / USA	754	13,649	433	8,129
Non-Miss. Controls	744	11,503	433	7,194
Non-Miss. Controls & GAAP ETR	742	10,754	431	6,691

Notes: The sample is based on firms that were included in the S&P500 or StoxxEurope600 stock market indices at least once during the period 2000 to 2020.

For most empirical tests, we use alternative ETR measures as indicators for tax expenses (Hanlon and Slemrod 2009; Dyreng, Hanlon, and Maydew 2010). The computation of ETRs is based on information provided in consolidated financial statements.<sup>20</sup> In our main analysis, we focus on the *GAAP*, *CURRENT* and *CASH ETR* of firms. The *GAAP ETR* is defined as the ratio of tax expenses (Compustat variable: *txt*) and pre-tax income (*pi*).<sup>21</sup> The variable tax expense includes both current and deferred tax expenses. The *GAAP ETR* is easily available in the financial reports of MNCs and often referred to in public debate. A particular feature of the *GAAP ETR* is that it is unaffected by tax base rules because financial accounts consider deferred taxes for temporary differences between financial and taxable profits. Therefore, we also consider the *CURRENT ETR* and the *CASH ETR*. These alternative tax measures exclude, by definition, any influence of deferred taxes. The *CURRENT ETR* excludes deferred taxes from the numerator. The *CURRENT ETR* is defined as the ratio of current taxes (*txt-txdi*) and pre-tax income (*pi*). The *CASH ETR* only takes taxes paid in the current period into account. We define the *CASH ETR* as taxes paid (*txpd*) divided by pre-tax income (*pi*).

<sup>20</sup> Note that the consolidated information provided by *Compustat* and *Compustat Global* is based on different accounting standards. European firms normally account for IFRS rules and U.S. firms report in accordance to U.S.-GAAP. We exclude firm-year observations where the ETR is negative or greater than one. Further, we exclude the observation if the numerator or denominator is negative.

<sup>21</sup> We adjust pre-tax income for extraordinary items (*xi*). Missing values in the extraordinary items are replaced by including zeros.

We additionally use the *FOREIGN ETR* defined as the ratio of foreign taxes (*txfo*) and foreign income (*pifo*). Foreign taxes and foreign income are only reported for some European MNCs. For the other European MNCs, we follow an approach proposed in Overesch et al. (2020). We obtain domestic taxes and domestic income taken from the Amadeus database, and then subtract those from the overall taxes and income.<sup>22</sup>

In order to obtain some first insights into whether the TCJA changed the ETRs of firms, we simply compare the *GAAP*, *CASH* and *FOREIGN ETRs* for our base sample of U.S. and European MNCs during the period 2012 to 2019. We distinguish between a pre- and a post-reform period, that is, the fiscal years before and after the U.S. tax reform. We include the fiscal years ending between 2012 and November 2017 in the period before the TCJA, and fiscal years ending between December 2018 and 2019 in the period after the TCJA. Former President Donald Trump signed the TCJA on December 22nd, 2017. Firms with a fiscal year ending after December 22nd, 2017, thus had to recognize the changes in law within their annual reports. Consequently, we assume that all fiscal years ending between December 2017 and November 2018 are affected by potential one-time effects, and are therefore excluded from our main analysis.

Figure 3.1 depicts the development of the mean and median *GAAP ETR* for U.S. MNCs over time. We distinguish between three time sections.<sup>23</sup> During the first section, before the TCJA, 2012-2016, the *GAAP ETR* is at a constant level. For the period after the TCJA, 2018-2019, Figure 3.1 suggests significantly lower ETRs. In 2017, the year the TCJA was enacted, U.S. MNCs experienced a significant increase in the *GAAP ETR*. This effect may be attributed

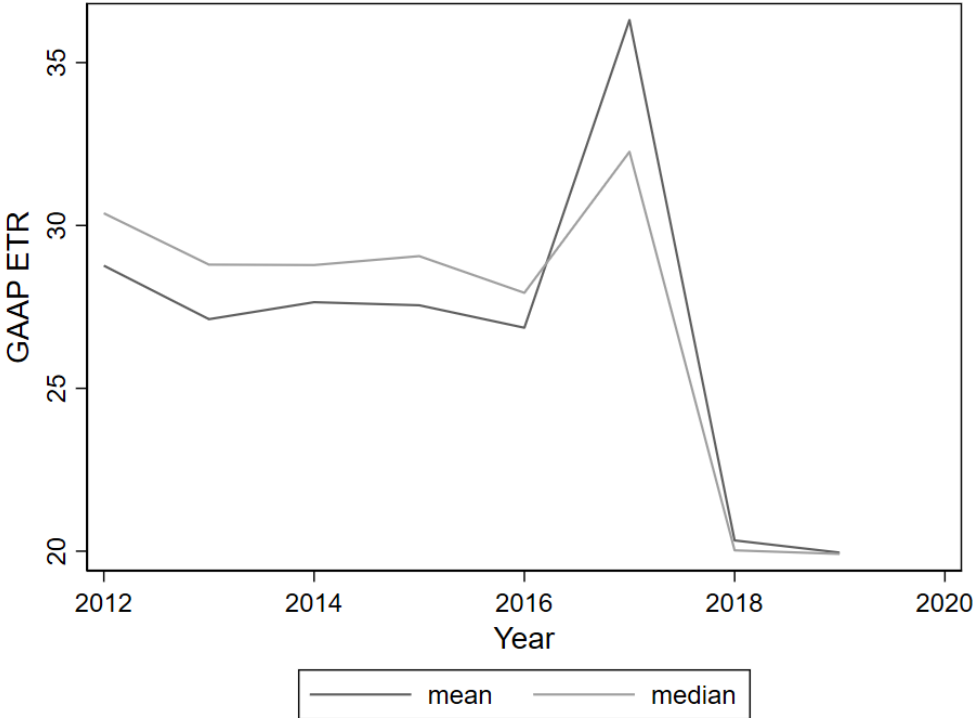
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<sup>22</sup> Overesch, Strueder, and Wamser (2020) provides a number of examples and tests regarding whether this approach leads to a plausible and sufficient coverage of firms. For some European MNCs, foreign taxes and foreign income is directly reported in *Compustat*. In this case, we directly use the reported data.

<sup>23</sup> Please note that in Figure 3.1, the year 2017 is defined as the reporting periods ending between December 2017 and November 2018. Reporting periods ending prior to December 2017 are therefore included in 2016 and periods ending between January and November 2018 are included in 2017.

to one-time effects such as the adjustment of deferred tax liabilities.<sup>24</sup> Further adjustments could be related to the introduction of the transition tax, payable over eight years. We therefore generally disregard the first year after the enactment as a transition period in the empirical analysis.

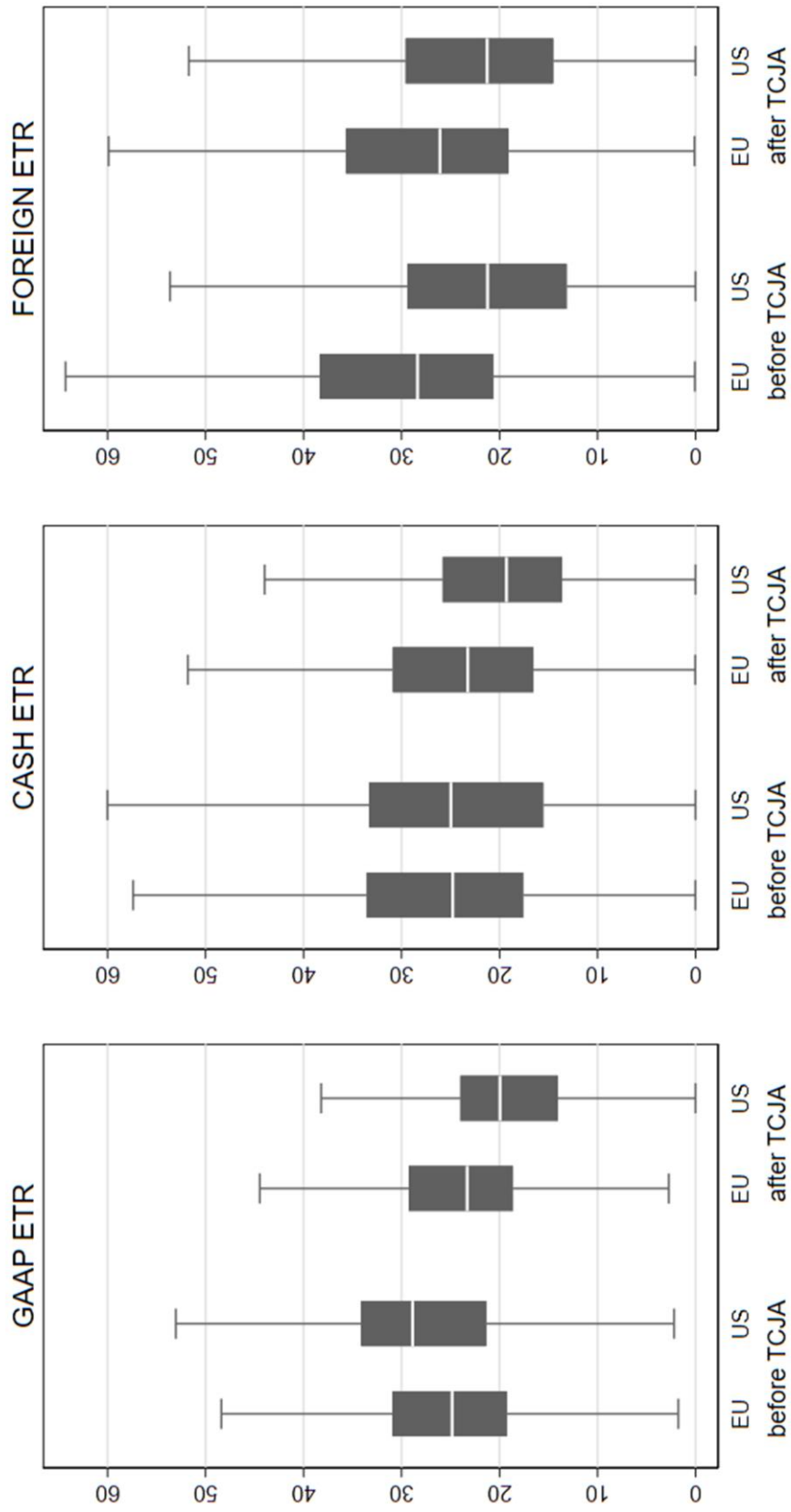
**Figure 3.1: GAAP ETR**



Notes: Trends in the mean and median *GAAP ETRs* of U.S. MNCs listed in the *S&P500* at least one time during the period 2000 to 2020. The figure is based on the data for the years 2012 to 2019, including several adjustments in the transition year: The year 2017 is defined as the reporting periods ending between December 2017 and November 2018. Reporting periods ending prior to December 2017 are therefore included in 2016 and periods ending between January and November 2018 are included in 2017.

<sup>24</sup> For example, the cut in the statutory tax rate leads to an adjustment of the deferred tax assets on loss carry forwards. Further, U.S. MNCs without permanent reinvested earnings outside the U.S. prior to the TCJA should experience a decrease in deferred tax liabilities. On the other hand, U.S. MNCs with permanent reinvested earnings should experience an increase in deferred tax liabilities.

**Figure 3.2: GAAP ETR, CASH ETR and FOREIGN ETR**



Notes: Comparison of GAAP, CASH and FOREIGN ETR between U.S. and European MNCs, before and after the TCJA. The figure is based on data for the years 2012 to 2019, excluding the transition year. A box portrays the interquartile range of the ETR distribution. The horizontal line in the box represents the median. Outside values are excluded.



Figure 3.2 plots the *GAAP*, *CASH* and *FOREIGN ETRs* for the base sample by period (before the TCJA and afterwards) and group (U.S. and European MNCs). The average *GAAP ETR* of U.S. MNCs is equal to 27.6% (median 28.9%) prior to the TCJA, while the average for European firms is 26.1% (median 24.8%). The distribution of the U.S. *GAAP ETRs* is left-skewed, and consequently there are some U.S. firms with low *GAAP ETRs* but many others which report relatively high ETRs compared to the European MNCs. After the TCJA, the mean *GAAP ETR* of U.S. MNCs is equal to 20.1%, compared to a mean of 25.3% for European MNCs. The (mean) tax differential between the two groups thus amounts to 5.2 percentage points. This explorative analysis suggests that U.S. MNCs faced a significant reduction in their effective tax payments compared to European MNCs.

The description of the *CASH ETR* supports this view. Prior to the TCJA, the mean *CASH ETR* of U.S. MNCs is equal to 25.3%, while European MNCs report a mean *CASH ETR* of 27.6%. After the TCJA, our data suggests a significant decrease in terms of the *CASH ETR*. The mean *CASH ETR* is now equal to 21.5% for U.S. MNC (median: 19.3%) compared to 25.9% (23.2%) for European MNCs.

The average *FOREIGN ETR* is 22.9% (median: 21.2%) for U.S. MNCs and 31.4% (median: 28.4%) for European MNCs, prior to the TCJA. After the TCJA, the average *FOREIGN ETRs* amount to 23.4% (median: 21.3%) for U.S. MNCs and 30.1% (median: 26.1%) for European MNCs. This indicates that, while the average *FOREIGN ETR* of U.S. MNCs does not change significantly, the *FOREIGN ETRs* of European MNCs decrease, on average.

Our explorative analysis suggests that, even though the ETRs of European MNCs have declined over time, those of U.S. MNCs fall quite substantially after the TCJA. At this point, however, note that these unconditional comparisons might be biased due to systematic differences in firm characteristics and firm operations between U.S. and European MNCs.

Therefore, we include several firm characteristics as control variables in the regression analysis below: the return on assets (*ROA*), size (*SIZE*), R&D expenditures (*RD*), leverage (*LEV*) and the share of intangible assets (*INTAN*)<sup>25</sup> (see Appendix A3.1 for a detailed variable description). Table 3.2 provides summary statistics for all firms for the years prior to the TCJA (Panel A), as well as after the TCJA (Panel B). Very broadly, Panel A indicates that U.S. MNCs are, on average, bigger and more profitable than the European MNCs; however, both increase in size after the TCJA. Panels C and D include only the matched sample of similar firms (see below), again reporting the years before and after the TCJA, respectively.

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<sup>25</sup> *ROA* is defined as the ratio of pre-tax income (*pi*) and total assets (*at*), *SIZE* is the logarithm of total assets, *RD* are the research and development expense (*xrd*) divided by total assets, *LEV* is total debt (*dlc* + *dltt*) divided by total assets, and *INTAN* is the ratio of intangible assets (*intan*) to total assets.

**Table 3.2: Summary Statistics**

	Panel A: unmatched, years from 2012 to 2016						Panel B: unmatched, years from 2018 to 2019					
	European Firms			U.S. Firms			European Firms			U.S. Firms		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
SIZE *	2,999	9.16	1.90	1,941	9.58	1.51	1,249	9.51	1.82	686	9.91	1.47
ROA *	2,999	0.08	0.13	1,941	0.10	0.08	1,249	0.08	0.13	686	0.09	0.08
LEV *	2,999	0.25	0.18	1,941	0.27	0.19	1,249	0.26	0.17	686	0.32	0.19
RD *	2,999	0.02	0.04	1,941	0.03	0.05	1,249	0.01	0.03	686	0.03	0.05
INTAN *	2,999	0.23	0.21	1,941	0.27	0.22	1,249	0.23	0.22	686	0.28	0.23
GAAP ETR	2,783	0.26	0.14	1,808	0.28	0.12	1,170	0.25	0.14	614	0.20	0.12
CURRENT ETR	2,494	0.26	0.16	1,783	0.27	0.14	1,150	0.25	0.15	617	0.21	0.14
CASH ETR	2,313	0.28	0.16	1,821	0.25	0.14	950	0.26	0.16	633	0.22	0.15
FOREIGN ETR	1,722	0.31	0.18	1,477	0.23	0.15	771	0.30	0.16	496	0.23	0.14

	Panel C: matched, years from 2012 to 2016						Panel D: matched, years from 2018 to 2019					
	European Firms			U.S. Firms			European Firms			U.S. Firms		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
SIZE *	1,044	9.53	1.95	1,171	9.40	1.47	423	9.89	1.78	389	9.78	1.44
ROA *	1,044	0.08	0.09	1,171	0.11	0.09	423	0.08	0.08	389	0.10	0.07
LEV *	1,044	0.28	0.19	1,171	0.25	0.17	423	0.28	0.18	389	0.30	0.19
RD *	1,044	0.02	0.05	1,171	0.02	0.04	423	0.02	0.04	389	0.02	0.04
INTAN *	1,044	0.28	0.22	1,171	0.26	0.22	423	0.27	0.22	389	0.28	0.23
GAAP ETR	1,037	0.26	0.12	1,148	0.28	0.11	420	0.24	0.12	378	0.20	0.10
CURRENT ETR	933	0.26	0.14	1,091	0.27	0.13	403	0.25	0.13	360	0.20	0.11
CASH ETR	818	0.27	0.15	1,128	0.26	0.13	336	0.25	0.13	372	0.21	0.12
FOREIGN ETR	725	0.30	0.17	882	0.24	0.15	311	0.31	0.19	289	0.23	0.13

Notes: Sample sizes differ usually because of data availability. All variables with "\*" are used to calculate the propensity scores. Panel A includes the unmatched sample prior to the TCJA, and Panel B includes the unmatched sample after the TCJA. Panels C and D include the matched sample of 238 pairs; matching year is 2016. Panel C includes the observations prior to the TCJA, Panel D includes the observations after the TCJA.

### 3.3.2 Empirical Approach

Key to our empirical analysis of the tax reform effects is a comparison of U.S. MNCs and their international peers from Europe. We therefore consider U.S. MNCs listed in the *S&P500* and European firms listed in the *STOXXEurope600*. While this pre-selection already guarantees subsamples of similar U.S. and European firms, we additionally apply matching techniques to generate pairs of very similar firms. More precisely, for each U.S. MNC, we search in our data for the best European match, and require that the two MNCs belong to the same industry and have very similar firm characteristics.<sup>26</sup> Conditional on the matched pairs, we then run panel regressions that additionally control for time-varying firm characteristics.

#### Propensity Score Matching

Let us first introduce an indicator variable  $US_i$ , which determines whether firm  $i$  is U.S.-based ( $US_i = 1$ ) or Europe-based ( $US_i = 0$ ) during the time period 2012 to 2019.<sup>27</sup> Then, to find pairs of firms, we estimate the probability  $\hat{p}_i$  of MNC  $i$  being U.S.-based, given a vector of observables. We specify the linear probability index as:

$$US_{i,2016} = \beta X_{i,2016} + \varepsilon_{i,2016} \quad (1)$$

The vector  $X_{i,2016}$  in equation (1) indicates several firm- $i$ -specific characteristics. We ultimately estimate (1) using a probit model. The use of the regressors is in accordance with prior literature (Augurzky and Schmidt 2001; Caliendo and Kopeinig 2008) and is based on tax expense determinants. These are firm size ( $SIZE_i$ ), profitability ( $ROA_i$ ), leverage ( $LEV_i$ ), intangible assets ( $INTAN_i$ ), and R&D expenses ( $RD_i$ ).<sup>28</sup> All variables are measured in 2016, the last year before to the U.S. tax reform.

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<sup>26</sup> Earlier findings suggest that differences in ETRs are naturally related to differences in industry membership and firm characteristics (Gupta and Newberry 1997; Plesko 2003; Rego 2003; Richardson and Lanis 2007; Stickney and McGee 1982).

<sup>27</sup> Our sample includes only MNCs that do not change the location of their headquarters over the sample period.

<sup>28</sup>  $INTAN$  and  $RD$  are set equal to zero for missing data.

The estimation of equation (1) results in two vectors of propensity scores,  $\hat{p}^{US}$  for all U.S. firms and  $\hat{p}^{EU}$  for all European firms. We then use the estimated propensity scores to find a nearest neighbor for each U.S. firm within the exact same industry.<sup>29</sup> We therefore obtain the best comparable match from the European firms for each U.S. firm. Let  $\omega_i$  denote a matched European firm  $m$  as the best identified match for an U.S. firm  $i$ , that is,  $\omega_i = \min_{\{m\}}(|\hat{p}_i^{US} - \hat{p}_m^{EU}|)$ ,  $i \neq m$ . Put differently, if  $m$  is  $i$ 's nearest neighbor or best match, for each  $i$ ,  $\omega_i$  denotes the  $i$ - $m$  firm-pair that is the best comparable combination found in the data, based on observables  $\mathbf{X}_{i,2016}$ . In line with the literature (Austin 2011), we further require a difference in propensity scores (caliper) of less than 0.03. This approach generates firm pairs  $\{US_i = 1; US_m = 0\}$ , where the individual firms are comparable.<sup>30</sup>

**Table 3.3: Nearest Neighbor Matching, Balancing Property (2016)**

Nearest Neighbor 1:1		Mean		Bias	Bias Reduction	t-test	
		Treated	Control	(in %)	(in %)	t	p>t
SIZE	Unmatched	9.6551	9.3021	21.2		3.00	0.003
	Matched	9.5074	9.6603	-9.2	56.7	-1.01	0.314
ROA	Unmatched	0.1023	0.0852	15.6		2.13	0.034
	Matched	0.0970	0.0821	13.6	13.0	1.95	0.052
LEV	Unmatched	0.3025	0.2508	28.9		4.25	0.000
	Matched	0.2757	0.2722	2.0	93.1	0.22	0.828
INTAN	Unmatched	0.2934	0.2343	26.5		3.87	0.000
	Matched	0.2697	0.2757	-2.7	89.8	-0.29	0.770
RD	Unmatched	0.0264	0.0148	27.3		4.14	0.000
	Matched	0.0192	0.0216	-5.9	78.4	-0.66	0.508

Notes: Balancing property tests. The tests are based on observations from the year 2016. The matching applies one-to-one nearest neighbor matching within the same industry, which requires a difference in propensity scores of less than 0.03.

<sup>29</sup> We use the *Fama and French* classification of 17 different industry groups.

<sup>30</sup> Note that if propensity score matching is used to estimate treatment effects, this is based on two central assumptions. The first assumption is called ‘ignorability of treatment’. The second assumption is the so-called balancing property. The latter assumption is testable (see Table 3.3). Note, however, that we implement a different approach to estimate the TCJA effect. In our analysis, the idea of matching on the propensity score is to make firms more comparable, and it ultimately helps in establishing a common trend (between *treated* and *untreated*). Identification in our difference-in-differences setting rests on the latter.

## Aggregate Time Effects of the TCJA

To gain a first purely descriptive understanding of the effects of the TCJA, let us start with estimating the following regression for U.S. and European firms separately:

$$ETR_{it} = \alpha_1 POST_t + \rho \mathbf{Z}_{it} + \mu_i + u_{it} \quad (2)$$

The dependent variable is an ETR measure of firm  $i$  in year  $t$ . The variable of interest is  $POST_t$ , which equals one if the year of observation is after the TCJA came into force, and zero otherwise.<sup>31</sup> The vector  $\mathbf{Z}_{it}$  includes different time-varying firm-level characteristics. The coefficient  $\alpha_1$  measures the aggregate effect on the respective ETR after the TCJA, conditional on firm-specific effects ( $\mu_i$ ).

## Estimating Conditional ETR Differentials – Difference-in-Differences Setting

Based on a matched sample (see above) of similar U.S. and European MNCs, we next propose the following regression equation:

$$ETR_{it} = \alpha_1 US_i + \alpha_2 POST_t \times US_i + \rho \mathbf{Z}_{it} + \theta_t + \omega_i + u_{it} \quad (3)$$

The dependent variable is again the ETR of firm  $i$  in year  $t$ ;  $\alpha_1$  captures the general tax differential between U.S. and European MNCs. Although we consider a matched sample, we still control for the time variation of firm-level characteristics by a vector  $\mathbf{Z}_{it}$ . The coefficient we are most interested in is  $\alpha_2$ , measuring the change in the differential after the TCJA, both conditional on pair- ( $\omega_i$ ) and year- ( $\theta_t$ ) specific effects. The pair fixed effects ( $\omega_i$ ) ensure that we estimate a potential difference in ETRs within pairs of very similar U.S. and European firms. Note that the coefficient on the interaction  $POST_t \times US_i$  is effectively estimated by averaging over firm pairs, and measures the differential response of U.S. MNCs relative to European MNCs.

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<sup>31</sup> As discussed before, we exclude the transition year, therefore  $POST_t$  equals one if the reporting period ends after November 2018, and equals zero if the reporting period ends before December 2017.

## Subsidiary-Level Data and Profit-Shifting Behavior

In additional tests, we draw on the influential contributions of Hines and Rice (1994) and Huizinga and Laeven (2008) to identify the profit-shifting behavior of MNCs. We therefore resort to a subsidiary-level dataset of the MNCs included in our matched sample. That is, we consider the data of the subsidiaries of each U.S. and EU MNC included in our matched sample. Due to data restrictions, our sample is limited to the respective subsidiaries located in Europe. We estimate the following regression model:

$$\begin{aligned} \ln(\text{profit}_{jt}) = & \delta_1 US SUB_j + \delta_2 POST_t \times US SUB_j + \delta_3 STR_{jt} + \delta_4 US SUB_j \times STR_{jt} \\ & + \delta_5 US SUB_j \times STR_{jt} \times POST_t + \rho \mathbf{W}_{jt} + \theta_t + \omega_i + u_{jt} \end{aligned} \quad (4)$$

Outcomes in (4) are alternative measures of profits, such as the earnings before interest and taxes (*EBIT*) and earnings before taxes (*EBT*) of subsidiary  $j$ . The vector  $\mathbf{W}_{jt}$  in equation (4) includes subsidiary as well as country characteristics. To capture the main inputs of production, we use *CAPITAL* $_{jt}$  – defined as fixed assets (*fias*) –, and *LABOR* $_{jt}$  – calculated as total payroll expenses (*staf*) – as well as *GDP PER CAPITA* $_{jt}$  as regressors. Again, the coefficients are conditional on the group-level-pair- ( $\omega_i$ ) and year- ( $\theta_t$ ) fixed effects. The interaction of interest is  $US SUB_j \times STR_{jt} \times POST_t$ . The estimate represents the change in the semi-elasticity of the statutory tax rate  $STR_{jt}$  of U.S. MNCs after the TCJA in comparison to European MNCs.

## 3.4 Results

### 3.4.1 Effects of the U.S. Tax Reform on the ETRs of U.S. MNCs

We begin with a simple test of how the TCJA has affected ETR measures of U.S. MNCs. We consider our sample of U.S. firms as described in section 3.3 and run regressions following equation (2). The regression results are presented in Table 3.4. In columns (1) – (2), we consider the *GAAP ETR* as the dependent variable, in columns (3) – (4) the *CURRENT ETR*, and in (5) –

(6) the *CASH ETR*.<sup>32</sup> The variable *POST* indicates whether a fiscal year falls into the period post TCJA (*POST* = 1), or before TCJA was enacted (*POST* = 0).<sup>33</sup>

**Table 3.4: Regression Analysis, only U.S. MNCs**

Variables	GAAP ETR		CURRENT ETR		CASH ETR	
	1	2	3	4	5	6
POST	-0.0870*** (0.0051)	-0.0747*** (0.0062)	-0.0769*** (0.0062)	-0.0729*** (0.0074)	-0.0467*** (0.0063)	-0.0509*** (0.0073)
SIZE		-0.0506*** (0.0126)		-0.0350** (0.0150)		-0.0075 (0.0173)
ROA		-0.2578*** (0.0771)		-0.5829*** (0.1087)		-0.4909*** (0.0931)
LEV		0.0039 (0.0374)		-0.0025 (0.0407)		0.0132 (0.0430)
INTAN		0.0408 (0.0434)		-0.0009 (0.0552)		0.0255 (0.0557)
RD		0.0593 (0.3813)		1.3748*** (0.3924)		1.0283** (0.4471)
Firm FE	✓	✓	✓	✓	✓	✓
N	1,526	1,526	1,451	1,451	1,500	1,500
Adj. R <sup>2</sup>	0.51	0.52	0.43	0.48	0.42	0.45

Notes: Regressions are based on a matched sample, where we only use the MNCs headquartered in the U.S.; years from 2012 to 2019, excluding the transition year. Dependent variable is the *GAAP ETR* in columns (1) – (2), *CURRENT ETR* in columns (3) – (4) and the *CASH ETR* in columns (5) – (6). Robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

The effect of the *POST* variable is negative across all specifications. These findings suggest significantly lower ETRs of U.S. MNCs after the tax reform. Column (2) shows that the *GAAP ETR* of U.S. firms decreased by 7.5 percentage points. Note, though, that our goal here is simply to document the variation in our data – findings are conditional on some firm-level controls, but we cannot distinguish this effect from an aggregate time shock.

What we can learn from Table 3.4, however, is that the substantial 14 percentage points U.S. tax cut is not fully reflected in the ETRs of MNCs. One explanation for this finding may be that part of the MNCs' income is associated with international business activities, and

<sup>32</sup> In additional robustness checks for Tables 3.4 to 3.10, we (i) keep the sample size fixed and we (ii) include a linear time trend. The results (not tabulated) confirm our findings and document that the statistical significance is not sensitive to a linear time trend and in general not to variation in sample size. However, in Table 3.8 we find a lower TCJA effect on the *CURRENT ETR*.

<sup>33</sup> We exclude the transition year 2017.



foreign income is primarily subject to foreign taxes. U.S. MNCs with a large share of foreign income could therefore benefit less from the U.S. tax reform, and mainly from the cut in the corporate tax rate at home. Our data allows us to make a distinction between domestic and foreign tax rates for U.S. MNCs. The *DOMESTIC ETR* is defined as domestic income taxes divided by domestic income, and the *FOREIGN ETR* as foreign income taxes divided by foreign income.<sup>34</sup> We consider these ETR measures – distinguishing between domestic and foreign taxes – as dependent variables in Table 3.5.

**Table 3.5: Alternative ETR Measures, only U.S. MNCs**

Variables	DOMESTIC GAAP ETR	DOMESTIC CURRENT ETR	FOREIGN ETR
	1	2	3
POST	-0.1202*** (0.0099)	-0.0935*** (0.0134)	-0.0123 (0.0092)
SIZE	-0.0293 (0.0224)	-0.0588** (0.0281)	0.0090 (0.0205)
ROA	-0.0359 (0.1099)	-0.2726* (0.1646)	-0.2320 (0.2075)
LEV	0.0142 (0.0449)	0.0481 (0.0564)	-0.0383 (0.0514)
INTAN	-0.0392 (0.0777)	-0.0558 (0.1008)	-0.0186 (0.0567)
RD	-0.7829 (0.6700)	0.3183 (0.5871)	0.1012 (0.3952)
Firm FE	✓	✓	✓
N	1,001	850	1,171
Adj. R <sup>2</sup>	0.47	0.44	0.48

Notes: Regressions are based on a matched sample, where we only use the MNCs headquartered in the U.S.; years from 2012 to 2019, excluding the transition year. Dependent variables are the *DOMESTIC GAAP*, *DOMESTIC CURRENT* and the *FOREIGN ETR*. The *DOMESTIC GAAP ETR* is defined as the sum of the deferred and current U.S. domestic income taxes divided by U.S. domestic income. *DOMESTIC CURRENT ETR* is defined as the current U.S. domestic income taxes divided by U.S. domestic income. Robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

In column (1), the dependent variable is the *DOMESTIC GAAP ETR*, and in column (2) the *DOMESTIC CURRENT ETR*.<sup>35</sup> The estimated coefficients on *POST* indicate that both ETR

<sup>34</sup> See Appendix A3.1, for details on the calculation of these measures.

<sup>35</sup> The *DOMESTIC GAAP ETR* includes deferred and current domestic taxes (similar to the *GAAP ETR*), and the *DOMESTIC CURRENT ETR* includes only current domestic taxes (similar to the *CURRENT ETR*).

measures are significantly lower after the TCJA. The magnitudes come relatively close to the 14 percentage points cut in the U.S. statutory corporate tax rate. While the *DOMESTIC GAAP ETR* only recognizes permanent tax differences such as the tax rate cut, the *DOMESTIC CURRENT ETR* also reflects temporary differences in the immediate expensing of new investment. The results are of similar magnitude for both measures. This finding supports the view that the tax rate cut explains most of the reduction in the ETRs of U.S. MNCs.

In column (3), the dependent variable is the *FOREIGN ETR*. The estimate suggests no significant difference in the *FOREIGN ETR*, post-TCJA. The foreign taxes of U.S. MNCs basically remain at the same level as prior to the TCJA. The result is still somehow surprising as the U.S. international tax system has changed significantly with the TCJA. We will come back to this issue in the following subsections.

The results of Table 3.5 support Hypothesis H2 – that the domestic taxes of U.S. MNCs decrease after the TCJA, while foreign taxes are, to a large extent, unaffected. Even if these estimates are not measured relative to an appropriate control group, they seem to provide first insights that the variation in U.S. ETRs actually reflects the changes associated with the U.S. tax reform, and not just some aggregate time shock.

### **3.4.2 Effects of the U.S. Tax Reform on European Competitors of U.S. MNCs**

This subsection focuses on the international competitors of U.S. MNCs – European firms. The goal is to provide some insight into whether the TCJA affects European firms (knowing this will ultimately help us to better construct a valid control group for the analysis below). We start with a brief replication of Table 3.4, but now consider only the European firms.

Table 3.6 presents the respective regression results. The variable of interest is again the indicator variable *POST*. Across specifications (1) to (4), the results in Table 3.6 suggest that

the TCJA may have affected the European MNCs as well because some of their business is located in the U.S. While statistically significant, the estimated effect on *POST* is small.

**Table 3.6: Regression Analysis, only European MNCs**

Variables	GAAP ETR		CURRENT ETR	CASH ETR
	1	2	3	4
POST	-0.0242*** (0.0065)	-0.0276*** (0.0080)	-0.0203*** (0.0078)	-0.0249*** (0.0092)
SIZE		0.0013 (0.0132)	-0.0061 (0.0121)	-0.0017 (0.0158)
ROA		-0.5547*** (0.1042)	-0.8242*** (0.1685)	-0.8226*** (0.1782)
LEV		0.1292** (0.0573)	0.1413** (0.0657)	0.1263 (0.0774)
INTAN		-0.0823 (0.0628)	-0.1190 (0.0898)	-0.0588 (0.0743)
RD		0.3447* (0.1947)	0.4489 (0.3161)	0.3472 (0.3225)
Firm FE	✓	✓	✓	✓
N	1,457	1,457	1,336	1,154
Adj. R <sup>2</sup>	0.34	0.38	0.45	0.36

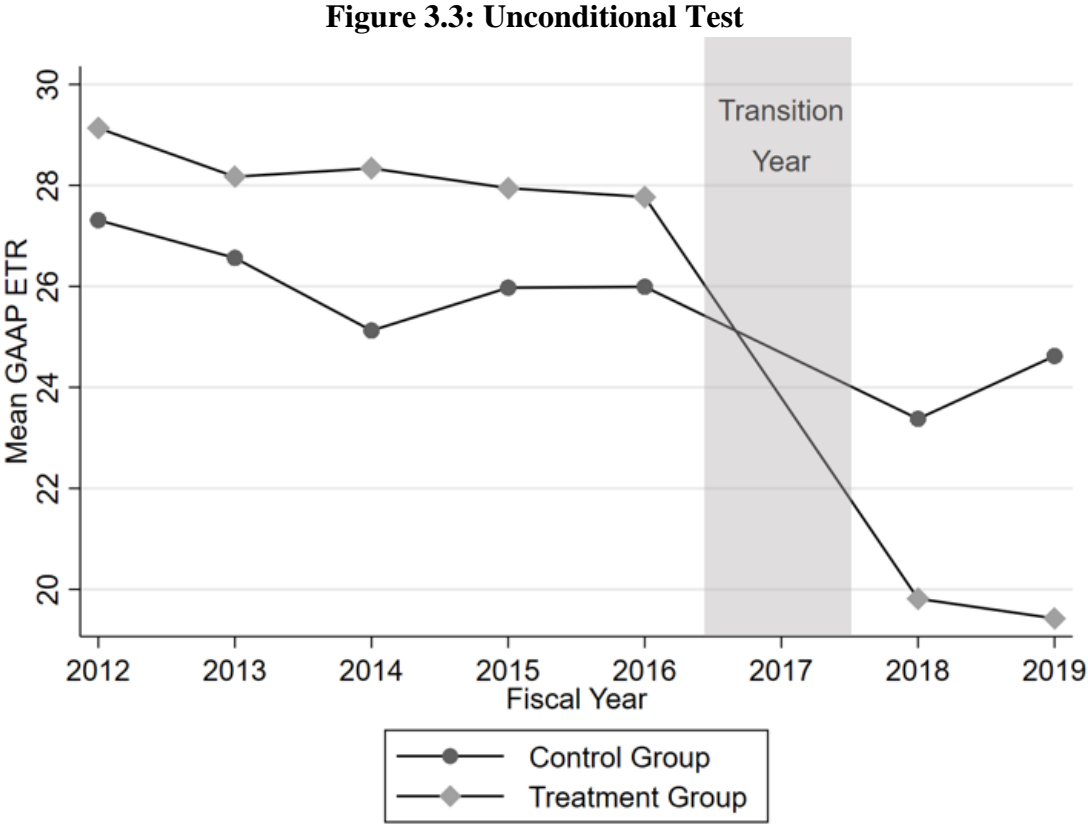
Notes: Regressions are based on a matched sample, where we only use the MNCs headquartered in Europe; years from 2012 to 2019, excluding the transition year. Dependent variable is the *GAAP ETR* in columns (1) – (2), *CURRENT ETR* in column (3), and *CASH ETR* in column (4). Robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

### 3.4.3 Comparison of U.S. MNCs and their European Competitors

Our analysis above provides some initial indications that the TCJA has affected U.S. MNCs, and also, to some extent, European MNCs. In the following, we will investigate how the competitive tax-position of U.S. MNCs – relative to their peers in Europe – has been changed by the TCJA. We thus compare a matched sample of U.S. MNCs and their counterparts in Europe that are from the same industry, and similar in several firm characteristics (as described in section 3.3.2).

Identification in our difference-in-differences setting requires a parallel trend in ETRs between control and treatment units. Using the mean values of the *GAAP ETR* over time, separately for *treated firms* (U.S. MNCs) and *control firms* (European MNCs), Figure 3.3

suggests that the assumption of a parallel trend holds. In fact, in the periods prior to the TCJA, 2012 until November 2017, U.S. and European MNCs move in a fairly parallel way.<sup>36</sup> Note that while Figure 3.3 is based on our matched sample, it depicts an unconditional comparison of means.



Notes: Unconditional mean GAAP ETRs of U.S. MNCs (*Treatment Group*) and European MNCs (*Control Group*) over the years. Excluding transition year.

The regression analysis then also conditions on firm-specific, time-varying controls. The regression results are presented in Table 3.7. In columns (1) – (2), we consider the GAAP ETR as the dependent variable, in columns (3) – (4) the CURRENT ETR, and in (5) – (6) the CASH ETR. While columns (1), (3) and (5) include only year and pair fixed effects, all other columns include also the set of firm characteristics.<sup>37</sup>

<sup>36</sup> Please note that we exclude the transition year.  
<sup>37</sup> Both firms of a pair operate within the same industry, i.e. pair-fixed effects also nest industry-fixed effects.

Using this set up, our identification approach rests on the notion that a firm pair moves in a parallel way until the TCJA. Given pair-fixed effects, the coefficient on the indicator variable *US* reflects an average level effect that can be attributed to U.S. MNCs (i.e., identification is based on *within-pair* variation). The additional TCJA effect is then measured by the estimated coefficient on  $POST_t \times US_i$ .

**Table 3.7: Matched Sample, ETR Differentials**

Variables	GAAP ETR		CURRENT ETR		CASH ETR	
	1	2	3	4	5	6
US	0.0222*** (0.0064)	0.0254*** (0.0065)	0.0143* (0.0077)	0.0204*** (0.0078)	-0.0147* (0.0078)	-0.0053 (0.0078)
US × POST	-0.0660*** (0.0101)	-0.0670*** (0.0100)	-0.0554*** (0.0117)	-0.0581*** (0.0116)	-0.0287** (0.0122)	-0.0317*** (0.0119)
SIZE		0.0048 (0.0044)		-0.0056 (0.0051)		0.0030 (0.0055)
ROA		-0.1182** (0.0531)		-0.2743*** (0.0717)		-0.2997*** (0.0615)
LEV		-0.0030 (0.0333)		-0.0191 (0.0362)		0.0193 (0.0402)
INTAN		0.0448* (0.0243)		0.0736*** (0.0275)		0.0666** (0.0327)
RD		-0.1162 (0.1605)		0.0180 (0.1687)		0.0036 (0.1882)
Year FE	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓
N	2,983	2,983	2,787	2,787	2,654	2,654
Adj. R <sup>2</sup>	0.22	0.23	0.23	0.25	0.22	0.25

Notes: Regressions are based on the matched sample, where MNCs are headquartered either in the U.S. or in Europe; years from 2012 to 2019, excluding the transition year. Dependent variable is the *GAAP ETR* in columns (1) – (2), the *CURRENT ETR* in columns (3) – (4) and the *CASH ETR* in columns (5) – (6). Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

The results for the indicator *US* in columns (1) to (4) suggest that prior to the U.S. tax reform, U.S. MNCs report significantly *higher GAAP ETRs* and *CURRENT ETRs* compared to their European peers. In terms of the *CASH ETR*, we find no or only slightly significant tax differentials between U.S. firms and their European counterparts (see discussion below). The coefficient on *US* in column (2) suggests that the average *GAAP ETR* of U.S. MNCs is about 2.5 percentage points higher than European ones – prior to the TCJA. The result of a somewhat

higher *GAAP ETR* of U.S. MNCs compared to European firms confirms previous findings (Overesch et al. 2020).

The interaction term  $US \times POST$  is negative and statistically significant for all specifications. The estimates on  $US \times POST$  in columns (1) and (2) suggest that the tax differential in terms of the *GAAP ETR* is about 6.7 percentage points lower in the post TCJA periods. Similar magnitudes are found for the *CURRENT ETR* in columns (3) and (4). Considering the tax rate differentials prior to the tax reform, our results suggest that U.S. MNCs have a competitive advantage of about 3 to 4 percentage points in terms of their *GAAP ETRs* (or *CURRENT ETRs*) compared to their European peers.<sup>38</sup> This corresponds to a competitive tax advantage of about \$24.5 million less annual taxes per U.S. firm after the TCJA was enacted.<sup>39</sup> Hence, we can confirm H3.

In terms of the *CASH ETRs* we also find a competitive advantage of about 3 percentage points after the TCJA. This finding should be interpreted carefully, however. Cash taxes are more volatile, and we consider only a relatively short time period after the TCJA. Although we excluded the transition year 2017, cash taxes might be more affected by one-time or at least short-term effects – for example, by the transition tax.

We carry out a great number of additional tests (see Appendix A3.2) that all confirm the robustness of our main findings in Table 3.7. We consider different types of fixed effects, alternative matching procedures, and also regressions based on our base sample of all *S&P 500* and *StoxxEurope600* firms without matching.

We are well aware of the fact that, in our difference-in-differences setting, it is not ideal to include all European firms (the *control group*) in our sample. While we believe that the findings in Table 3.7 are very relevant (given the research question on tax-competitiveness),

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<sup>38</sup> The findings are in accordance with the summary statistics presented in Table 3.2 (Panels C and D) and indicate an average annual tax saving of 28.6% in tax expenses measured by the *GAAP ETR* for U.S. MNCs.

<sup>39</sup> Average tax expenditures of MNCs multiplied by the competitive tax advantage (\$612.825 million  $\times$  0.04).

identifying the “true” TCJA effect on the ETRs of U.S. firms requires that the control group is completely unaffected by the TCJA. Unfortunately, we lack the data to precisely isolate U.S. taxes and U.S. income of European firms. But a subgroup of European firms should be unaffected by the U.S. tax reform because they do not have any substantial business in the U.S.. We use information disclosed in geographical segment reports taken from the *Refinitiv Eikon* database as an approximation for the U.S. activities of a European firm.<sup>40</sup>

In Table 3.8, we use the same setting as in Table 3.7, but include only pairs for which the European MNCs do not report revenues or fixed assets in the U.S.<sup>41</sup> The point estimates for the TCJA effect are, to a certain extent, greater in absolute values. For example, column (1) suggests a competitive advantage of about 7.5 percentage points in terms of the *GAAP ETRs* of U.S. MNCs compared to their European peers in the period after the TCJA.

**Table 3.8: Matched Sample, only European MNCs without U.S. Activities**

Variables	GAAP ETR	CURRENT ETR	CASH ETR
	1	2	3
US	0.0414** (0.0159)	0.0385** (0.0191)	0.0128 (0.0179)
US × POST	-0.1165*** (0.0252)	-0.1117*** (0.0271)	-0.0509** (0.0227)
Firm characteristics	✓	✓	✓
Year FE	✓	✓	✓
Pair FE	✓	✓	✓
N	664	626	575
Adj. R <sup>2</sup>	0.29	0.31	0.34

Notes: Regressions are based on the matched sample, where MNCs are headquartered either in the U.S. or in Europe; years from 2012 to 2019, excluding the transition year. We exclude pairs, where the European MNC reports fixed assets or revenues in the U.S. in 2016 and pairs where no data is reported in the *Refinitiv Eikon* database for the European MNC. Dependent variable is the *GAAP ETR* in column (1), the *CURRENT ETR* in column (2) and the *CASH ETR* in column (3). We control for the full set of firm characteristics (i.e. *SIZE*, *ROA*, *LEV*, *INTAN* and *RD*). Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

<sup>40</sup> We should note that the reporting of the geographical data is not fully consistent across all reports. Sometimes firms do not report at the country level, but on a regional or continental level, e.g. North America or the EMEA region. We assume U.S. activities where the MNC reports fixed assets in the U.S. or in (North) America.

<sup>41</sup> Further, we exclude pairs for which no data is available for European MNCs in the *Refinitiv Eikon* database.

The findings suggest that our estimates in Table 3.7 suffer from a small downward bias. Since we are mainly interested in tax reform effects on the tax-competitiveness of U.S. MNCs, we return to the larger sample, including all European peers. However, the small downward bias needs to be considered in the further analysis.

### 3.4.4 Foreign Activity and Tax-Competitiveness of U.S. MNCs

Our results presented in Table 3.5 suggest a larger effect of the TJCA on the *DOMESTIC ETRs* of U.S. MNCs. In Table 3.9 we consider our matched sample but distinguish between U.S. MNCs with a high share of foreign income – measured as share of foreign income in total earnings – by defining the two binary variables, *HIGHFORACT* and *LOWFORACT*, indicating those U.S. MNCs above and below the median of the foreign income share, respectively.

**Table 3.9: Matched Sample, Foreign Activities**

Variables	GAAP ETR	CURRENT ETR	CASH ETR
	1	2	3
HIGHFORACT	-0.0083 (0.0088)	-0.0079 (0.0103)	-0.0283** (0.0113)
LOWFORACT	0.0566*** (0.0077)	0.0474*** (0.0101)	0.0193* (0.0106)
HIGHFORACT × POST	-0.0382*** (0.0121)	-0.0280* (0.0154)	0.0108 (0.0151)
LOWFORACT × POST	-0.0982*** (0.0117)	-0.0924*** (0.0138)	-0.0690*** (0.0151)
Firm characteristics	✓	✓	✓
Year FE	✓	✓	✓
Pair FE	✓	✓	✓
N	2,497	2,402	2,285
Adj. R <sup>2</sup>	0.24	0.25	0.22

Notes: Regressions are based on the matched sample, where MNCs are headquartered either in the U.S. or in Europe; years from 2012 to 2019, excluding the transition year. Dependent variables are the *GAAP ETR*, the *CURRENT ETR* and the *CASH ETR*. The indicator variable *HIGHFORACT* (*LOWFORACT*) equals one for U.S. MNCs with above-median (below-median) share of foreign income. Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

The coefficients on *LOWFORACT* and *HIGHFORACT* measure the general difference in the tax differentials between U.S. MNCs with either a low (*LOWFORACT* = 1) or a high



(*HIGHFORACT* = 1) foreign income, compared to their respective European peers.<sup>42</sup> The results suggest that U.S. MNCs with a lower share of foreign income had significantly higher ETRs compared to European competitors before the reform. Prior to the tax reform, the U.S. corporate tax rate was ranked among the highest corporate tax rates worldwide. Consequently, U.S. firms with a low share of foreign activities suffered from the unfavorable domestic tax rate. U.S. MNCs with a high share of foreign income could benefit more from lower foreign tax rates.

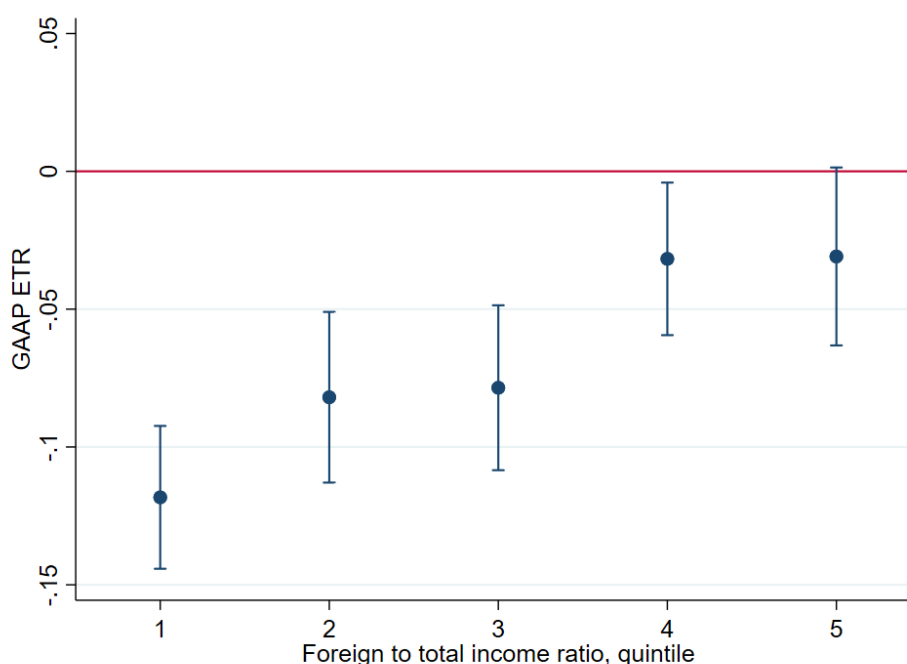
The treatment indicator  $LOWFORACT \times POST$ , capturing those U.S. MNCs with a low share of foreign income, suggests a significant drop in the tax differentials of U.S. MNCs after the reform and relative to their European competitors. If the share of foreign income is high ( $HIGHFORACT \times POST$ ), then the reform effect is smaller in terms of the *GAAP ETR* and *CURRENT ETR*.

Figure 3.4 presents point estimates and confidence intervals for the TCJA effect on the *GAAP ETR* for different quintiles of our measure for foreign activities (ratio of foreign to total income). It supports the view that those firms with a low share of foreign income benefit most from the TCJA. In other words, the 14 percentage points tax cut seems to be almost fully reflected in the ETRs of U.S. MNC if the main part of their income is subject to domestic U.S. taxation. The estimates presented in Figure 3.4 allow us to calculate statutory tax pass-through ratios. For example, about 84% of the tax cut is reflected in the ETRs of firms with the lowest share of foreign income (estimated coefficient/tax cut = 0.118/0.14). The pass-through ratio corresponds to about 0.55 for those firms that are located in the middle of the foreign income distribution. The firms with the highest share of foreign income benefit least, as only about three of the 14 percentage points tax cut shows up in their ETRs. This corresponds to a pass-through ratio of about 0.21.

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<sup>42</sup> Please note that our data allow us to define the variables *HIGHFORACT* and *LOWFORACT* only for U.S. MNCs. This is sufficient to address our research question, however.

**Figure 3.4: Effects of the TCJA depending on Foreign Activities**



Notes: Point estimates and confidence intervals for the TCJA effect for quintiles of our measure of foreign activity (the ratio of foreign to total income). Regression specification as column (1) in Table 3.9. The dependent variable is the *GAAP ETR*.

### 3.4.5 Effects of GILTI on the Tax-Competitiveness of U.S. MNCs

The TCJA includes several important changes in the taxation of international activities of U.S. MNCs. How these changes affect ETRs is unclear, and depends on a number of things. For example, the abolishment of the WWTS could incentivize more international tax avoidance because foreign tax savings are no longer offset by U.S. taxes upon repatriation. Our findings, so far, suggest that U.S. MNCs with a high share of foreign activities benefit less from the TCJA. Moreover, the *FOREIGN ETRs* of U.S. MNCs remain relatively unchanged after the TCJA. One explanation for the results may relate to the introduction of GILTI. The new GILTI regime leads to the additional U.S. taxation of foreign income if effective foreign taxes are low.

Unfortunately, the identification of subsidiaries and foreign income subject to GILTI is rather difficult, beside the general problem that firms might adjust unobserved tax avoidance margins or tax haven operations to avoid GILTI treatment. In the following, to be specific, we make use of the fact that MNCs with a low *FOREIGN ETR* prior to the TCJA are most likely affected by the new GILTI regime – either by direct treatment or because these firms are most

likely the ones that adjust at unobserved margins to avoid treatment. We therefore construct a dummy variable *GILTI*, that is one for all U.S. MNCs with a *FOREIGN ETR* below the sample median of 22.8% during the period 2012 to 2016 (the period before the TCJA).<sup>43</sup>

In Table 3.10, we replicate our main analysis and use the matched sample from Table 3.7 but consider the additional interaction terms  $US \times GILTI$  and  $US \times POST \times GILTI$ . An effect of the former term indicates a difference between U.S. MNCs, depending on the level of their foreign taxes prior to the TCJA, while the effect of the latter measures any difference in the response to the TCJA under potential GILTI treatment.

In columns (1) – (3), the dependent variables are our standard ETR measures. Let us briefly go through the results. First, the estimates on *US* confirm the higher ETRs of U.S. MNCs compared to European competitors prior to the TCJA. Second, the ETRs of those U.S. MNCs that reported below median *FOREIGN ETRs*, that is, the coefficient on  $US \times GILTI$ , are significantly lower, as we would expect. Third, the treatment effect depends on GILTI. Compared to Table 3.7, estimates in columns (1) – (3) of Table 3.10 suggest larger TCJA effects in absolute values for U.S. MNCs that are unaffected by GILTI. The positive and significant coefficients for the triple interactions ( $US \times POST \times GILTI$ ) in columns (2) and (3) suggest that the reform effect is smaller if the MNC is (probably) GILTI treated.

In columns (4) – (5), the dependent variable is the *FOREIGN ETR*. Prior to the reform, the foreign taxes of U.S. MNCs were significantly lower compared to their European peers, of course mainly for U.S. firms with low *FOREIGN ETRs* (by construction). The aggregate effect of the TCJA in column (4) is insignificant. If, however, we distinguish between a potential GILTI treatment, our estimates in column (5) suggest a negative effect of  $US \times POST$ . The negative effect is fully offset for the U.S. firms that are likely to be subject to GILTI. We may

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<sup>43</sup> In additional tests, we also use the GILTI threshold of 13.125%. The untabulated results are in line with the results presented.

conclude that our findings support the view that abolishing the WWTS is associated with some additional avoidance of foreign taxes (estimate on  $US \times POST$ ). However, if GILTI treatment is likely, foreign taxes increase.

**Table 3.10: Matched Sample, GILTI Regime**

Variables	1	2	3	4	5
	GAAP ETR	CURRENT ETR	CASH ETR	FOREIGN ETR	FOREIGN ETR
US	0.0574*** (0.0082)	0.0643*** (0.0104)	0.0416*** (0.0111)	-0.0856*** (0.0117)	0.0080 (0.0136)
US × GILTI	-0.0717*** (0.0113)	-0.0869*** (0.0135)	-0.0909*** (0.0146)		-0.1861*** (0.0168)
US × POST	-0.0716*** (0.0140)	-0.0783*** (0.0154)	-0.0604*** (0.0162)	-0.0043 (0.0152)	-0.0361** (0.0179)
US × POST × GILTI	0.0192 (0.0141)	0.0515*** (0.0176)	0.0773*** (0.0178)		0.0510*** (0.0151)
Firm characteristics	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓
N	2,350	2,269	2,150	2,207	2,013
Adj. R <sup>2</sup>	0.23	0.26	0.23	0.28	0.33

Notes: Regressions are based on the matched sample, where MNCs are headquartered either in the U.S. or in Europe; years from 2012 to 2019, excluding the transition year. Dependent variable is the *GAAP ETR* in column (1), *CURRENT ETR* in column (2), *CASH ETR* in column (3), *FOREIGN ETR* in columns (4) – (5). We use the *FOREIGN ETRs* as an indicator to learn about the effects of international anti-tax-avoidance rules, especially the GILTI regime. We exclude U.S. MNCs that do not report data on the *FOREIGN ETR*. The dummy variable *GILTI* indicates whether the average *FOREIGN ETR* of an U.S. MNC is lower than the median (0.228) of the average *FOREIGN ETR* of U.S. MNCs during the time period 2012 to 2016. We control for the full set of firm characteristics (i.e. *SIZE*, *ROA*, *LEV*, *INTAN* and *RD*). Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

### 3.4.6 TCJA Effect on Profit Shifting

Finally, we investigate whether the TCJA affects the international profit shifting of U.S. MNCs, and will now resort to *subsidiary-level data*. Our goal is to better understand how intrafirm tax planning and tax avoidance activities are affected by the TCJA.

We consider only subsidiaries that belong to the MNCs included in our matched sample of U.S. and European MNCs used before. Due to data restrictions, we focus on subsidiaries in Europe.<sup>44</sup> We use the *Amadeus* database to obtain information on ownership relationships and non-consolidated accounting data at the level of European subsidiaries.<sup>45</sup> That is, we consider the European subsidiaries of our large U.S. and European MNCs in our previously matched sample.

We generally follow the approach as described in section 3.3 using equation (4). Regression results are presented in Table 3.11. In our base regressions in columns (1) – (3), the dependent variable is *EBIT*. In all regressions, we condition on pair- and year-fixed effects. To capture the main inputs of production, we use *CAPITAL* (defined as fixed assets in logs), and *LABOR* (total payroll expenses in logs) as well as *GDP PER CAPITA* as regressors. The sum of the coefficients on *LABOR* and *CAPITAL* is about 0.75, which may be interpreted as decreasing returns to scale (see Huizinga and Laeven 2008).

The variable we are mostly interested in is the local statutory tax rate (*STR*) of the respective host country. The coefficient on *STR* reflects the tax semi-elasticity of the reported profits of a subsidiary. We find negative estimates on *STR* across all specifications. This finding is usually interpreted as evidence of profit shifting. The estimate in column (1) suggests that

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<sup>44</sup> International subsidiary-level data is only available to a limited extent. While the *Orbis* dataset records worldwide firm activities, it only includes insufficient data for the U.S. MNCs in our sample. We therefore use the *Amadeus* database and focus on European subsidiaries.

<sup>45</sup> We include a subsidiary if at least 50 percent of the shares are held by an MNC in our sample. Where an MNC has several subsidiaries in one country, the relevant variables are aggregated at the country level. The sample is restricted to subsidiaries only, i.e. we exclude the parent companies from our sample.

the reported *EBIT* of a subsidiary is about 1.4 percent smaller if the local tax rate is one percentage point higher.

We then define the dummy variable *US SUB*, indicating whether an observation is a subsidiary of an U.S. MNC (*US SUB* = 1), and the interaction *US SUB* × *POST*. In Specification (2), we also include the interactions *STR* × *US SUB* and *STR* × *US SUB* × *POST*. Estimates for these interaction terms reflect differences in the tax semi-elasticities of reported profits for subsidiaries of U.S. firms, compared to European firms. The coefficient on the first interaction (-0.917) suggests that subsidiaries of U.S. MNCs are significantly more tax responsive than those of European MNCs. This is consistent with and complements the findings in Tørsløv et al. (2022), based on macroeconomic data and focusing on tax haven countries: U.S. multinationals shift about twice as much profit as other multinationals. The insignificant coefficient on the triple interaction indicates that U.S. firms have, however, not become less (or more) responsive after the TCJA.

In column (3), we further distinguish between U.S. subsidiaries belonging to U.S. MNCs being affected by GILTI and subsidiaries of U.S. MNCs unaffected by GILTI (based on the definition of the *GILTI* variable above). Our results suggest a higher tax semi-elasticity only for those U.S. subsidiaries that belong to U.S. MNCs with a low *FOREIGN ETR*. Although, these are the MNCs that are probably affected by GILTI, we cannot find a significant change in the tax semi-elasticities post TCJA. Consequently, our results do not support the view that GILTI changed the income- shifting behavior of U.S. subsidiaries.

In columns (4) and (5) of Table 3.11, we consider a subsidiary's *EBT* as the dependent variable. While *EBIT* does not, by definition, include shifting opportunities associated with inter-company financing, the estimated semi-elasticity on *EBT* reflects an overall profit shifting responsiveness. The results in columns (4) and (5) support the previous findings, and confirm that U.S. MNCs are more tax sensitive. Again, the TCJA has not changed this pattern.

**Table 3.11: Profit Shifting Opportunities, Subsidiary Level**

Variables	EBIT			EBT	
	1	2	3	4	5
STR	-1.3707*** (0.2471)	-0.9007*** (0.2687)	-0.8962*** (0.2694)	-0.6052** (0.2764)	-0.6058** (0.2772)
STR × US SUB		-0.9171*** (0.2934)		-0.9412*** (0.3286)	
STR × US SUB × POST		0.0177 (0.5827)		-0.6543 (0.6974)	
STR × US SUB × GILTI			-1.7557*** (0.3166)		-2.4615*** (0.4319)
STR × US SUB × (1-GILTI)			-0.3535 (0.4060)		0.0288 (0.4398)
STR × US SUB × GILTI × POST			-0.1453 (1.0534)		-0.4794 (1.3327)
STR × US SUB × (1-GILTI) × POST			0.1959 (0.7294)		-0.6346 (0.8433)
US sub	0.0627* (0.0379)	0.3041*** (0.0959)		0.3569*** (0.0969)	
US SUB × POST	0.0297 (0.0388)	0.0001 (0.1465)		0.1368 (0.1824)	
US SUB × GILTI			0.4881*** (0.0939)		0.7704*** (0.1265)
US SUB × (1-GILTI)			0.2192 (0.1458)		0.0849 (0.1451)
US SUB × (GILTI) × POST			0.0218 (0.2632)		0.0621 (0.3465)
US SUB × (1-GILTI) × POST			-0.0304 (0.1935)		0.1592 (0.2223)
LABOR	0.5512*** (0.0125)	0.5510*** (0.0125)	0.5512*** (0.0125)	0.5448*** (0.0156)	0.5449*** (0.0155)
CAPITAL	0.1938*** (0.0069)	0.1937*** (0.0069)	0.1932*** (0.0069)	0.2150*** (0.0089)	0.2134*** (0.0087)
GDP PER CAPITA	0.1335*** (0.03527)	0.1262*** (0.0346)	0.1265*** (0.0347)	0.1139*** (0.0395)	0.1114 (0.0393)
Pair FE	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓
N	25,198	25,198	25,198	17,788	17,788
Adj. R <sup>2</sup>	0.56	0.56	0.56	0.56	0.56

Notes: Subsidiary level data, based on the matched sample (at the group level); years from 2012 – 2019, excluding the transition year. Dependent variables are the *logarithm of earnings before interest and taxes* in columns (1) – (3), and the *logarithm of earnings before taxes* in columns (4) – (5). *LABOR* is the log of the total labor compensation. *CAPITAL* is the log of the fixed assets. *GDP PER CAPITA* is the log of GDP per capita. All regressions include industry dummies at the 2-digit NACE industry code level, year fixed effects and pair fixed effects on the group level. Robust standard errors clustered at the host-country year level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.



The results in Table 3.11 confirm that the foreign subsidiaries of U.S. MNCs have always been responsive to tax incentives, even under the WWTS, before the TCJA. Overall, we may interpret the results as the more successful profit shifting of U.S. MNCs, compared to their European peers – prior to as well as after the TCJA. TCJA has not changed the tax-avoidance behavior of U.S. MNCs, conditional on their European peers. Compared to their European peers, U.S. MNCs achieve a competitive advantage in terms of international tax avoidance. We therefore reject H5.

While the new TTS does not incentivize U.S. MNCs to more aggressively exploit profit shifting opportunities, we cannot confirm that GILTI prevents income shifting. There could be several reasons for this. The subsidiaries for which we have financial data in *Amadeus* mainly cover operative business in high-tax countries. Conduit entities and tax-haven subsidiaries are often not included in *Amadeus/Orbis* data.<sup>46</sup> Clausing (2020) only expects moderate GILTI effects in high-tax countries but significant effects in tax havens.

Our analysis therefore allows the analysis of tax avoidance through profit shifting at locations of subsidiaries with mainly operative business. However, our results are also consistent with the recent study by Garcia-Bernardo et al. (2021). The study focus on the locations towards which profits are shifted and also finds no evidence of significant changes in the tax haven operations of U.S. MNCs post-TCJA. Both perspectives contribute to a better understanding of profit-shifting behavior before and after the major U.S. tax reform. On the other hand, Atwood and Johnson (2021) suggest an increase in the income shifting of U.S. MNCs in the first two years after the TCJA. Contrary, their study uses consolidated data, while our approach recognizes financial data from operative subsidiaries.

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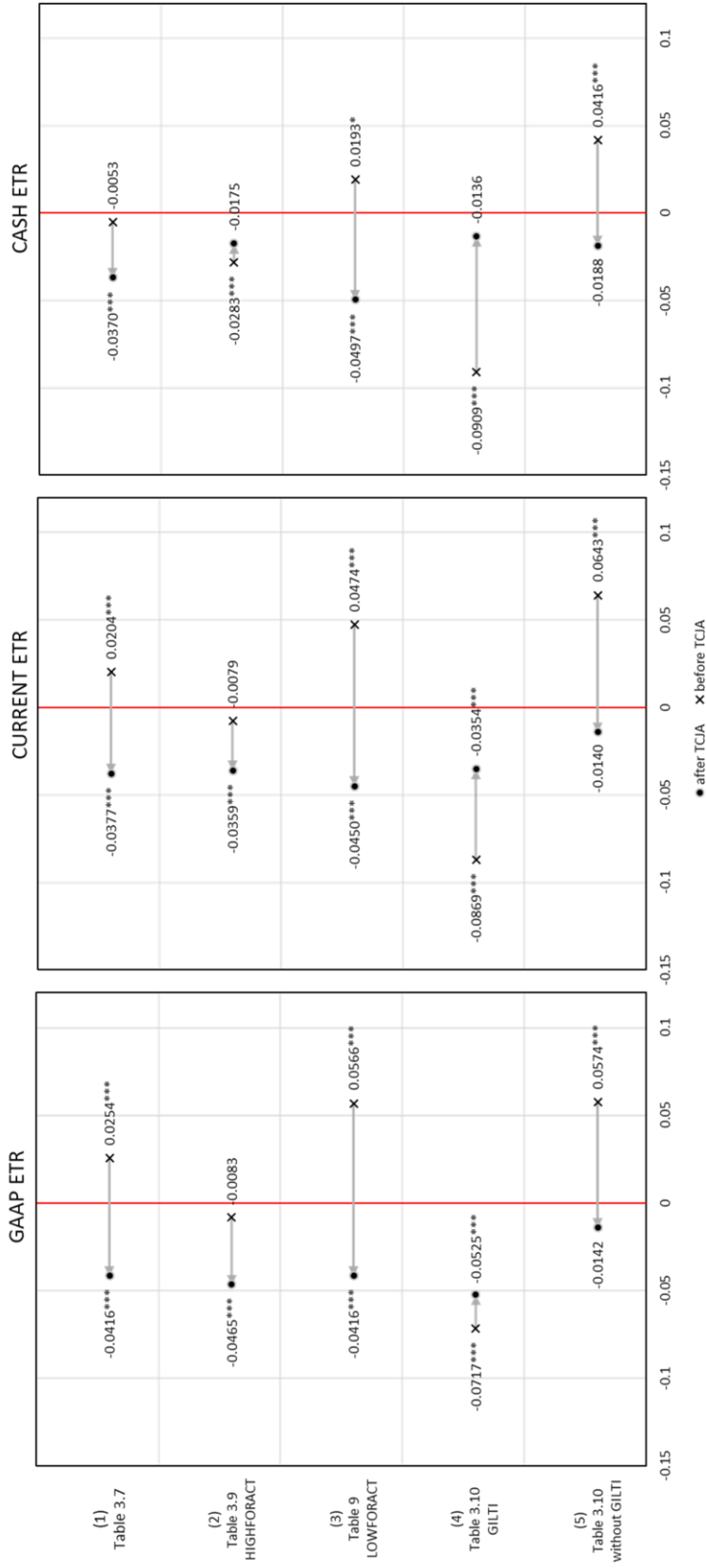
<sup>46</sup> For a comparison between publicly available data, such as *Orbis* or *Amadeus*, and *country-by-country reporting* data, see Fuest, Hugger, and Neumeier (2022). Tørsløv, Wier, and Zucman (2022) also suggest that subsidiary-level data is not well-suited to be used for aggregation exercises, in this context.

### 3.5 TCJA Effects on the Tax-Competitiveness of U.S. MNCs

Equipped with our results, we can discuss how the TCJA has changed the tax-position or tax-competitiveness of U.S. MNCs compared to their European competitors. Figure 3.5 provides an overview of the relative tax-position of U.S. MNCs in terms of our three ETR measures, based on the regression results in Tables 3.7, 3.9 and 3.10. In the figure, a cross indicates the ETR difference between U.S. and European MNCs prior to the TCJA. Dots depict the ETR difference after the TCJA (the sum of the two coefficients on *US* and *US* × *POST*). Positive values indicate a competitive disadvantage of U.S. MNCs due to the higher ETRs of U.S. firms compared to their European competitors. Negative values suggest an advantage of U.S. firms.

The pattern in Figure 3.5 is clear. U.S. MNCs had a relative disadvantage mainly in terms of higher *GAAP ETRs* and *CURRENT ETRs* before the TCJA. The tax-competitiveness of U.S. firms has significantly improved. After the TCJA, the *GAAP ETRs* of U.S. MNCs are approximately 4.2 percentage points lower than the ETRs of their European competitors. The results for the *CURRENT ETR* suggest similar effects. U.S. MNCs with a low share of foreign activity or a low level of international tax avoidance experience the greatest improvement in their tax-competitiveness. Only U.S. MNCs that have already reported low foreign tax rates (i.e. probably affected by GILTI) show a decline in their competitive tax-position.

**Figure 3.5: Tax-Competitive Position of U.S. MNCs Before and After the TCJA**



Notes: Tax-competitiveness of U.S. MNCs compared to their European competitors before and after enactment of the TCJA. GAAP, CURRENT and CASH ETR in columns. The rows indicate different specifications in accordance with prior results. The crosses (dots) denote the tax-competitiveness of U.S. MNCs compared to European MNCs prior to (after) the TCJA. The values specify the relative competitive dis-/advantage in terms of different ETR measures. A negative value indicates a competitive advantage compared to the European MNCs. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively. The significance levels prior the TCJA indicate the significance of the *US* dummy in rows (1) and (5), *HIGHFORACT* in row (2), *LOWFORACT* in row (3) and *US* × *GILTI* in row (4). Significance levels post TCJA indicate the joint significance of the coefficient on the before TCJA dummy and the coefficient on the change due to the TCJA. Note that row (1) corresponds to the coefficients on *US* prior to the TCJA and *US* × *POST* after the TCJA; in row (2) the coefficients correspond to *HIGHFORACT* and *HIGHFORACT* + *HIGHFORACT* × *POST*. In row (3), the coefficients correspond to *LOWFORACT* and *LOWFORACT* + *LOWFORACT* × *POST*, respectively. Further, in row (4), we display the coefficients on *US* × *GILTI* prior to the TCJA and *US* × *POST* + *US* × *POST* × *GILTI* after the TCJA, depicting the competitive position of U.S. MNCs when the GILTI regime most probably apply. In row (5), we report the corresponding coefficients on *US* and *US* × *POST* for U.S. MNCs where anti-tax-avoidance rules do not apply (most probably).

Even though the main focus of our study is on the 2017 tax reform, our results may be interpreted in light of tax policy proposals such as the Biden administration's 'American Jobs Plan'. The proposal has included, for example, a higher statutory tax rate of 28%, which would undo half of the TCJA's tax cut. Disregarding other effects and presuming a similar sensitivity, we can use our results to make predictions about the potential effects of an increase in the statutory tax burden. First, the average *GAAP ETR* of U.S. MNCs would increase by approximately 3.7 percentage points. Second, compared to European MNCs, the benefit of the TCJA would decrease by about 3.4 percentage points. Third, the average advantage in terms of the *GAAP ETR* would shrink to approximately 0.6 percentage points. The average advantage in terms of the *CURRENT ETR* would vanish. However, increasing the *STR* would of course lead to heterogeneous effects, depending on firm characteristics, and particularly the extent to which a firm is exposed to the higher tax burden.

Additional effects on the tax-competitiveness of U.S. MNCs might be associated with more international tax regulation or the introduction of the corporate minimum tax of 15% for certain corporations under the 'Inflation Reduction Act' of August 7<sup>th</sup>, 2022. The approach presented in this study could also be used to evaluate potential reform effects on the tax position of U.S. MNCs.

### **3.6 Conclusion**

The 2017 U.S. tax reform has changed the U.S. tax system in a fundamental way. We add to studies evaluating the consequences of the TCJA by comparing ETRs of U.S. MNCs to their international peers. One of the main objectives of the reform has been to improve the tax-competitiveness of U.S. MNCs. Our estimation approach is based on a comparison of U.S. MNCs and their European peers in a counterfactual framework.

The results support the view that U.S. MNCs benefited substantially from the TCJA in terms of lower total ETRs. The mean *FOREIGN ETR*, however, remains almost unchanged.

U.S. MNCs with low foreign activities benefited most from the tax reform compared to MNCs with high foreign activities. While the latter have lower initial tax levels, the pass-through ratios for the former are about 84% (given the 14 percentage points tax cut).

A central goal of the TCJA was to strengthen the tax-competitiveness of U.S. MNCs against their global competitors. This clearly has been achieved through the substantial tax cut. While ETRs at the MNC level seem to be the best measures to study tax-competitiveness, they can also be analyzed to study behavioral responses to tax reforms – as they reflect international profit-shifting activities, for example. Earlier studies suggest that U.S. MNCs were avoiding taxes and shifting profits before the TCJA. Abolishing the WWTS may incentivize them to become even more aggressive in this behavior. At the same time, the new GILTI rules have been introduced to reverse these incentives. Consistent with this, our findings show that firms benefit most from the TCJA if the GILTI regulation is most probably not binding. However, it is for future research to investigate whether the effects are permanent.

In additional tests, we also consider subsidiary-level data of our matched sample of MNCs. The results suggest that U.S. MNCs were massively avoiding taxes through profit shifting before the reform (consistent with previous findings), and this behavior did not change thereafter.

Our paper is, to the best of our knowledge, the first that studies TCJA effects on ETRs in an international setting, which allows us to measure firm responses relative to a well-defined benchmark, and make statements about tax-competitiveness. Furthermore, our empirical approach allows us to evaluate the effects of future tax reforms on the tax-competitiveness position of MNCs. For instance, this can be utilized to infer the potential competition effects of recent tax changes including the minimum tax as part of the ‘Inflation Reduction Act’.

## Appendix

**Table A3.1: Variable Definition**

GAAP ETR	$\text{txt} / (\text{pi} - \text{xi})$ , i.e., income taxes divided by pretax income, adjusted for extraordinary items (set to zero if missing); exclude outliers.
CURRENT ETR	$(\text{txt} - \text{txdi}) / \text{pi}$ , i.e., current taxes divided by pretax income; exclude outliers.
CASH ETR	$\text{txpd} / \text{pi}$ , i.e., taxes paid divided by pretax income; exclude outliers.
FOREIGN ETR	$\text{txfo} / \text{pifo}$ for U.S. MNCs, i.e., foreign income taxes divided by foreign pretax income; exclude outliers; $(\text{txt} - \text{txdom}) / (\text{pi} - \text{pidom})$ for European MNCs, i.e., domestic taxes subtracted from total taxes divided by pretax income excluding domestic pretax income; exclude outliers.
DOMESTIC GAAP ETR	$(\text{txt} - \text{txfo}) / (\text{pi} - \text{pifo} - \text{xi})$ , i.e., foreign taxes subtracted from total taxes, divided by pretax income excluding foreign income and adjusted for extraordinary items (set to zero if missing); excludes outliers.
DOMESTIC CURRENT ETR	$(\text{txt} - \text{txfo} - \text{txdfed} - \text{txds}) / (\text{pi} - \text{pifo})$ , i.e., foreign taxes, deferred federal taxes and deferred state taxes subtracted from total taxes, divided by pretax income excluding foreign income; exclude outliers.
ROA (Return on Assets)	$\text{pi} / \text{at}$ , i.e., pretax income divided by total assets.
SIZE	$\log(\text{at})$ , i.e., logarithm of total assets.
RD (Research & Development)	$\text{xrd} / \text{at}$ , i.e., research and development expense divided by total assets (set to zero if missing xrd).
LEV (Leverage)	$(\text{dlc} + \text{dltt}) / \text{at}$ , i.e., total debt divided by total assets.
INTAN (Intangibles)	$\text{intan} / \text{at}$ , i.e., intangibles divided by total assets (set to zero if missing intan).
STR (Statutory Tax Rate)	Statutory corporate tax rate of the MNC's/subsidiaries home country.
US	Dummy, which is one for U.S. MNCs and zero for European MNCs.
POST	Dummy, which is one for the period after the TCJA was enacted; exclude transition year.
HIGHFORACT	Dummy, which is one for U.S. MNCs identified with high foreign activities, and zero otherwise.
LOWFORACT	Dummy, which is one for U.S. MNCs identified with low foreign activities, and zero otherwise.
GILTI	Dummy, which is one for U.S. MNCs identified with average FOREIGN ETRs lower than the sample median, prior to the TCJA and zero otherwise.
US SUB	Dummy, which is one for a subsidiary of an U.S. MNC, and zero otherwise.
LABOR	$\ln(\text{staf})$ , i.e., logarithm of the total labor compensation.
CAPITAL	$\ln(\text{fias})$ , i.e., logarithm of fixed assets.
GDP PER CAPITA	$\ln(\text{GDPPC})$ , i.e., logarithm of GDP per Capita.

Notes: Data are taken from Compustat and Compustat Global. Foreign taxes and pretax income for European MNCs, European taxes and subsidiary level information were calculated by combining the Compustat and *Amadeus* databases.

**Table A3.2: Additional Sensitivity Checks (Treatment: US)**

Specification	Coefficient on $US \times POST$		
	GAAP ETR	CURRENT ETR	CASH ETR
	1	2	3
(1) Exact matching by industry Base specification	-0.0670*** (0.0100)	-0.0581*** (0.0116)	-0.0317*** (0.0119)
(2) No matching Year and industry FE	-0.0647*** (0.0077)	-0.0514*** (0.0096)	-0.0203** (0.0102)
(3) Standard matching Only year FE	-0.0649*** (0.0097)	-0.0584*** (0.0114)	-0.0275** (0.0120)
(4) Standard matching Year FE and industry FE	-0.0639*** (0.0098)	-0.0570*** (0.0114)	-0.0274** (0.0121)
(5) Standard matching Year-Pair-FE	-0.0726*** (0.0116)	-0.0579*** (0.0143)	-0.0272* (0.0142)
(6) No exact industry matching	-0.0670*** (0.0091)	-0.0545*** (0.0106)	-0.0206* (0.0117)
(7) Matching including 2nd order polynomial	-0.0688*** (0.0095)	-0.0551*** (0.0114)	-0.0280** (0.0121)
(8) Matching including 3rd order polynomial	-0.0645*** (0.0092)	-0.0555*** (0.0109)	-0.0246** (0.0118)
(9) Matching including size interactions	-0.0713*** (0.0097)	-0.0609*** (0.0117)	-0.0349*** (0.0125)
(10) Matching including size interaction and 2nd order polynomial	-0.0670*** (0.0089)	-0.0515*** (0.0114)	-0.0202 (0.0125)

Notes: Regressions are based on the matched sample (except specification (2)), where MNCs are included in the *S&P500* or *StoxxEurope600* stock market indices at least once during the period 2000 to 2020 and the MNCs are headquartered either in the U.S. or in Europe; years from 2012 to 2019 are included; the transition year is excluded. We report only results for the interaction  $US \times POST$ . Unless otherwise described, we include year and firm-pair fixed effects in all specifications. The dependent variable is *GAAP ETR* in column (1), *CURRENT ETR* in column (2) and *CASH ETR* in column (3). In all columns, we control for the respective firm characteristics, *SIZE*, *ROA*, *LEV*, *RD* and *INTAN*. Specifications in row (1) repeat our basic regression (Panel B in Table 3.2), while row (2) considers the unmatched sample (Panel A, Table 3.2). In row (3), only year fixed effects are included, in row (4) industry fixed effects are added, and in row (5) year-pair fixed effects are considered. In rows (6) to (10), different matching procedures apply. Row (6) does not require an exact industry matching of firm-pairs. Rows (7) to (10) consider higher-order polynomials of (all) explanatory variables as well as interaction terms between size and explanatory variables when computing propensity scores. Number of matched pairs in rows (1) and (3) – (5) 242, in (6) 287, in (7) 224, in (8) 238, in (9) 235, and in (10) 240. Robust standard errors clustered at the firm level are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

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## **Chapter 4**

Heterogeneity in Tax Avoidance within and between the U.S.  
and Europe in the Last Decade

# Heterogeneity in Tax Avoidance within and between the U.S. and Europe in the Last Decade

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## **Abstract:**

This paper examines the heterogeneity in tax avoidance of firms in the United States (U.S.) and Europe. Clustering analysis reveals six distinct levels of tax avoidance in both regions. Furthermore, the study uses a propensity score matching (PSM) approach to find firm pairs of European and U.S. firms, to examine heterogeneity in tax avoidance among direct competitors across the two continents. Interestingly, U.S. firms and their direct European competitors exhibit significantly different tax avoidance levels, i.e. the U.S.-European firm pairs frequently fall in different tax avoidance clusters. Additionally, I examine the potential changes in tax-competitiveness due to recent tax legislation in Europe and the U.S. In line with prior literature, I find that U.S. firms gained a competitive tax advantage following the implementation of the Tax Cuts and Jobs Act of 2017 (TCJA). However, an important insight from the clustering approach is that there is significant heterogeneity in the tax-competitiveness effects of the TCJA. Although most U.S. firms experience a significant increase in their tax-competitiveness, U.S. tax avoiders are negatively affected by the introduction of anti-tax avoidance provisions. On the other hand, European tax avoiders maintain a tax-competitive advantage over their U.S. competitors. Finally, despite recent anti-tax avoidance policy efforts in Europe, there is a group of more than 100 European firms that maintain low ETRs throughout the sample period from 2012 to 2022.

**Keywords:** tax avoidance, tax-competitiveness, propensity score matching, TCJA, determinants of tax avoidance, anti-tax avoidance rules, ATAD

**JEL Classification:** H25, H26

Acknowledgements: I gratefully acknowledge funding from the German Research Foundation (DFG), grants OV 120/2-1, and FOR2783. I am also thankful for helpful comments and suggestion by Michael Overesch and Max Pflitsch.

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## **4.1 Introduction**

There is a heated debate about firms' tax avoidance, both in the U.S. and Europe. Firms are oftentimes perceived as 'not paying their fair share of taxes' by the media and public. This in turn exerted pressure on policy makers to curb tax avoidance, leading to different tax reforms in the U.S. and Europe. This paper provides in depth analyses on the tax avoidance behavior of U.S. and European firms and sheds light on the effectiveness of implemented anti-tax avoidance policies on both continents.

To gain a deeper understanding of tax avoidance in the U.S. and Europe, I employ two types of analyses. First, I employ clustering to examine whether there are different types of firms with respect to their tax avoidance behavior, both in the U.S. and in Europe. Second, I utilize propensity score matching (PSM) to find pairs of firms from the U.S. and Europe to analyze whether competitors across countries fall within the same type (i.e. cluster) of tax avoidance.

The clustering analyses suggests that the tax avoidance behavior can be summarized in six groups of tax avoidance in each region with similar levels of tax avoidance of U.S. and European firms from 2012 to 2016. Contrary to expectations, the PSM analyses reveals that U.S. tax avoiders are not the direct competitors of European tax avoiders. That means the matched firm pairs oftentimes fall in different tax avoidance categories. This is an important insight because prior studies using the matching approach to identify competitors mostly disregarded this heterogeneity in tax avoidance. In addition, the examination of tax-competitiveness between cross-border competitors is important for policymakers in both the U.S. and Europe. European policy makers are still debating on how to respond to the changed tax landscape due to the TCJA, while there is also a policy debate in the U.S. surrounding the different provisions of the TCJA, since many of these are due to expire in 2025.

Next, I consider the effects of recent tax policy changes in the U.S. and Europe and the potential effects on tax avoidance. In the last decade, European firms have been targeted by tax rulings such as the BEPS implementation or ATAD I (Anti-Tax Avoidance Directive) and ATAD II that aim at ending international tax planning and tax evasion. ATAD I had to be implemented by the European Union (EU) member states latest until the end of 2018 and included interest deduction limitations, General-Anti-Tax-Avoidance-Rules (GAAR), Controlled-Foreign-Corporation-Rules (CFC-Rules) and exit taxation rules. ATAD II was supplementary to ATAD I and contained the implementation of anti-hybrid mismatch rules latest by the end of 2019. All European Union member states implemented these regulations into national law latest by the end of 2019. However, the clustering analyses reveals that more than hundred European firms (7.5% of European sample firms) have consistently remained high tax avoiders from 2012 to 2022, seemingly unaffected by newly introduced anti-tax avoidance legislation, and continue to have very low ETRs. This suggests that recent anti-tax avoidance regulation may be ineffective.

On the U.S. side, the TCJA changed the tax landscape for international U.S. firms significantly. On the one hand, it reduced the corporate tax rate from 35% to 21%, installed an even lower tax burden for so-called ‘Foreign-Derived-Intangible Income’ (FDII) and immediate expensing of certain capital investments. All of these changes are likely to reduce the tax burdens of U.S. firms significantly and should result in better tax-competitiveness of U.S. firms after the TCJA (e.g., Dyreng, Gaertner, Hoopes, and Vernon 2023; Garcia-Bernardo, Janský, and Zucman 2022; Overesch, Reichert, and Wamser 2023). However, the TCJA also installed anti-tax avoidance provisions similar to the BEPS implementation, such as the Global Intangible Low Taxed Income (GILTI), Base Erosion and Anti-Abuse Tax (BEAT) and a limit on interest deductions rendering the overall effect of the TCJA on tax-competitiveness



(Carrizosa, Gaertner, and Lynch 2023; Dunker, Pflitsch, and Overesch 2021; Amberger and Robinson 2023).

I confirm prior studies on the TCJA and find that it overall improved the competitiveness of U.S. firms. In addition to prior research, I consider the different tax avoidance clusters and perform PSM. This reveals that the TCJA supports particularly those U.S. firms that were at a tax-competitive disadvantage before the TCJA. Further, the clustering approach reveals that U.S. tax avoiders potentially targeted by anti-tax avoidance provisions implemented by the TCJA lose part of their tax-competitive advantage. Therefore, clustering helps evaluating extensive tax policies like the TCJA with potential countervailing effects on different firm groups.

This paper examines the tax-competitiveness of European firms over the last decade using the long-term *CASH ETR* over three and five years (Dyreng, Hanlon, and Maydew 2008). This measure allows me to obtain actual tax cash outflows for each period and compensates for potential time mismatches using the annual *CASH ETR*. The tax-competitiveness is the tax-differential between competitors. Firms with a higher competitiveness have lower cash outflows compared to their competitors and therefore a cash or liquidity advantage.

Previous literature has analyzed the ‘tax-position’ and ‘tax-competitiveness’ of U.S. firms relative to non-U.S. firms (Collins and Shackelford 1995, 2003) and the tax-competitiveness of U.S. firms and their direct European competitors before and after the TCJA (PriceWaterhouseCoopers 2011; Markle and Shackelford 2012; Overesch, Strueder, and Wamser 2020; Overesch et al. 2023). These studies show that, on average, European firms had a tax-competitive advantage before the TCJA, which turned into a disadvantage after the TCJA.

Focusing on the period after recent tax regulation in the U.S. and Europe (i.e. 2020 to 2022), my results reveal that there remain six clusters of tax avoidance in Europe. The subsequent PSM analysis suggests that very tax aggressive European firms (i.e. in the most

aggressive cluster) maintain a tax-competitive advantage over their U.S. competitors in this period. All other European firms have a competitive disadvantage between 2020 and 2022.

Finally, further analysis provides new insights into the determinants of tax avoidance in Europe and in the U.S. The findings suggest, that tax avoidance in both regions is determined by similar factors. Both groups of tax avoiders tend to be smaller in their size and have lower intangibles. However, U.S. tax avoiders are less profitable, have a higher leverage, and lower market power.

This study is the first to analyze different groups of tax avoidance within Europe and within the U.S. and compares them to their foreign competitors. In addition to examining the tax-competitiveness, I provide initial findings on the differences in tax avoidance between Europe and the U.S. and how anti-tax avoidance legislation has affected the tax-competitiveness of European firms and their tax avoidance practices. Thus, this study contributes to the existing literature by demonstrating the significant heterogeneity in corporate tax avoidance behavior in both Europe and the U.S. This should be considered in future research, particularly when evaluating tax policy proposals. As a result, this research design can be utilized to examine tax policies and gain a better understanding of the variation within Europe and the U.S., as well as among direct competitors. Finally, this paper summarizes the current tax-competitiveness of European firms and shows that European firms on average pay significantly higher amounts of cash taxes compared to their U.S. competitors. However, more than 100 firms in Europe also manage to maintain low tax burdens throughout the sample period despite recent policy efforts to curb tax avoidance in Europe.

The paper is organized as follows: section 4.2 presents testable hypotheses. Section 4.3.1 presents the data and provides a brief exploratory analysis. The subsequent section 4.3.2 outlines the empirical approach. Section 4.4 presents the results regarding the heterogeneity in tax avoidance within and between the U.S. and Europe. Section 4.5 analyzes the determinants

of being a high tax avoider and section 4.6 shows the changes in tax avoidance in Europe over time. Finally, section 4.7 concludes.

## **4.2 Related Literature and Hypotheses Development**

Empirical evidence indicates that there is significant cross-variation in tax avoidance across firms (e.g., Dyreng et al. 2008; Gallemore, Maydew, and Thornock 2014). Some firms are highly tax aggressive and engage in tax avoidance structures, while others do not engage in tax avoidance (Jacob, Rohlfig-Bastian, and Sandner 2021). According to Jacob et al. (2021), tax avoidance is determined by a function of moral hazard, tax-planning costs, and the potential increase in earnings. Studies demonstrate, that tax avoidance enhances firm value by increasing the cash flows of the firm (Desai and Dharmapala 2009; Hasan, Lobo, and Qiu 2021). The impact of reputational costs is well documented and implies a trade-off between reputational costs and tax benefits (e.g., Hanlon and Slemrod 2009; Graham, Hanlon, Shevlin, and Shroff 2014). Studies indicate that firms may face political costs when they have direct dependence on the government (Mills, Nutter, and Schwab 2013), or when they attempt to avoid scrutiny by government agencies, like tax authorities (Key 1997; Han and Wang 1998; Badertscher, Phillips, Pincus, and Rego 2009; Ramanna and Roychowdhury 2010).

Further, several studies have analyzed the firm level determinants of tax avoidance and firm size (Siegfried 1974; Stickney and McGee 1982; Zimmerman 1983; Porcano 1986; Gupta and Newberry 1997; Richardson and Lanis 2007; Dyreng et al. 2008; Richardson, Taylor, and Lanis 2015). Highly profitable firms are more incentivized to engage in tax avoidance and have greater resources to invest in such practices (Gupta and Newberry 1997; Rego 2003; Eichfelder and Hechtner 2018; Mocanu, Constantin, and Răileanu 2021). Similar studies show, that there is a positive relation between leverage and tax avoidance (Mills and Newberry 2005; Allen, Francis, Wu, and Zhao 2016; Chyz, Ching Leung, Zhen Li, and Meng Rui 2013).

Several studies have examined the relationship between corporate governance and tax avoidance. However, the results have been mixed (e.g., Armstrong, Blouin, Jagolinzer, and Larcker 2015). Another strand of literature analyzes the relation between a firm's management and its tax avoidance practices. Desai and Dharmapala (2006), Armstrong, Blouin, and Larcker (2012), and Graham et al. (2014) have shown that compensation incentives may have an impact on the tax avoidance level of a firm. Furthermore, recent literature suggests that internal parties (i.e. firm characteristics) explain tax avoidance to a much higher degree than external factors (Belnap, Hoopes, and Wilde 2024).

In short, there are a large number of determinants, which suggests a large cross-sectional variation in the level of tax avoidance. Therefore, I propose my first hypothesis, H1:

***H1: In both Europe and the U.S. there are groups of firms that engage in varying degrees of tax avoidance.***

Next, I consider whether European and U.S. firms that directly compete with each other exhibit similar tax avoidance levels. Different firm characteristics may be associated differently with tax avoidance in the U.S. and Europe, for instance due to difference in the tax codes. Correspondingly, it could be that the competitor pairs exhibit different tax avoidance strategies.

For instance, some studies suggest a negative correlation between firm size and tax avoidance in the U.S. (Siegfried 1974; Porcano 1986), other studies emphasize a positive correlation (Zimmerman 1983; Dyreng et al. 2008). Also, in Europe, the findings are mixed. Mocanu et al. (2021) support the positive relationship between firm size and tax avoidance for firms in Romania. On the other hand, Thomsen and Watrin (2018) find a negative relationship for 12 European countries in the period from 2005 to 2016 and Overesch et al. (2023) find no significant effect of firm size on tax avoidance in Europe.

Intuitively, for both U.S. and Europe studies show that highly profitable firms are incentivized to engage in tax avoidance (Gupta and Newberry 1997; Rego 2003; Eichfelder and

Hechtner 2018; Mocanu et al. 2021). Similarly, in Europe and the U.S., R&D intensity is related to profit shifting through the placement of intellectual property (IP) (Overesch and Schreiber 2010; Dischinger and Riedel 2011; Griffith, Miller, and O'Connell 2014; Belz, Hagen, and Steffens 2017). Previous studies conducted in the U.S. indicate a negative correlation between a firm's tax avoidance and its leverage (Mills and Newberry 2005; Allen et al. 2016; Chyz et al. 2013). Mocanu et al. (2021) and Overesch et al. (2023) found similar results in Europe.

These studies on tax avoidance indicate that overall similar factors influence the level of tax avoidance in both the U.S. and Europe, but there might be nuanced differences. Therefore, it appears likely that tax avoiders in the U.S. and in Europe are direct competitors. Accordingly, I state hypothesis H2 as follows:

**H2:** *The U.S. - European firm pairs frequently fall in the same cluster of tax avoidance.*

Next, I examine recent tax policy and its effect on the tax avoidance of U.S. and European firms. After 2016, the European Union (EU) enacted two directives aimed at preventing tax avoidance. The first directive, ATAD I, included limitations on interest deductions, GAARs, CFC-rules, and exit taxation rules. These rules had to be implemented into national law by the end of 2018. The second directive, ATAD II, was supplementary to ATAD I and contained the implementation of anti-hybrid mismatch rules, which had to be implemented by the end of 2019. Although these rules may apply to foreign companies active in Europe, they primarily affect European firms. The objective of these regulations is to curb tax avoidance, particularly the transfer of profits outside of Europe.

During the initial stage of my analysis, I employ clustering methods to identify distinct groups of tax avoiders in Europe and the U.S. between 2012 and 2016, prior to the enactment of the ATADs in Europe. I use the five-year *CASH ETRs* for the periods 2012 to 2016 and 2018 to 2022, respectively. The first period serves as a basis for comparison, while the second period includes the years when the ATADs came into force and subsequent years. If the ATADs

achieve their goal of targeting European tax avoiders, I expect the *CASH ETR5* of European tax avoiders to increase after 2018. Therefore, I propose the following third hypothesis, H3:

**H3:** *European high tax avoiders are targeted by Anti-Tax Avoidance Directives and therefore are not able to maintain low ETRs over the whole decade.*

Next, I turn to the effects of the TCJA on tax-competitiveness. Previous studies have examined the tax differentials between U.S. firms and their European competitors before and after the TCJA. These studies conducted prior to the TCJA indicate that U.S. firms generally had a competitive disadvantage compared to their European and international competitors due to the high U.S. corporate tax rate (PriceWaterhouseCoopers 2011; Markle and Shackelford 2012; Overesch et al. 2020). However, some firms are able to compensate for the high U.S. corporate tax rate through international tax avoidance, especially with the use of permanent reinvested earnings outside the U.S. and deferring repatriation tax on foreign earnings (Overesch et al. 2020).

The TCJA reduced the corporate tax rate by 14 percentage points, installed an even lower tax burden for FDII and immediate expensing of certain capital investments. These changes may reduce the tax burdens of U.S. firms significantly and should result in better tax-competitiveness of U.S. firms after the TCJA (e.g., Dyreng et al. 2023; Garcia-Bernardo et al. 2022; Overesch et al. 2023). In line with prior literature, I expect the TCJA to overall improve the tax-competitiveness of U.S. firms due to the favorable rules described above. Accordingly, I state my next hypothesis as follows:

**H4a:** *After the TCJA, U.S. firms have a tax-competitive advantage over their European competitors.*

However, I note that besides the favorable provisions, the TCJA also introduced non-beneficial provisions such as GILTI, BEAT, and a limit on interest deductions. GILTI applies when foreign income is taxed at a rate lower than 13.125%, and 50% of the foreign income will

be taxed in the U.S. if certain returns are exceeded, depending on the firm's qualified business assets. Lyon and McBride (2018) suggest, that the benefits of the TCJA may be partially offset by GILTI. The simulation by Clausing (2020) indicates, that GILTI significantly reduces the profits of U.S. MNEs in low-tax countries. Amberger and Robinson (2023) and Dunker et al. (2021) indicate that the TCJA, and particularly GILTI, encourages U.S. firms to make fewer tax-motivated foreign acquisitions.

BEAT tries to curb tax avoidance using deductible payments like interests and royalties by imposing a minimum tax of 10% on the modified taxable income of a firm (Donohoe, McGill, and Outslay 2019; Carrizosa et al. 2023). However, recent evidence suggests that BEAT may be ineffective (Kelley, Lewellen, Lynch, and Samuel 2023).

Finally, Carrizosa et al. (2023) show that the limitation on interest deductions results in a substantial reduction in leverage for U.S. firms. Those findings suggest, that the anti-tax avoidance provisions implemented by the TCJA impact the tax avoidance behavior of U.S. firms. Therefore, U.S. high tax avoiders might exhibit a decrease in tax-competitiveness after the TCJA. As a result, I propose my fourth hypothesis:

***H4b:** After the TCJA, the most aggressive U.S. tax avoiders have a lower tax-competitive advantage over their European competitors.*

Similarly, Europe recently implemented tax legislation to curb tax avoidance (see above for details on ATAD). This regulation also aims at very aggressive European tax avoiders. Correspondingly to hypothesis 3, I expect that European firms that fall in the high tax avoiding group, exhibit a decrease in relative competitiveness after the introduction of ATAD. Therefore, I state my final hypothesis H5:

***H5:** After the TCJA, the most tax-aggressive European firms face a tax-competitive disadvantage compared to their U.S. competitors.*

## 4.3 Data and Research Design

### 4.3.1 Data and Explorative Analysis

My sample consists of firms that are headquartered in either the U.S. or in Europe with consolidated financial data available in *Compustat* or *Compustat Global* respectively. I consider fiscal years 2012 to 2022. My base sample consists of 2,170 European and 1,910 U.S. firms (see Table 4.1).

**Table 4.1: Sample Selection**

Description	European Firms		U.S. Firms	
	Firms	Firm-Years	Firms	Firm-Years
Non-Miss. Controls	8,421	65,450	9,141	66,904
Non-Miss. Controls & CASH ETR5 before and after the TCJA	2,170	26,305	1,910	16,589

Notes: The sample is based on firms where data is available for the period 2012 to 2022 in the *Compustat* and *Compustat Global* databases.

To get a first insight into the research questions and the data, I divide my sample into firms headquartered either in the U.S. or in Europe<sup>47</sup>. I exclude firms that change their location over time. Therefore, I introduce the indicator variable  $EU_i$  indicating whether firm  $i$  is headquartered in Europe ( $EU_i = 1$ ) or in the U.S. ( $EU_i = 0$ ). I compute the *CASH ETR* for both U.S. and European firms by calculating the ratio of cash taxes paid ( $txpd$ ) and pretax income ( $pi$ ).<sup>48</sup> Figure 4.1 shows the yearly mean, 25%-quartile, and 75%-quartile *CASH ETR* for both regions. Although the differentiation is crude, the graph already indicates a certain level of tax avoidance by European and U.S. firms. It appears that in both Europe and the U.S. there are certain high tax avoiders as well as firms that do not engage in tax avoidance at all.

The graphical overview of the U.S. firms shows one main effect: on average a significant decrease in the *CASH ETRs* of U.S. firms after the TCJA in 2017. The graphical differentiation suggests that particularly U.S. firms in the 75%-quartile benefit from the TCJA.

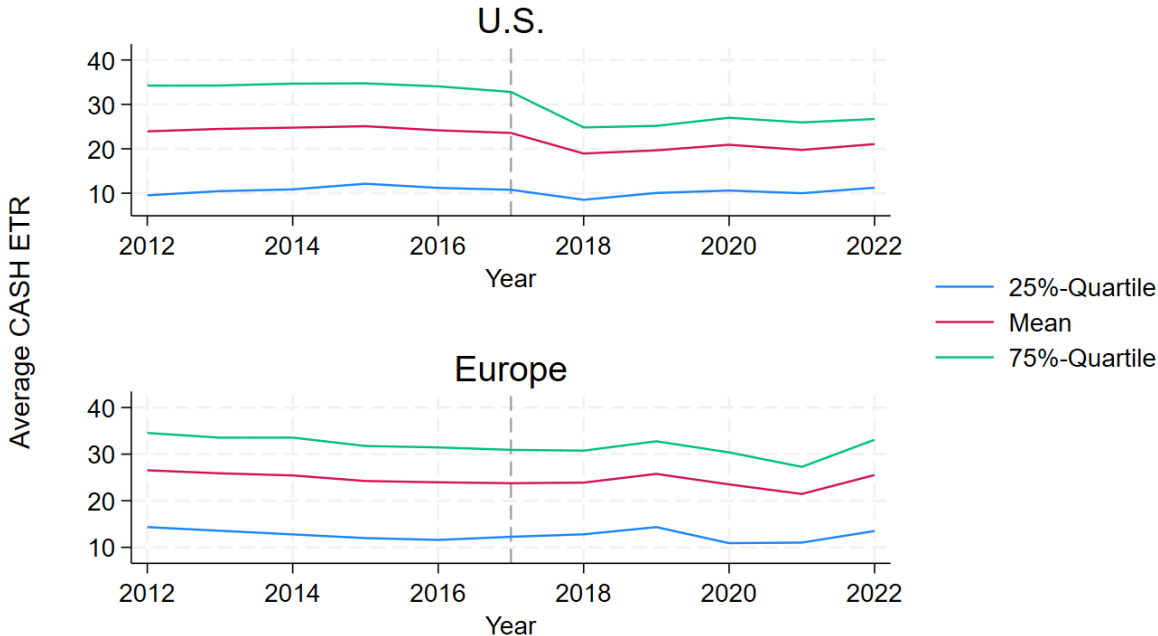
<sup>47</sup> Located in the European Union or in the European Economic Area.

<sup>48</sup> Please note that European firms in the *Compustat Global* database normally account for IFRS and the U.S. firms in the *Compustat* database report in accordance to US-GAAP.



This is quite obvious and consistent with previous literature (e.g., Dyreng et al. 2023; Overesch et al. 2023). It is interesting to note, that the distance between the mean and the 75%-quartile decreases after the TCJA. The second striking observation concerns the group with the lowest *CASH ETRs*. While the average pre-TCJA (years 2012 to 2016) *CASH ETR* is about 10.8%, the average post-TCJA (years 2018 to 2022) *CASH ETR* is about 10.1%. Almost no change. This suggests, that the positive TCJA affect may be offset by negative effects of anti-tax avoidance provisions under the TCJA, such as GILTI.

**Figure 4.1: Comparison of Level of Tax Avoidance in U.S. and Europe**



Notes: Depiction of 25%-quartile, mean and 75%-quartile of the average *CASH ETRs* of U.S. and European firms over the time period 2012 to 2022.

When examining the European firms, one main finding emerges: all three groups move similar over time, but at different levels of tax expenses. There appears to be a slight downward trend until 2016, followed by an increase until 2019. The decrease could be mainly due to sinking corporate tax rates in Europe. However, the increase is mostly attributable to the introduction of anti-tax avoidance measures in Europe, such as BEPS after 2016 and ATAD after 2018.

When comparing the three groups in the U.S. and Europe (e.g., U.S. mean versus European mean) some interesting observations can be made. On average, European firms have higher average *CASH ETRs* throughout the sample period. Prior to the TCJA in 2017, U.S. firms have an average *CASH ETR* of 24.5%, which decreases to 20.0% after the TCJA. In Europe, the average *CASH ETR* moves from 25.2% before 2017 to 23.7% after 2017. During the entire sample period, European firms in the 25%-quartile have slightly higher *CASH ETRs* than their U.S. counterparts. However, European firms in the 75%-quartile have lower average *CASH ETRs* (32.9%) than their U.S. counterparts (34.4%) before 2017. After 2017, the average *CASH ETRs* of the U.S. firms decrease significantly (25.9%), while those of European firms remain higher at 30.4%.

While this brief explorative analysis already suggests some similarities and differences between tax avoidance by European and U.S. firms, Figure 4.1 shows two further issues. First, it shows, that there is in both region heterogeneity in the level of the tax expenses. Prior to the TCJA, the tax-differential in terms of the *CASH ETR* is in both the U.S. and Europe over 20 percentage points. This heterogeneity is of most interest as it expects, that there are different groups and levels of tax avoidance in the U.S. and in Europe. Therefore, in the next section I employ clustering methods to obtain the number of different groups in terms of tax avoidance in the U.S. and in Europe.

Second, the graphic shows, that prior to the TCJA the *CASH ETRs* move slightly but on a parallel level within both regions. However, starting in 2017 with the U.S. tax reform several tax institutions affect European and U.S. firms. In the U.S. there is a big drop and in Europe there is a slight increase in the average *CASH ETRs*. Therefore, to observe tax avoidance over time, there are two essential time periods. First the period 2012 to 2016, before the TCJA. Secondly the period 2018 to 2022, after the TCJA and after ATAD. Thus, in the following I use the consolidated data to compute the long-term *CASH ETR* as proposed by Dyreng et al. (2008)

as an indicator for the level of a company’s tax expense. For the main part of my analyses, I focus on the *CASH ETR5*, as five years before and five years after the TCJA. The *CASH ETR5* is the ratio of the sum of cash taxes paid (*txpd*) over five years with the sum of pre-tax income (*pi*) less the special items over the same five years. However, I do not exclude special items from pretax income for both European and U.S. firms, since firms that account for IFRS do not disclose for special items and therefore, the *CASH ETR5* would not be comparable:

$$CASH\ ETR5 = \frac{\sum_{t=1}^5 Cash\ Tax\ Paid_{it}}{\sum_{t=1}^5 Pretax\ Income_{it}}$$

In this setting I also include firm-years with a negative pre-tax income (loss-years) or years with negative taxes paid (e.g. use of loss-carry-forwards or refund after tax audit).<sup>49</sup>

### 4.3.2 Empirical Approach

#### Clustering

According to Jacob et al. (2021), tax avoidance is determined by a function of moral hazard, tax-planning costs, and the potential increase in earnings. Additional, previous literature has identified a large number of determinants for tax avoidance. Further, firms might be constrained by their own societal norms and the ability to engage in certain structures. For example, a purely domestic company may be limited to one tax code, while an international company may be able to exploit ‘loopholes’ in the tax codes of/between multiple jurisdictions or take advantage of tax differentials between jurisdictions. In this environment, companies can achieve different levels of effective tax rates and can therefore be categorized according to their level of tax expense. However, ex-ante the heterogeneity within the U.S. and Europe is obscure. It is unclear how similar the tax avoidance behavior of firms in Europe and in the U.S. is and

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<sup>49</sup> Firm-year observations with negative values for both the nominator and denominator of the *CASH ETR5* are excluded, as well as those with a long-term *CASH ETR5* greater than one or less than zero.

how different groups of firms can be categorized. Therefore, as a first step, I use cluster methods to group European and U.S. firms separately according to their level of tax avoidance.

Using these clustering methods, I aim to organize the firms in my sample into subgroups, where the firms within a cluster are similar, while firms across clusters are dissimilar in terms of their relative tax expense. This form of unsupervised learning allows me to obtain groups of firms with similar tax avoidance behavior or opportunities.<sup>50</sup>

The general strength of cluster analysis is that it is purely data-driven and generally does not involve prior information or subjective choices. Four steps are required: (i) selecting the variables to be used in the clustering process, (ii) selecting and computing of the distance or similarity measure, (iii) selecting the clustering method, and (iv) selecting the number of clusters.

As previously mentioned, clustering is utilized to divide the sample of European and U.S. firms into subgroups based on their level of tax avoidance, independent of certain firm characteristics. The one-dimensional clustering process, only employs the *CASH ETR5* over 2012 to 2016 as the relevant variable. This was done to observe changes in tax avoidance behavior over a relatively long period and to evaluate the impact of certain tax institutions introduced over time, such as the TJCA in 2017 or ATAD in 2018 and 2019, on tax avoidance behavior. In a further analysis, clustering was also performed based on the period from 2020 to 2022 (see section 4.6).

The long-run *CASH ETR* over five years is used, as regular ETRs are solely based on annual data. Thus, significant year-to-year variation, such as a negative pre-tax income or the use of loss-carry-forwards, could be disregarded. The *GAAP ETR* is not utilized, as it includes both current and deferred taxes, which excludes forms of tax avoidance that involve deferring income for tax purposes. The *CURRENT ETR*, on the other hand, excludes deferred tax expense

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<sup>50</sup> Note that this does not imply that firms within the same group employ identical tax avoidance strategies. This clustering only employs groups based on the level of ETR.

by definition and is therefore affected by deferral tax strategies. However, the *CURRENT ETR* also has its own issues. It is influenced by various factors, such as employee stock options or the legislation for special tax cushions (Dyreng et al. 2008; Schenkelberg 2018).

The *CASH ETR* relies on cash taxes paid in the current period and not on an accrual basis. It accounts for tax payments accrued in prior periods and includes adjustments after a tax audit. However, there may be a timing mismatch between the cash taxes paid and the pre-tax income. As Dyreng et al. (2008) introduced, I use the *CASH ETR5*. This is calculated, by dividing the sum of cash taxes paid over five years by the sum of pre-tax income over the same five years. Schenkelberg (2018) states that the *CASH ETR5* has three qualifications: (i) it considers a less material timing mismatch between cash taxes paid and the pre-tax income, (ii) it compensates for large or small ETRs over time, and (iii) it does not exclude loss-making years from the sample.<sup>51</sup>

In the second clustering step, the squared Euclidean distance is used as the distance measure. This measure is commonly used in the literature and is also the most intuitive (Backhaus, Erichson, Gensler, Weiber, and Weiber 2021). Although a similarity measure would also be applicable in my sample, I focus on the more widely used distance measure. The squared Euclidean distance is not scale-invariant. However, this is not a problem in this case since ETRs are defined between 0 and 1 and are metrical.

The third step involves selecting the clustering method. A two-stage cluster analysis will be performed. Initially, a hierarchical agglomerative procedure will be used to determine the number of clusters in the sample. Hierarchical clustering has several advantages, including not requiring a priori knowledge about the number of clusters in the sample (unlike partitioning clustering), high versatility, and providing a solid foundation for making assumptions about the number of clusters. However, it also has weaknesses, such as the lack of reflection, meaning

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<sup>51</sup> Please note, that negative ETRs on an annual basis are difficult to interpret.

that merged clusters remain unchanged in subsequent iterations. Therefore, in the second step, I use the number of clusters obtained from the hierarchical procedure to perform partitioning clustering. This method allows for reflection and a change in the cluster assignment of firms in subsequent iterations. I use the k-means clustering method as it is reliable and commonly used.

### **Propensity Score Matching**

After using the cluster methods to group the European and U.S. firms based on their tax avoidance behavior, I compare the firms in the different groups with their direct competitors. For example, I compare European firms from different groups with U.S. competitors and U.S. firms from different groups with European competitors. To find pairs of similar firms, I perform PSM following Overesch et al. (2020) and Overesch et al. (2023). Therefore, my sample only includes European firms that have direct competitors in the U.S. and U.S. firms that have direct competitors in Europe. Let me briefly summarize the PSM performed.

Again, I obtain the dummy variable  $EU_i$ , which determines whether firm  $i$  is based in Europe ( $EU_i = 1$ ) or is U.S.-based ( $EU_i = 0$ ) during the time period 2012 to 2022. Then, I estimate the probability  $\hat{p}_i$  if firm  $i$  being based in Europe, dependent on a vector of variables in the year 2016. I introduce the vector  $\mathbf{X}_{i,2016}$  which includes several firm- $i$ -specific tax expense determinants according to prior literature (e.g., Gupta and Newberry 1997; Mills and Newberry 2005; Belz et al. 2017; Kubick, Lynch, Mayberry, and Omer 2015). These are profitability ( $ROA_i$ ), size ( $SIZE_i$ ), R&D expense ( $RD_i$ ) leverage ( $LEV_i$ ), intangible assets ( $INTAN_i$ ), property plant and equipment ( $PPE_i$ ), the free cash flow ( $FCF_i$ ), the adjusted price-cost margin ( $PCM_i$ ) as an indicator for product market power, and the Herfindahl-Hirschman Index ( $HHI_i$ ) of firm  $i$ .  $ROA$  is calculated by dividing the pre-tax income ( $pi$ ) by the total assets ( $at$ ).  $SIZE$  is the logarithm of total assets,  $RD$  is the ratio of the research and development expenses ( $xrd$ ) to the total assets ( $at$ ), the  $LEV$  is calculated by dividing the total debt ( $dltc + dltd$ ) by the total assets ( $at$ ), and  $INTAN$  is the ratio of intangible assets ( $intan$ ) to total assets

(*at*). In case of missing values, I set *INTAN* and *RD* equal to zero. *PPE* represents the total property, plant and equipment (*ppegt*) divided by the total assets (*at*) and *FCF* is the ratio of operating cash flows less capital expenditures (*OANCF-CAPX*) to total assets (*at*).<sup>52</sup> Like Kubick et al. (2015), this study employs the industry-adjusted, firm-specific price-cost margin as the measure for product market power, following Gaspar and Massa (2006) and Peress (2010). *PCM* is the ratio of the operating profit to the sales (*sale*) less the with sales of firm *i* weighted yearly industry average *PCM*. Industries are classified by 2-digit SIC codes. Operating profit is calculated as the sales (*sale*) of firm *i* minus cost of goods sold (*cogs*) and selling, general, and administrative expenses (*xsga*). If cost of goods sold or selling, general, and administrative expenses are missing, operating profit is defined as operating income after depreciation (*oiadp*). *HHI* is calculated as the sum of the squared firm-level market share, defined by their sales. Table A4.1 in the Appendix provides a detailed description of the variables. I use the following linear probability index:

$$EU_{i,2016} = \beta \mathbf{X}_{i,2016} + \varepsilon_{i,2016} \quad (1)$$

Estimating equation (1) results in two vectors of propensity scores. One for the European firms  $\hat{p}^{EU}$  and one for the U.S. firms  $\hat{p}^{US}$ . Utilizing the propensity scores allows me to obtain a nearest neighbor from the U.S. for each European firm. Using the *Fama and French 17* industry classification allows me to find pairs within the same industry. Thereby, the difference in the propensity scores of a pair (caliper) is set a maximum of 0.03 in accordance to the literature (Austin 2011). This approach gives me pairs of similar European and U.S. firms  $\{EU_i = 1; EU_i = 0\}$ . An example of a pair in this matching is The New York Times Company and one of Europe's largest publishing companies, the German Axel Springer SE, which also has several investments in the U.S.

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<sup>52</sup> I set *OANCF* or *CAPX* equal to zero in case of missing values.

## ETR Differentials between European and U.S. Firms over Time

Using the described matched sample enables observation of tax differentials between direct competitors in Europe and the U.S. Therefore, I introduce the variable  $POST_t$  which equals to one if the fiscal year is between 2018 and 2022 and zero otherwise. The dependent variable is the  $CASH ETR5$  for firm  $i$  in the period 2012 to 2016 or the period 2018 to 2022. First, I take the European firm clustering and their matched U.S. competitors, and run the following regression:

$$CASH ETR5_{it} = \alpha_1 EU_i + \alpha_2 POST_t + \alpha_3 POST_t \times EU_i + \rho \mathbf{Z}_{it} + \omega_i + u_{it} \quad (2)$$

Thereby,  $\alpha_1$  captures the tax differential of European and U.S. firms prior to the TCJA. The coefficient on  $POST_t$ ,  $\alpha_2$ , is the change of the average  $CASH ETR5$  of U.S. firms compared to their average  $CASH ETR5$  prior to the TCJA. Finally,  $\alpha_3$  is the differential after the TCJA. Besides pair-fixed effects ( $\omega_i$ ) that also nest industry-fixed effects, I control for the time variation of firm-level characteristics ( $\mathbf{Z}_{it}$ ). These are the  $ROA$ ,  $SIZE$ ,  $RD$ ,  $LEV$ , and  $INTAN$  as well as  $STR$ , which is the statutory corporate tax rate in a firm's home country for a given year. The pair-fixed effects allow me to estimate tax differentials between direct competitors in Europe and the U.S. Thereby, the estimates are averages over the firm pairs.

Next, I take the U.S. firm clustering and their matched European competitors and introduce the variable  $US_i$  which is the mirrored variable  $EU_i$ . I run the following regression:

$$CASH ETR5_{it} = \alpha_1 US_i + \alpha_2 POST_t + \alpha_3 POST_t \times US_i + \rho \mathbf{Z}_{it} + \omega_i + u_{it} \quad (3)$$

### 4.4 Heterogeneity in Tax Avoidance

The descriptive analysis in section 4.3.1 shows, that there are groups of firms with different levels of tax avoidance both within Europe and within the U.S. However, the differentiation is superficial and just for an initial overview. To gain insight into the tax avoidance structure of firms within Europe and the U.S., I employ clustering methods as

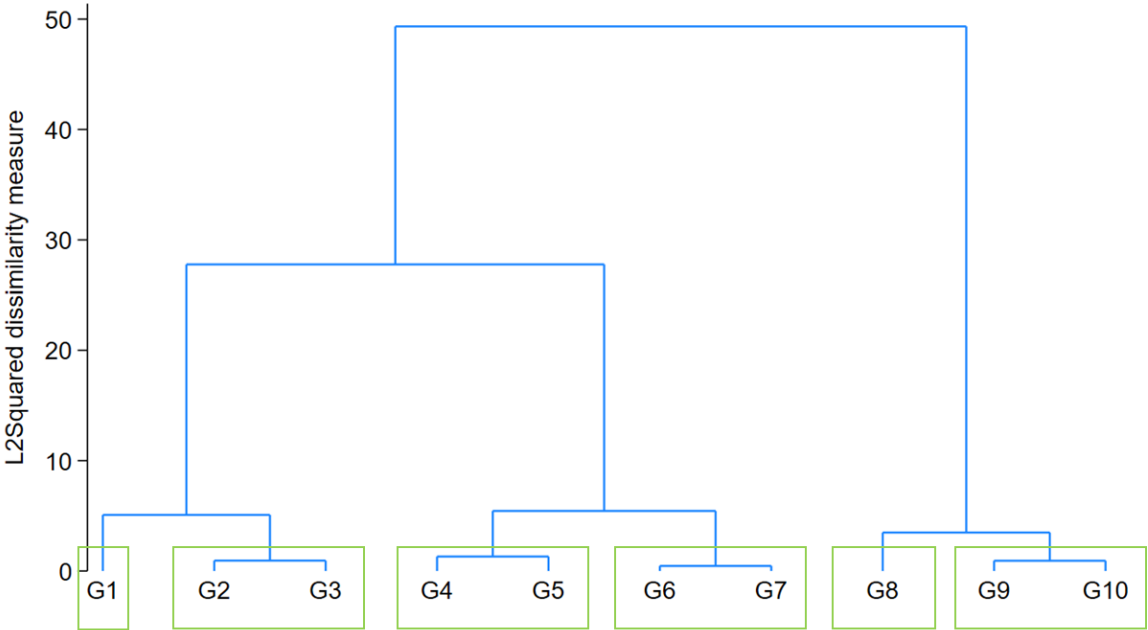


outlined in section 4.3.2. I analyze the European and U.S. firm groups separately to better understand their tax avoidance patterns.

**4.4.1 Determination of Clusters in Europe and the U.S.**

I use my sample of European and U.S. firms, as previously described, and only include European firms. Then, I perform the clustering steps (i) to (ii) as described under section 4.3.2. Further, in the steps (iii) and (iv) I perform hierarchal clustering to obtain the potential number of clusters. I use the Ward’s method, as it is most reliable, widely used in practice (Backhaus et al. 2021) and generates groups of similar size. To obtain the number of clusters, the decision tree as shown in Figure 4.2 is used. To ensure similarity in group size, I have limited the maximum cluster to ten.

**Figure 4.2: Europe: Hierarchical Cluster Dendrogram**



Notes: Dendrogram for European grouping after performing hierarchical clustering for 2012 to 2016. Green squares/rectangles are the chosen groups.

The decision tree plots the squared Euclidean distance (L2 squared dissimilarity measure) to the maximal groups G1 to G10. The groups are chosen to minimize the Euclidean distance within a group. Figure 4.2 suggests that a six-cluster solution would be the most

appropriate for my sample. To obtain the actual cluster members (i.e., European firms), I use the k-means method with six clusters as described in section 4.3.2.

**Table 4.2: Cluster Summary**

<i>Panel A</i>		<b>European Firms</b>					
<b>Cluster</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	
Number of firms	336	605	560	288	80	41	
Mean CASH ETR5 before TCJA	0.0659	0.1882	0.2845	0.4046	0.6135	0.8367	
Mean CASH ETR5 after TCJA	0.1642	0.2326	0.2746	0.3030	0.3268	0.3192	
<b>Cluster after Re-Grouping</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	
Number of firms	294	555	481	192	71	24	
Mean CASH ETR3	0.0560	0.1707	0.2641	0.3898	0.5666	0.8599	

<i>Panel B</i>		<b>U.S. Firms</b>					
<b>Cluster</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	
Number of firms	530	431	636	459	91	23	
Mean CASH ETR5 before TCJA	0.0237	0.1617	0.2688	0.3701	0.5584	0.8603	
Mean CASH ETR5 after TCJA	0.0911	0.1846	0.2209	0.2508	0.3117	0.2888	

Notes: Summary of the cluster member size and cluster means for the six European and six U.S. cluster separately before matching. The mean *CASH ETR5* before the TCJA includes the *CASH ETR5* for the period 2012 to 2016 and the mean *CASH ETR5* after TCJA includes the period 2018 to 2020. The mean *CASH ETR3* for 2020 to 2022 is computed for European firms after the re-grouping.

Panel A in Table 4.2 provides a brief summary of the cluster means for the periods 2012 to 2016 and 2018 to 2022 after performing the k-means method.<sup>53</sup> The average *CASH ETR5* prior to the TCJA indicates that there is a group of firms with very low ETRs (approximately 6.6%) and a group of firms with very high ETRs (approximately 83.7%). There is a significant difference in the tax expense of European firms, with a 77.1 percentage points difference from the first to the sixth group and 54.8 percentage points to the fifth group. Following the TCJA, there seems to be a reduction in the average *CASH ETR5* of firms in clusters four to six, but an increase in the first and second clusters. The third cluster experienced a small decrease of about one percentage points. Therefore, the simple mean analysis suggests that there is high

<sup>53</sup> Please note, that the cluster summary statistics are prior to the matching.

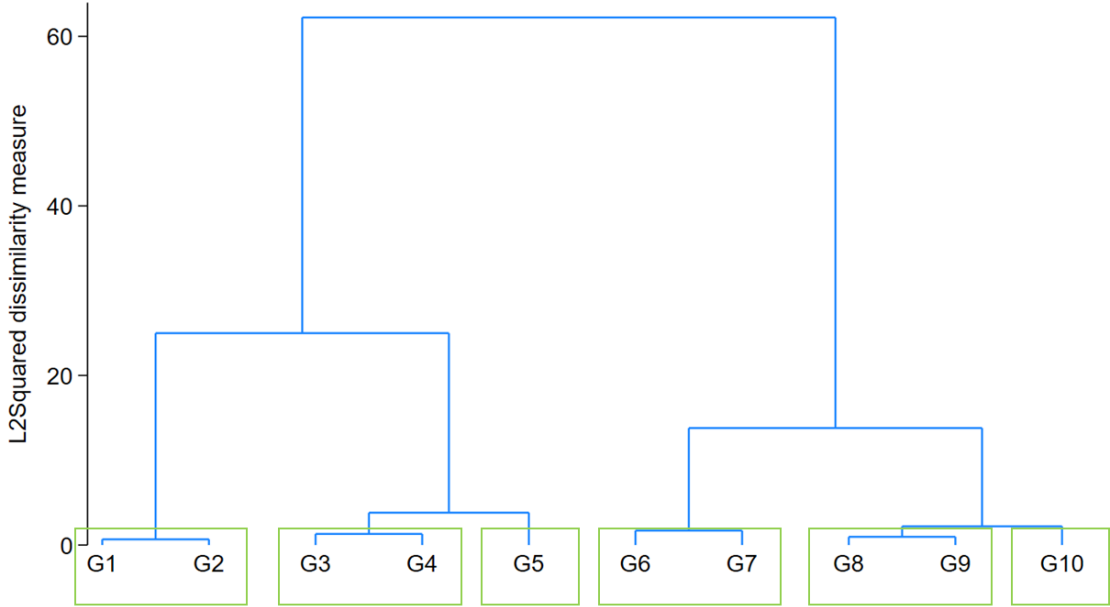
heterogeneity in tax avoidance, leading competitive differential in terms of tax expenses within Europe.

Examples of firms in different clusters include: (1) the German telecommunications firm 1&1 AG and the Irish Kerry Group PLC; (2) Husqvarna AB and Domino’s Pizza Group PLC; (3) Allianz SE, BASF SE, and Danone SE; (4) Deutsche Telekom and BMW AG; (5) Scout24 SE and Shell PLC; and (6) Oxford Instruments PLC.

The clustering process for U.S. firms is performed in the same way as before, following steps (i) to (iii) and starting with a hierarchical cluster to determine the number of clusters.

Figure 4.3 illustrates the decision tree.

**Figure 4.3: U.S.A.: Hierarchical Cluster Dendrogram**



Notes: Dendrogram for U.S. grouping after performing hierarchical clustering for 2012 to 2016. Green squares/rectangles are the chosen groups.

The decision tree suggests that a six-cluster solution would be the best fit for the U.S. sample. To obtain the cluster members, the k-means method with six clusters as described in section 4.3.2 are utilized. Panel B in Table 4.2 provides a brief summary of the cluster means. The average *CASH ETR5* prior to the TCJA reveals that there is a group of firms with very low ETRs (approximately 2.4%) and a small group of firms with very high average *CASH ETR5* of

approximately 86.0%. This is an 83.6 percentage points difference, indicating a significant variance in tax expense among U.S. firms. After the TCJA, there appears to be a notable decrease in the average *CASH ETR5* for firms in clusters three to six, but a slight increase for those firms in the first and second clusters. However, there remains heterogeneity in the level of tax avoidance and also dramatic differences in the competitiveness within the U.S.

Examples of firms in different clusters include: (1) Atmos Energy Corporation and Ford Motor Company; (2) Adobe Inc., Alphabet Inc., AT&T Inc., and Berkshire Hathaway Inc.; (3) 3M Corporation and The Walt Disney Company; (4) AutoNation Inc., ExxonMobil Corporation, and Foot Locker Inc.; (5) Abercrombie & Fitch and HP Inc.; and (6) Progress Software Corporation.

The summary statistics after the cluster analysis support hypothesis H1, there is heterogeneity in tax avoidance in Europe and the U.S. Further, the findings for both U.S. and European firms indicate that the groups are diverse and not restricted to certain industries. For instance, the Atmos Energy Corporation is in the first group in the U.S., while ExxonMobil is in the fourth group. This is noteworthy because gas and oil firms often benefit from special tax regimes and privileges in the U.S.

Although a plain comparison of the means of European and U.S. groups in general is not very useful, a comparison of the first group, the firms with the lowest *CASH ETR5* before the TCJA, indicates that on average, U.S. high tax avoiders have significantly lower *CASH ETR5* compared to European high tax avoiders. This is a first insight on the tax differentials between U.S. and European firms. Therefore, in the next step, I use the U.S. and European clusters and perform PSM in accordance to section 4.3.2. Table 4.3 depicts the U.S. and European competitor pairs, dependent on their grouping according to their level of tax-expense in their home region. The rows indicate the European grouping, while the columns indicate the U.S. grouping of the competitor-pair.

Table 4.3 shows that most of the European and U.S. firm-pairs are not in the same group. For example, tax avoiders in Europe and tax avoiders in the U.S. are usually not direct competitors. However, there are some overlaps, such as 20 firm pairs consisting of a European and a U.S. tax avoider. However, 90 U.S. competitors of European companies with high tax avoidance practices are not themselves high tax avoiders in the U.S. Similarly, 120 European competitors of U.S. companies with high tax avoidance practices are not high tax avoiders in Europe.

**Table 4.3: Cluster in Europe and their Competitors in the U.S.**

		U.S. Grouping						Total
		1	2	3	4	5	6	
European Grouping	1	20	17	38	25	5	5	<b>110</b>
	2	47	41	69	67	14	1	<b>239</b>
	3	41	56	82	74	10	6	<b>269</b>
	4	27	24	54	33	6	0	<b>144</b>
	5	4	9	14	6	2	2	<b>37</b>
	6	1	1	4	6	2	1	<b>15</b>
Total		<b>140</b>	<b>148</b>	<b>261</b>	<b>211</b>	<b>39</b>	<b>15</b>	<b>814</b>

Notes: Depiction of the overlap of the separately conducted grouping of European and U.S. firms after matching. The columns represent the U.S. grouping of U.S. competitors, while the rows represent the grouping in Europe.

Overall, Table 4.3 suggests, that similar firms in the U.S. and in Europe have different levels of tax expenses. This finding is interesting, because PSM is based on firm characteristics that are known determinants for the level of tax expense of a firm, according to previous literature. The descriptive table supports the rejection of hypothesis H2, which suggests that U.S. - European firm pairs frequently fall in the same cluster of tax avoidance.

Although, this descriptive analysis already provides initial insights, in the next section, I will use the clustering and the matched sample to compare the tax-competitiveness with an appropriate control group.

#### 4.4.2 Comparison of European and U.S. Firms over Time

The primary objective of this paper is to gain a better understanding of the differences in the tax avoidance behavior between European and U.S. firms and their effects on the tax-competitive position. To achieve this, the paper argues that tax expenses have a significant impact on a firm's liquidity, and lower ETRs provide a cash or liquidity advantage. However, this cash or liquidity advantage is difficult to interpret without an appropriate control group.

Using the matched sample of U.S. and European competitor-pairs as described in section 4.3.2, I utilize the European firms within the six clusters along with their direct competitors from the U.S. Then I run equation (2) and the results for the six European groups are presented in Table 4.4. The dependent variable is the *CASH ETR5* and the base for comparison is the *CASH ETR5* of U.S. firms from 2012 to 2016. The columns represent the six European firm groups identified above. Therefore, the regression coefficients are to be interpreted within their respective groups. The first group has the lowest average *CASH ETR5* before 2017 while the sixth group has the highest. I chose 2017 as the cut-off point because the TCJA was one of the most extensive tax reforms in the U.S. and had a significant impact on the tax-competitive position of U.S. firms, which in turn affected the tax-competitive position of European firms (Overesch et al. 2023). The corporate tax rate cut of 14 percentage points was particularly significant, highlighting the weight of the tax reform. Further, in Europe ATAD was implemented into national law in 2018 and 2019, which introduced several anti-tax avoidance rules. I do not include 2017, as it is the transition year of the TCJA and includes several one-time effects, that would corrupt the findings.

Table 4.4 shows significant differences between the six groups over time and compared to their direct U.S. competitors. The coefficient on *EU* represents the tax differential between European firms and their U.S. competitors for the period 2012 to 2016. The coefficient on the interaction *EU#POST* represents the tax differential for the period 2018 to 2022. Finally, the

coefficient on *POST* indicates the change in the average *CASH ETR5* of U.S. firms after the TCJA.

**Table 4.4: European Groups versus U.S. Competitors**

Variables	CASH ETR5					
	1	2	3	4	5	6
POST	-0.0275 (0.0287)	-0.0131 (0.0180)	-0.0132 (0.0159)	-0.0008 (0.0247)	-0.0626 (0.0521)	-0.2159** (0.0953)
EU	-0.1682*** (0.0296)	-0.0315* (0.0182)	0.0623*** (0.0135)	0.1759*** (0.0187)	0.3234*** (0.0485)	0.3604*** (0.0610)
EU#POST	-0.0961*** (0.0364)	-0.0010 (0.0217)	0.0535*** (0.0172)	0.0548** (0.0223)	0.0185 (0.0605)	-0.1851** (0.0839)
SIZE	0.0070 (0.0051)	0.0098*** (0.0036)	0.0025 (0.0037)	0.0058 (0.0051)	0.0105 (0.0086)	0.0007 (0.0328)
ROA	-0.0141 (0.0382)	0.0481*** (0.0164)	0.0097** (0.0044)	0.0261** (0.0122)	-0.0110 (0.0619)	-0.0572 (0.0982)
LEV	-0.0672* (0.0347)	-0.0413* (0.0219)	0.0534** (0.0249)	-0.0233 (0.0301)	-0.1034 (0.0636)	0.1181 (0.0981)
RD	0.2594** (0.1008)	-0.1973** (0.0958)	-0.2104** (0.0842)	-0.1237 (0.1656)	-0.4183 (0.5282)	-0.8362 (0.7227)
INTAN	0.1244*** (0.0321)	0.0309 (0.0210)	0.0157 (0.0202)	0.0578* (0.0316)	0.0113 (0.0581)	0.0927 (0.0621)
STR	0.1733 (0.1682)	0.2165** (0.1066)	0.3333*** (0.0894)	0.1286 (0.1353)	0.0695 (0.3599)	-0.9602** (0.4107)
Pair FE	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓
N	2,031	4,526	5,083	2,716	688	280
Adj. R <sup>2</sup>	0.4899	0.3486	0.3403	0.4729	0.6833	0.7873

Notes: Regressions are based on a matched sample of European firms with six clusters and their U.S. competitors; years from 2012 to 2022. The dependent variable is the *CASH ETR5* for the years 2012 to 2016 and 2018 to 2022. The columns represent the six different European groups after clustering. Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

The first group of European firms have the lowest ETRs over the five-year period prior to the TCJA, with an average *CASH ETR5* of only 6.6%. These firms were able to maintain consistently low ETRs during this time, indicating a likelihood of engaging in tax avoidance structures. From 2012 to 2016, these firms have an average *CASH ETR5*, that is 16.8 percentage points lower than their direct U.S. competitors. This section reveals an important finding and rejects hypothesis H2, which states that U.S. - European firm pairs frequently fall in the same

cluster of tax avoidance. I will come back to this finding in section 4.6, where the differences in the determinants of being a high tax avoidance in Europe and in the U.S. will be examined. The regression results regarding the high tax avoiders suggest two additional interesting findings.

First, carefully interpreted, in accordance to prior literature (Dyreng et al. 2023; Overesch et al. 2023), on average the ETRs of U.S. firms decrease by about 2.8 percentage points after the TCJA, presumably due to the cut in the corporate tax rate. The second finding shows that the average *CASH ETR5* of European firms increase after 2017. The *CASH ETR5* of the first group of European firms increases on average by about 4.5 percentage points ( $=16.82 - 2.75 - 9.61$ ). This is an interesting finding, since it suggests only a marginal impact of the introduction of anti-tax avoidance rules in Europe on tax avoiders. This marginal affect is free of opposing changes in the statutory tax rates in the home country, since I control for the *STR* separately.<sup>54</sup> This finding leads to a rejection of hypothesis H5.

Overall, the average tax-competitive advantage of European high tax avoiders over their direct U.S. competitors decreases from 16.8 percentage points to approximately 9.6 percentage points after the TCJA.

Although the first group, which includes the high tax avoiders in Europe, is of the most interest, the other groups also suggest interesting results. Prior to the TCJA, besides the first group, the second group is the only European group with a tax-competitive advantage. The advantage amounts to 3.2 percentage points and is already 13.7 percentage points lower than the advantage of the first group over their U.S. peers. On average, those European firms experience a 1.7 percentage points increase in *CASH ETR5*, while their competitors experience a 1.3 percentage points decrease. This situation results in a stalemate where both European

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<sup>54</sup> In an additional test I exclude *STR* from all regressions. The untabulated results suggest only marginal lower effects.



firms in the second group and their direct competitors are equally competitive during the period 2018 to 2022.

Firms in the third and fourth groups have an average *CASH ETR5* of 27.3% and 34.6% between 2012 and 2022. These average ETRs are similar to the average statutory tax rates in Europe, which range from 9% to 38%, with a mean of 21.6%. Therefore, it can be inferred that these firms are not very active in tax avoidance schemes on average. The results presented in columns (3) and (4) of Table 4.4 show, that firms in the third and fourth groups had a tax disadvantage of approximately 6.2 and 17.6 percentage points respectively, even before the TCJA. However, after the TCJA, the ETRs of these firms appear to decrease (by 2.2 percentage points in the third group and 12.0 percentage points in the fourth group), while only the ETRs of U.S. competitors of the third group decrease on average. Although I control for the home country tax rate, the decrease in ETRs for firms in the third group may be attributed to the reduction in statutory tax rates in Europe. This is because the home country tax rate does not encompass the tax rate of subsidiaries in Europe and other parts of the world. Before the TCJA, the average statutory tax rate in Europe amounted to 22.4%, which decreased to 20.8% after the TCJA. A decrease in 1.6 percentage points, which is similar to the decrease in the average *CASH ETR5* of 2.2 percentage points for firms in the third group. Overall, after the TCJA, there remains an average tax disadvantage of 5.4 percentage points for the third group and 5.5 percentage points for the fourth group.

Returning to the decrease in the *CASH ETR5* of European firms in the fourth group after the TCJA, European firms are able to compensate for the existing disadvantage of 17.6 percentage points after the TCJA. The decrease of 12.0 percentage points is significant and may not be solely attributed to the decrease in statutory tax rates of European firms. This finding will be further discussed in section 4.6.

Finally, the interpretation of the fifth and sixth groups is difficult due to two issues. Firstly, the groups consist of only 80 and 41 European firms respectively, making them relatively small. Secondly, the average *CASH ETR5* for the fifth and sixth groups is 61.4% and 83.7% respectively, which is well above the average statutory tax rates. This results in a tax-competitive disadvantage of 32.3 and 36.0 percentage points respectively, prior to the TCJA. As expected, these high average ETRs appear to be one-time issues and only of a temporary nature. In the section 4.6, I will analyze those firms more closely. However, it appears after the TCJA, there is carefully interpreted a potential, but statistically insignificant disadvantage of 1.9 percentage points in group five and a potential, advantage of 18.5 percentage points for firms in the sixth group.

After assessing the tax-competitiveness of various European firm groups, I repeat the process for U.S. groups. This involves using the matched sample of U.S. firms and their direct European competitors, and running equation (3). The results are presented in Table 4.5, with the dependent variable being the *CASH ETR5* before and after the TCJA. The base for comparison is the *CASH ETR5* of European firms in the period 2012 to 2016. The columns represent the six U.S. firm groups identified previously. Therefore, the regression coefficients are to be interpreted within their respective groups. As in the European case, the first group consist of firms with the lowest average *CASH ETR5* prior to the TCJA, while the sixth group comprises those with the highest. The coefficient on *US* is the average tax differential between U.S. and European competitors prior to the TCJA, and the coefficient on *US#POST* is the tax differential after the TCJA. Finally, the coefficient on *POST* is the average change in the *CASH ETR5* of European competitors after the TCJA.

European competitors of U.S. firms in the second to fifth group seem to experience on average a decrease in their average *CASH ETR5* after the TCJA. However, European

competitors of the sixth group experience a potential increase in their ETRs and competitors of the first group experience on average no change at all.

**Table 4.5: U.S. Groups versus European Competitors**

Variables	CASH ETR5					
	1	2	3	4	5	6
POST	-0.0043 (0.0125)	-0.0429*** (0.0125)	-0.0231* (0.0119)	-0.0191 (0.0126)	-0.0486* (0.0289)	0.0446 (0.0531)
US	-0.2577*** (0.0154)	-0.1394*** (0.0157)	-0.0697*** (0.0127)	0.0161 (0.0148)	0.2061*** (0.0387)	0.3272*** (0.0934)
US#POST	-0.1515*** (0.0109)	-0.0755*** (0.0124)	-0.0438*** (0.0097)	-0.0124 (0.0112)	-0.0031 (0.0321)	0.0061 (0.0570)
SIZE	0.0036 (0.0031)	0.0016 (0.0061)	-0.0042 (0.0037)	0.0035 (0.0044)	-0.0124 (0.0115)	-0.0517** (0.0246)
ROA	-0.0001 (0.0027)	-0.1430*** (0.0408)	-0.1273*** (0.0413)	-0.2251*** (0.0354)	-0.2688*** (0.0717)	0.0598 (0.1379)
LEV	-0.0229 (0.0198)	0.0056 (0.0312)	-0.0012 (0.0226)	-0.0379 (0.0255)	-0.0138 (0.0567)	0.4653*** (0.1334)
RD	-0.0278 (0.0576)	-0.2053 (0.1382)	-0.0720 (0.1042)	-0.2631*** (0.0930)	0.3737 (0.3823)	0.0873 (0.2626)
INTAN	0.0854*** (0.0300)	0.0367* (0.0218)	0.0688*** (0.0208)	-0.0242 (0.0256)	0.1302** (0.0514)	-0.0932 (0.1088)
STR	0.3482*** (0.1065)	0.1952* (0.1055)	0.4901*** (0.0749)	0.5805*** (0.0972)	0.3323 (0.2786)	1.7472*** (0.5594)
Pair FE	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓
N	2,618	2,811	4,930	3,956	727	282
Adj. R <sup>2</sup>	0.6532	0.3481	0.3207	0.4093	0.6002	0.7919

Notes: Regressions are based on a matched sample of U.S. firms with six clusters and their European competitors; years from 2012 to 2022. The dependent variable is the *CASH ETR5* for the years 2012 to 2016 and 2018 to 2022. The columns represent the six different U.S. groups after clustering. Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

Moving on to the U.S. firms, the results in the first column support the first finding in the European setting: high tax avoiders in Europe and in the U.S. are not direct competitors. From 2012 to 2016, the average *CASH ETR5* of U.S. firms in the first group was about 25.7 percentage points lower compared to their European peers. Therefore, I reject my hypothesis H2 that U.S. - European firm pairs frequently fall in the same cluster of tax avoidance. This

suggests that tax avoidance behavior and opportunities differ between the U.S. and Europe. As previously mentioned, I will discuss this further in section 4.5.

However, following the TCJA, the ETRs of U.S. firms in the first group increased by 11.1 percentage points, while the average *CASH ETR5* of their competitors remains unchanged. As a result, the tax-competitive advantage decreased to approximately 15.2 percentage points after the TCJA. Overall, this suggests that high tax avoiders in the U.S. did not benefit from the TCJA, and may have even been negatively impacted. Under the TCJA, U.S. companies may also be subject to anti-tax avoidance measures such as GILTI or BEAT (Lyon and McBride 2018; see e.g., Donohoe et al. 2019; Clausing 2020; Atwood and Johnson 2021; Dunker et al. 2021; Amberger and Robinson 2023; Garcia-Bernardo and Janský 2024). This supports my hypothesis H4b, that after the TCJA, the most aggressive U.S. tax avoiders have a lower tax-competitive advantage over their European competitors. These findings further demonstrate the strength of the cluster analysis. While previous studies, have attempted to identify a GILTI effect for potentially affected firms (e.g., Amberger and Robinson 2023; Dunker et al. 2021), this study is the first to actually show, that the anti-tax provision of the TCJA significantly affected the targeted high tax avoiders in the U.S. These findings further advocate the use of clustering methods to evaluate tax policies.

Both, firms in the second and in the third groups have a tax-competitive advantage prior to the TCJA, amounting to 13.9 and 7.0 percentage points, respectively. However, after the TCJA, the advantage of the second group decreases significantly, due to the decreasing average *CASH ETR5* of the European competitors. On the other hand, U.S. firms in the second group experience an average decrease in their *CASH ETR5* by 2.1 percentage points after the TCJA. This finding indicates that firms in the second cluster only slightly benefit from the TCJA. The second group still maintains a tax-competitive advantage of 7.6 percentage points, while the third group has an advantage of 4.4 percentage points

The fourth group is noteworthy because prior to the TCJA, they had slightly higher *CASH ETR5* than their European peers. After the TCJA, there appears to be a slight advantage. The fifth and sixth groups are comparable to the European fifth and sixth groups. It is important to note that the fifth group only includes 91 U.S. firms and the sixth group only includes 23. Before the TCJA, the disadvantage amounted to 20.1 and 32.7 percentage points. However, from 2018 to 2022, this tax disadvantage disappears, and both groups are on a similar level to their European competitors.

The ongoing public debate in Europe centers around two important issues: (i) the tax-avoidance practices of MNEs and (ii) the potential high tax burden for European firms due to the high corporate tax rates in Europe. This paper aims to address both of these issues. The comparative analysis results suggest that only high tax avoiders in Europe are able to statistically undercut their direct U.S. competitors in terms of the *CASH ETR5* after 2017. However, European firms in the second cluster, as well as European competitors of U.S. firms in the fifth and sixth groups, are able to compensate for potentially higher statutory tax rates in Europe. Therefore, they are, on average, at least on the same level as their competitors in the U.S. European firms that are not in a certain distress and are more or less on the level of the statutory tax rates in Europe, i.e. firms in the third cluster, are only partially tax-competitive. The tax-competitive disadvantage of firms in the third group amounts to \$52.6 million per year in terms of tax expense.<sup>55</sup> Eventually, European firms in the third, fourth and fifth groups, as well as European competitors of U.S. firms in the first four groups, have a competitive disadvantage. Therefore, I partially reject my hypothesis H4a, as European high tax avoiders are still in a tax-competitive advantage. This finding supports the use of the cluster analysis and the differentiation in levels of tax avoidance, as previous studies assumed a general tax-competitive advantage for U.S. firms over their direct competitors.

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<sup>55</sup> Disadvantage after the TCJA divided by average *CASH ETR5* after the TCJA multiplied by average tax expenses of European firms in the third group after the TCJA, e.g.,  $5.35/27.46 \times \$270 \text{ Mio.} = \$52.6 \text{ Mio.}$

#### 4.5 Determinants of being a High Tax Avoider

As the prior findings regarding the European and the U.S. groups suggest, high tax avoider in Europe and in the U.S., i.e. firms within the respective first groups, are not direct competitors. This raises several questions. To determine whether there are different determinants for tax avoidance in Europe versus the U.S., I analyze the European and U.S. firms from the first cluster (those that actively reduce their ETRs) separately using a linear probability model. Therefore, I introduce the variable  $TaxAvoider_i$  which equals to one in case firm  $i$  is a tax avoider in Europe or in the U.S during the period 2012 to 2016, and zero if a firm is in the respective second to sixth group in the U.S. or Europe. As dependent variables, I include the firm characteristics used for the PSM, i.e.  $SIZE$ ,  $ROA$ ,  $LEV$ ,  $RD$ ,  $PPE$ ,  $INTAN$ ,  $FCF$ ,  $PCM$ , and  $HHI$  and the *Fama & French 17* industry classification.

The results are presented in Table 4.6, with the dependent variable being a tax avoider ( $TaxAvoider = 1$ ) in Europe (columns (1) and (2)) and in the U.S. (columns (3) to (5)). Columns (1) and (3) include only the firm and industry characteristics, while columns (2), (4), and (5) also include the *Fama & French 17* industry classification dummies.

**Table 4.6: Determinants of Tax Avoidance**

Variables	TaxAvoider EU		TaxAvoider U.S.		
	1	2	3	4	5
SIZE	-0.1173*** (0.0243)	-0.1386*** (0.0256)	-0.0211 (0.0229)	-0.0679*** (0.0251)	-0.1074 (0.2050)
ROA	-0.3592 (0.8528)	-0.3934 (0.8812)	-4.3994*** (0.8352)	-3.5135*** (0.8139)	-6.2908 (4.7538)
LEV	0.1569 (0.3677)	0.0974 (0.3786)	1.1198*** (0.3050)	0.9215*** (0.3166)	0.7247 (2.2459)
RD	0.9968 (1.0538)	0.9912 (1.0910)	0.6773 (1.6217)	1.5479 (1.7167)	5.8257 (5.9086)
PPE	-0.0100 (0.1430)	0.1211 (0.1510)	0.1294 (0.1303)	-0.0881 (0.1459)	0.3548 (1.0841)
INTAN	-0.6332** (0.3092)	-0.5943* (0.3172)	-1.3059*** (0.2958)	-0.9924*** (0.3026)	-0.8296 (1.2019)
FCF	0.5732 (1.0444)	1.0560 (1.0687)	1.5617* (0.9368)	1.2208 (0.9927)	4.6261 (6.4333)
PCM	-0.0054 (0.0111)	-0.0089 (0.0129)	0.0138 (0.0103)	-0.0039 (0.0118)	-0.0189 (0.0353)
HHI	0.3207 (0.4103)	0.7790 (0.4855)	-1.0247** (0.5155)	-0.3091 (0.5999)	-16.4177*** (6.1128)
PRE					0.7497 (0.8797)
FOOD					
Mines				0.0572 (0.4467)	
Oil				0.9688** (0.4334)	
Clothing		-0.5850 (0.4593)			
Consumer Durables				-0.2171 (0.3480)	
Chemicals		0.1880 (0.3563)		-0.3188 (0.3596)	
Consumer		0.6990** (0.3103)		-0.0693 (0.3484)	
Construction		0.3520 (0.2830)		-0.2151 (0.2665)	

*Table continued on the next page.*

**Table 4.6 (continued)**

	1	2	3	4	5
Steel		-0.0970 (0.4833)			
Fabricated Products		-0.2058 (0.4875)			
Machinery		0.2352 (0.2643)		-0.0539 (0.2524)	-0.3710 (0.6343)
Cars					
Transportation		0.6816** (0.2916)		-0.1846 (0.2978)	
Utilities		0.3893 (0.3233)		1.3756*** (0.2869)	2.1502* (1.3002)
Retail		-0.2967 (0.3443)		-0.0449 (0.3069)	
Finance		1.2079** (0.5090)		0.4175 (0.4862)	1.5774 (1.3483)
Other		0.2609 (0.2496)		0.2749 (0.2309)	
N	924	863	954	897	87

Notes: Regressions are based on European and U.S. firms after clustering. The dependent variable is being a *TaxAvoider* in Europe in columns (1) and (2) and being a *TaxAvoider* in the U.S. in columns (3) to (5). *PPE* represents the property, plant and equipment divided by total assets. *FCF* represents the cash holdings defined as the difference between net cash flow and capital expenditures scaled by total assets. *PCM* is the adjusted price cost margin and *HHI* the Herfindahl-Hirschman Index. *PRE* is a dummy variable that equals one if a U.S. firm has permanent reinvested earnings outside the U.S. prior to the TCJA. The variables *FOOD* to *OTHER* represent the *Fama & French 17* industries classification dummies. Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

According to one strand of prior mixed literature (Siegfried 1974; Stickney and McGee 1982; Zimmerman 1983; Porcano 1986; Gupta and Newberry 1997; Richardson and Lanis 2007; Dyreng et al. 2008), the coefficients on *SIZE* are negative for both European and U.S. firms. Thus, large firms in terms of total assets do not appear to be high tax avoiders. Although there is mixed evidence on the relationship between the size of a firm and its tax avoidance behavior, most studies suggest a positive relation. However, it is important to note that these studies primarily focus on a sample of U.S. firms, including large corporations such as Microsoft, Apple, and Alphabet. It should be noted that these very large U.S. firms are present in the clustering process but not in my sample after matching. Only U.S. firms with a direct



European competitor are included in the sample. These firms are mostly dominant in their field and do not face significant competition in Europe. Therefore, their tax avoidance behavior is not relevant to potential tax-competitiveness. When comparing high tax avoiders in the U.S. and Europe, it appears that U.S. and European firms that engage in tax avoidance and have direct competitors in Europe tend to be smaller in size.

According to previous literature, firms that are highly profitable, meaning those with a higher *ROA*, are more incentivized to engage in tax avoidance and have greater resources to invest in such practices (Gupta and Newberry 1997; Rego 2003; Eichfelder and Hechtner 2018; Mocanu et al. 2021). Interestingly, the coefficients on *ROA* are negative for both but statistically significant only for U.S. high tax avoiders. Kubick et al. (2015) found a similar effect on the ETR. This suggests that more profitable firms are less active in tax avoidance in Europe and the U.S.

Besides the hedge for firms' non-operating decisions, the product market power theory argues, that firms with product market power are able to pass negative shocks to the consumer, by increasing prices, which allows them to secure their profitability (Kubick et al. 2015; Dyreng, Jacob, Jiang, and Müller 2022). This may incentivize them to engage in tax avoidance.<sup>56</sup> Hence, when analyzing the coefficient on *ROA*, it is also important to check the coefficient on the adjusted *PCM*. The coefficients on *PCM* are all economically and statistically insignificant, indicating that product market power does not explain tax avoidance in Europe and the U.S.

However, the coefficients on the Herfindahl-Hirschman Index (*HHI*), are positive but statistically insignificant in the European sample. Cautiously interpreted, this may be some evidence that in Europe firms with market power are more likely to engage in tax avoidance.

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<sup>56</sup> For a brief comparison of how product market power and profitability affect firms' tax avoidance behavior, refer to Kubick, Lynch, Mayberry, and Omer (2015).

On the other hand, in the U.S. the coefficients are negative but only in column (3) statistically significant. This finding suggests, that market power does not explain tax avoidance in the U.S. However, again it is to be noted, that only U.S. firms with competitors in Europe are included in this sample.

Further, the findings regarding the industry dummies give interesting insights.<sup>57</sup> In Europe, tax avoiders are particularly from the consumer, transportation, and finance industries (in terms of the *Fama & French 17* industry classification). In the U.S. firms from the oil and utilities industries have a certain emphasize for tax avoidance.

The coefficients on *LEV* are positive but not significant for European firms. However, for U.S. firms, the coefficients are positive and highly significant. This indicates that, in accordance to prior literature (e.g., Mills and Newberry 2005; Allen et al. 2016; Chyz et al. 2013), firms with a higher leverage tend to be more tax aggressive.

Several studies use R&D expenses or the R&D intensity as a proxy for intellectual property (e.g., Overesch and Schreiber 2010). This literature strand suggests that R&D expenses are related to the profit shifting channel of IP placement (Belz et al. 2017). Studies indicate, that multinational entities (MNE) have an incentive to locate IP in low-tax countries or countries with IP-favorable tax incentives (Dischinger and Riedel 2011; Griffith et al. 2014). Typically, the allocation of IP is agile and objective market prices for intragroup transfer prices are absent. As a result, firms can shift their IP to tax-havens and then optimize their intragroup royalty payments (Heckemeyer and Overesch 2017). The coefficients on the R&D intensity in Table 4.6 are positive but statistically insignificant in all columns. This supports the view, that firms with a higher R&D intensity may be more likely to engage in tax avoidance.

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<sup>57</sup> Please note that in Europe, no firms from the food, mines, oil, consumer durables, or cars industries are present in the group of tax avoiders. In the U.S., no firms from the food, clothing, steel, fabricated products, and cars industries are present in the group of tax avoiders.

Interestingly, the findings on *PPE* and *INTAN* are somewhat unexpected. *PPE* is positive in the columns (2) and (3) and negative in columns (1) and (4). However, statistically insignificant over all specifications. The coefficients on *INTAN* are negative and statistically significant in all columns. Given the industries in the U.S., this finding is not entirely surprising. Firms in the oil and utilities industries typically have higher levels of PPE. Conversely, the findings regarding the ‘finance’ industry in Europe would suggest a positive correlation between tax avoidance and intangibles. However, it is important to consider the impact of *RD* on *INTAN*. As suggested by Belz et al. (2017), the effect of R&D intensity can be separated into an accounting effect and a profit shifting effect. This is, (i) R&D intensity as a proxy for IP and therefore a direct profit shifting effect measurable with an ETR measure that includes deferred and current taxes, and (ii) a tax accounting effect due to the different timing of R&D expense in financial and tax accounts (Belz et al. 2017). Intangibles are already capitalized and can therefore play a role in shifting IP. The findings suggest a rejection of latter.

Finally, the results for the free-cash-flow of U.S. and European firms are as expected. Previous literature suggests that firms with higher cash holdings have greater incentives to engage in tax avoidance and have lower ETRs (Dhaliwal, Huang, Moser, and Pereira 2011; Kubick et al. 2015). Although statistically insignificant, the coefficients on *FCF* suggest, that U.S. and European firms with higher levels of cash holdings are more likely to engage in tax avoidance.

In column (5), the same regression as in column (4) is performed, but with the inclusion of a dummy variable indicating whether a U.S. firm reports permanent reinvest earnings outside the U.S. prior to the TCJA ( $PRE = 1$ ) in their annual reporting. Previous literature suggests that U.S. firms held large amounts of cash outside the U.S. to postpone repatriation tax and, as a result, had significantly lower ETRs (Overesch et al. 2020). As a result of the territorial tax system implemented by the TCJA, permanent reinvested earnings were subject to a one-time

repatriation tax in 2017, payable over eight years. Out of the 139 U.S. firms in my sample, 48 deny having permanent reinvested earnings outside the U.S. in their financial reports. Interestingly, only 11 firms in the group of high tax avoider report permanent reinvested earnings. The coefficient on *PRE* is positive but statistically insignificant, probably due to the very low group size. Therefore, the findings are to be interpreted with caution. However, the positive coefficient indicates that in accordance to the findings regarding the *FCF*, cash holding outside the U.S. explain to a certain extent being a high tax avoider in the U.S. prior to the TCJA.

Overall, the findings suggest that European firms engaging in tax avoidance tend to be smaller in firm size and have lower intangibles. Similarly, U.S. firms engaging in tax avoidance tend to be smaller in the firm size and have lower intangibles, but also have a lower ROA, higher leverage, lower market power, and potentially higher cash holdings. Additionally, high tax avoiders are prevalent in the oil and utilities industries in the U.S. and in the consumer, transportation, and finance industries in Europe, according to the *Fama & French 17* industry classification.

#### **4.6 Change in Tax Avoidance in Europe over Time**

For the clustering analysis, I utilized the *CASH ETR5* as a measure of a firm's level of long-term tax avoidance from 2012 to 2016. I focus on the period prior to the TCJA, as significant changes in tax codes were implemented in the U.S. and Europe starting in 2018 (e.g. implementation of ATAD in the EU). However, in a subsequent analysis, I observe the latest tax avoidance behavior and tax-competitive position of European firms. I use the *CASH ETR3* of European firms from 2020 to 2022 and perform clustering according to section 4.3.2. This enables the analysis of two additional issues. Firstly, the latest grouping allows observation of the current tax-competitive position of different firm groups in Europe. Secondly, this procedure enables observation of changes in tax avoidance behavior of firms, and the data can

be used to observe firms switching between the different groups. However, it is to be noted that the period 2020 to 2022 may be affected by COVID-19 tax reliefs.

Again, I use the European firms in my sample and perform the clustering procedure as described in section 4.3.2. However, I only extract the *CASH ETR3* of European firms from 2020 to 2022. Performing hierarchical clustering indicates that the six-cluster solution is still the best option (refer to Figure A4.1 in the Appendix for the dendrogram). Subsequently, I perform the k-means clustering with six clusters. Table 4.7 shows the changes in grouping before performing matching between the period prior to the TCJA and the present.<sup>58</sup> The sample consists of 1,617 European firms. Prior to the TCJA, there were 271 firms in the first cluster. In the current clustering, the first cluster contains 294 firms. As a result, 121 firms remained in the first cluster<sup>59</sup>, while the *CASH ETR3* of 173 firms increased, with most of them (85) moving to the second cluster. Additionally, the first cluster has a majority of new firms from the second cluster (82) and the third cluster (52). Only 21 firms arrived from the fourth cluster, 12 from the fifth cluster, and 6 from the sixth. It is noteworthy that these 121 firms were able to maintain very low *CASH ETRs* after 2020, despite being tax avoider before 2016 and the implementation of ATAD in Europe. This may be somewhat evidence that these firms are not affected by these anti-tax avoidance mechanisms or are able to avoid them.<sup>60</sup> Therefore, I reject hypothesis H3, which suggests that European high tax avoiders cannot maintain low ETRs over the entire decade.

Further, Table 4.4 shows that European firms in the fourth cluster experienced a significant reduction in their ETR after the TCJA. Table 4.7 supports these findings. While only

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<sup>58</sup> Please note, that Table 4.7 describes the grouping in Europe before matching, while Table 4.3 describes the grouping in the U.S. and Europe after matching. Therefore, the sums are not comparable.

<sup>59</sup> E.g. 1&1 AG and Kerry Group PLC.

<sup>60</sup> Please note, that some countries already had working anti-tax avoidance provisions implemented even before ATAD. However, those firms are even in the presence of those provisions able to maintain low ETRs.

40 firms remain in the fourth group, 187 firms are in the first three groups after the re-grouping. Only 14 firms move to a higher group.

**Table 4.7: Changes in Grouping of European Firms**

		Grouping 2020-2022						
		1	2	3	4	5	6	Total
Grouping 2012-2016	1	121	85	40	19	3	3	<b>271</b>
	2	82	237	131	44	22	7	<b>523</b>
	3	52	146	185	68	22	8	<b>481</b>
	4	21	66	100	40	12	2	<b>241</b>
	5	12	14	17	14	6	4	<b>67</b>
	6	6	7	8	7	6	0	<b>34</b>
Total		<b>294</b>	<b>555</b>	<b>481</b>	<b>192</b>	<b>71</b>	<b>24</b>	<b>1,617</b>

Notes: Depiction of the overlap of European firms' grouping before the TCJA (represented by rows) and after re-grouping for the years 2020 to 2022 (represented by columns) but before matching.

It is noteworthy that no firm remained in the sixth cluster, as all firms split into other groups. However, in the current grouping, there are still 24 firms in the sixth group. For instance, the German automotive supplier group Schaeffler is in the sixth group in the latest grouping of European firms, with a *CASH ETR3* of 84.5%. Previously, they were in the fourth group with a *CASH ETR5* of 36.5% from 2012 to 2016. However, the relatively high *CASH ETR3* can be explained by examining the financials. In 2020, the Schaeffler group paid a relatively high amount of cash taxes (\$361 million) despite having a consolidated net loss of \$414 million. The loss is attributable to one-time expenses such as severance payments and a goodwill impairment. The evidence from Table 4.7 and anecdotal evidence support the view that only distressed firms are members of the sixth group and, as a result, have temporarily higher ETRs.

Panel A of Table 4.2 shows the mean *CASH ETR3* for each group. A simple comparison of the means indicates that the average ETRs of the first to fifth groups are slightly lower as the

ETRs of the respective groups prior to the TCJA, but slightly higher for the sixth group. Table 4.7 supports these findings and suggests that while some firms were unable to maintain low ETRs after the TCJA, more than hundred firms were able to maintain very low long-term *CASH ETRs*, with an average of 7.9% for the period 2012 to 2022.

Additionally, I use the new grouping and repeat the PSM outlined in section 4.3.2, but with the matching year set to 2019, the year prior to the start of the *CASH ETR3*. Then, I run a regression similar to equation (2) but exclude  $POST_t$  and the interaction  $POST_t \times EU_i$ . As the dependent variable I include the *CASH ETR3* for the period 2020 to 2022. Therefore, the coefficient on *EU* indicates the tax differential between European and U.S. firms dependent on the European grouping for the period 2020 to 2022. The results are presented in Table 4.8, with each column representing the different groups. On average, the first group (column (1)) has the lowest *CASH ETR3*, while the last group (column (6)) has the highest.

The coefficients of interest pertain on *EU*, indicating the tax-competitive position of European firms compared to their direct U.S. competitors from 2020 to 2022. Although the findings must be interpreted with caution due to tax reliefs from the COVID-19 pandemic that may affect ETRs, the results suggest, that only the first and second groups have a tax-competitive advantage over their direct competitors. The advantage amounts to 14.0 percentage points for the first group but only to 4.7 percentage points for the second group. The third through sixth groups all have a tax-competitive disadvantage compared to their direct competitors, ranging from 4.3 percentage points in the third group to 61.7 percentage points in the sixth group.

**Table 4.8: Regression after Re-Grouping in Europe**

Variables	CASH ETR3					
	1	2	3	4	5	6
EU	-0.1403*** (0.0099)	-0.0472*** (0.0063)	0.0432*** (0.0070)	0.1713*** (0.0099)	0.3859*** (0.0180)	0.6171*** (0.0304)
SIZE	0.0098*** (0.0034)	0.0168*** (0.0027)	0.0037 (0.0031)	0.0085** (0.0037)	0.0182*** (0.0046)	0.0028 (0.0144)
ROA	0.0000 (0.0000)	-0.0026 (0.0023)	0.0014* (0.0008)	-0.0003 (0.0015)	0.0031 (0.0025)	0.0889 (0.0974)
LEV	-0.0319 (0.0202)	0.0053 (0.0171)	-0.0183 (0.0182)	-0.0392 (0.0278)	0.0371 (0.0387)	-0.1087 (0.0857)
RD	0.0275 (0.0390)	-0.0237 (0.0175)	0.1436 (0.1003)	-0.3606** (0.1456)	-0.0028 (0.1678)	0.2248 (0.7473)
INTAN	0.0318 (0.0253)	0.0180 (0.0152)	0.0600*** (0.0179)	0.0265 (0.0251)	-0.0175 (0.0448)	0.0291 (0.0673)
STR	0.0266 (0.0317)	0.0659** (0.0271)	0.0181 (0.0308)	0.1090** (0.0437)	0.2048*** (0.0724)	-0.1806 (0.1097)
Pair FE	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓
N	2,690	5,824	5,356	2,128	851	291
Adj. R <sup>2</sup>	0.7172	0.5628	0.5446	0.7395	0.9009	0.9479

Notes: Regressions are based on a matched sample of European firms with six clusters and their U.S. competitors; years from 2020 to 2022. The dependent variable is the *CASH ETR3* for the years 2020 to 2022. The columns represent the six different European groups after re-grouping. Robust standard errors clustered at the firm level are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the level of 10%, 5%, and 1%, respectively.

My previous findings have documented changes in the tax-competitive position of the different groups over time. Table 4.8 displays the current competitive position. The results indicate that only European firms in the first two groups, with an average *CASH ETR3* of 5.6% and 17.1% are able to undercut the tax expense of U.S. competitors. In contrast, all other European firms face a significantly higher tax burden compared to their U.S. peers. Therefore, the rejection of hypothesis H5 remains, as only European firms in the first two clusters can achieve a tax-competitive advantage over their U.S. competitors.

#### 4.7 Conclusion

In the last decade, MNEs are affected by significant international tax reforms and tax institutions. Major tax reforms, such as the TCJA in the U.S. in 2017, have significantly



changed the global playing field and impacted the tax-competitiveness of U.S. firms. While in some European countries there was a decrease in the statutory tax rates, European initiatives like ATAD in 2018 and 2019 try to curb tax avoidance. In the legislative process of implementing anti-tax avoidance rules and in the evaluation of those rules, the heterogeneity within Europe and the tax-competitiveness of European firms is not recognized. Newest directives, like the single effort in Europe in introducing a ‘Global-Minimum-Tax’ support the feeling, that currently, policy makers in Europe are focused on pushing the tax base and not create a relieve for European firms as in the U.S. in 2017. As in the public discussion, no research paper has yet examined the overall effects on different firm groups and on their tax-competitiveness after the introduction of anti-tax avoidance rules. This paper demonstrates that there are distinct groups of tax avoidance levels within Europe and the U.S.

I support previous findings, that U.S. firms are targeted by anti-tax avoidance rules implemented by the TCJA, but further profit from tax relieving changes like the cut in the statutory tax rate. However, my findings show, that overall only U.S. tax avoiders are affected by those anti-tax avoidance provisions. In addition, some European tax avoiders may be affected by ATAD, however there is a group of more than hundred firms, that manage to maintain low tax burdens throughout the sample period from 2012 to 2022, despite the implementation of those directives. This finding suggests, that overall the directives may be ineffective in targeting active tax avoiders.

This paper shows, that besides similar determinants in being a tax avoider in the U.S. and in Europe, tax avoiders in both regions are not direct competitors. Prior literature finds similar determinants in tax avoidance for U.S. and European firms. Utilizing the matching approach, I used firm characteristics that also explain tax avoidance behavior. Therefore, it is interesting, that the determinants differ only slightly, yet the firms are not competitors. The results suggest, that other factors may be analyzed in the future.

While prior literature suggests, that most U.S. firms were at a tax-competitive disadvantage before the TCJA, some U.S. firms already had a tax-competitive advantage due to permanent reinvested earnings. In general, my findings support this, however I show, that prior to the TCJA, U.S. tax avoider and U.S. competitors of European non-avoider were at a competitive advantage. However, after the TCJA and after ATAD, besides competitors of European tax avoiders, all U.S. firms are at a tax-competitive advantage or at least at the same level as their European peers.

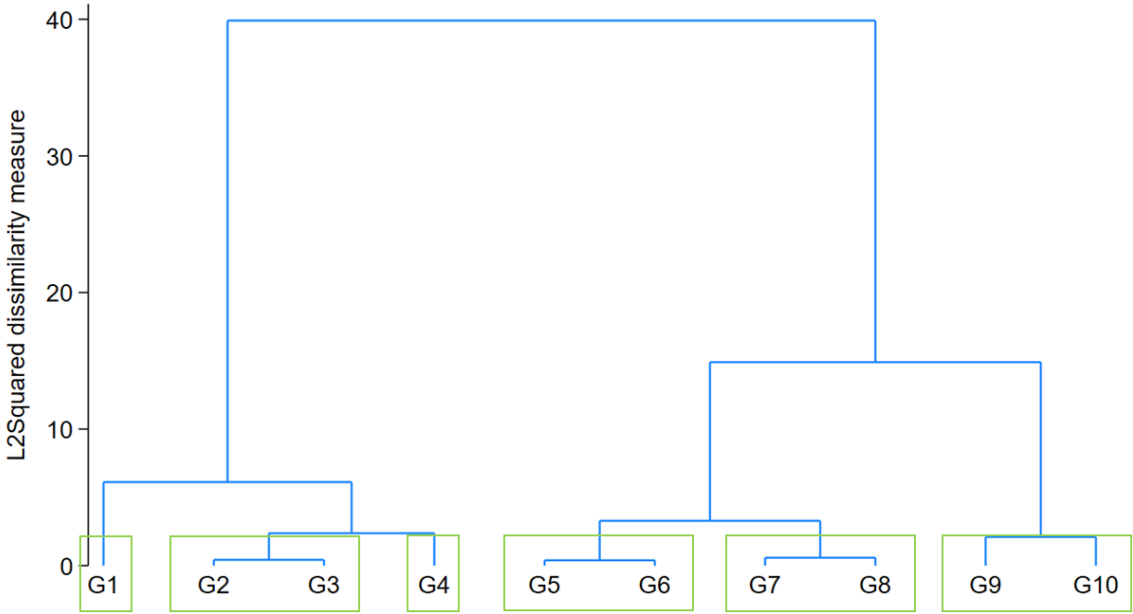
Finally, based on my latest findings for 2020 to 2022, it appears that only European firms with an average *CASH ETR3* between 5% and 17% are able to undercut their direct competitors in the current political climate. This finding may be particularly important for European policymakers, as European firms are affected by significantly higher tax burden than their direct U.S. competitors. Policymakers in Europe must consider the different groups in Europe when proposing new tax-directives. They may not only focus on the recoverable tax base but also on the impact on the various European groups and their tax-competitiveness within Europe and against foreign competitors.

To the best of my knowledge, this study is the first to analyze different groups of tax avoiders in Europe and the U.S., observe them over time, and compare them to their direct foreign competitors. This set-up should be considered in future research, most important when evaluating tax policy proposals.

Further, this study leaves space for future research questions. Those could comprise the identification of different tax avoidance channels in Europe and the U.S. among the different groups. Additionally, it would be worthwhile to investigate why tax avoiders in Europe and the U.S. are not direct competitors, given the similarity of the determinants of being a tax avoider in both regions. Finally, the analysis of the group of long-term tax avoiders would be of interest as well.

**Appendix**

**Figure A4.1: Europe: Hierarchical Cluster Dendrogram after Re-Grouping**



Notes: Dendrogram for European re-grouping after performing hierarchical clustering for 2020 to 2022. Green squares/rectangles are the chosen groups.

**Table A4.1: Variable Definitions**

CASH ETR5	$\frac{\sum_{t=1}^5 txpd_{it}}{\sum_{t=1}^5 pi_{it}}$ , i.e., sum of cash taxes paid over five years divided by sum of pretax income over five years.
CASH ETR3	$\frac{\sum_{t=1}^3 txpd_{it}}{\sum_{t=1}^3 pi_{it}}$ , i.e., sum of cash taxes paid over three years divided by sum of pretax income over three years.
CASH ETR	$txpd / pi$ , i.e., cash taxes paid divided by pretax income.
EU	Dummy, which is one for European firms and zero for U.S. firms.
US	Dummy, which is one for U.S. firms and zero for European firms.
POST	Dummy, which is one for the period after 2017, zero otherwise.
ROA (Return on Assets)	$pi / at$ , i.e., pretax income divided by total assets.
SIZE	$\log(at)$ , i.e., logarithm of total assets.
RD (Research & Development)	$xrd / at$ , i.e., research and development expense divided by total assets (set to zero if missing $xrd$ ).
LEV (Leverage)	$(dlc + dlft) / at$ , i.e., total debt divided by total assets.
PPE (Property, Plant & Equipment)	$ppegt / at$ , i.e., total property, plant & equipment divided by total assets.
INTAN (Intangibles)	$intan / at$ , i.e., intangibles divided by total assets (set to zero if missing $intan$ ).
FCF (Free Cash Flow)	$(oancf - capx) / at$ , i.e., difference of net cash flow and capital expenditures (both set to zero if missing), scaled by total assets.
STR (Statutory Tax Rate)	Statutory corporate tax rate of the MNE's home country.
PCM (Price-Cost Margin)	$((sale - cogs - xsga) / sale) -$ weighted industry average (based on 2-digit sic-codes), i.e., the ratio of operating profit and sales less the weighted industry average. In case of missing $cogs$ or $xsga$ , I use the operating income after depreciation ( $oiadp$ ) as proxy for the operating profit.
HHI (Herfindahl-Hirschman Index)	$\sum_{i=1}^N (\frac{sale_i}{\sum_{j=1}^N sale_j})^2$ within the given industry, based on 2-digit sic-codes).
PRE	Dummy, which is one if U.S. firm has permanent reinvested earnings outside the U.S. prior to the TCJA.
TaxAvoider	Dummy, which is one if European or U.S. firm is a tax avoider.

Notes: Data are taken from *Compustat* and *Compustat Global* as well as handcrafted data from the U.S. 10-K reports.

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## **Chapter 5**

### **Concluding Remarks**

## 5 Concluding Remarks

This thesis provides new insights into the relationship between tax avoidance and the tax-competitiveness of firms in the U.S. and Europe. It reveals that U.S. managers place significantly greater emphasis on tax avoidance than their European counterparts, which contributes an additional explanation for the tax differentials between U.S. and European firms. Besides researchers, this is of certain interest for firms' stakeholders, especially in the process of hiring executives who have previously worked in the U.S. Further, the thesis provides an analysis of the impact of recent tax reforms in the U.S. and Europe on the heterogeneity in tax avoidance and tax-competitiveness of affected firms. Therefore, providing new insights into the tax differentials of U.S. and European firms. This is of particular interest to policymakers because the thesis shows how tax policies have affected firms' tax avoidance and how tax-competitiveness, which is often overlooked, has changed over time.

The three essays of this thesis are interrelated. The first essay demonstrates that there is a particular U.S. management approach to tax avoidance, which may be a further explanation for tax differentials between U.S. and European firms, affecting tax-competitiveness. The second essay analyzes the effects of the TCJA on the tax avoidance behavior of U.S. MNCs and on the tax-competitiveness between U.S. and European competitor-firms. Finally, the third essay expands on the previous essays by introducing a new method to account for heterogeneity in tax avoidance within the home country when analyzing cross-country tax-competitiveness.

Chapter 2 analyzes a U.S. management approach to tax issues with a particular emphasis on tax avoidance, expanding the tax avoidance and tax-competitiveness literature. The findings show significant decreases in the ETRs of European firms that hire an executive directly from the U.S. This effect is even more pronounced if the executive previously worked at a particular tax-avoidant U.S. firm. The decline in the ETRs by approximately 4 percentage points corresponds to an average annual tax saving of about \$10.5 million. The study suggests that

managers tend to adopt the U.S. management approach from their previous employer and apply it in other countries. The results are consistent across additional tests, but they also indicate that the U.S. management approach is not viable in the long term. Finally, the U.S. management approach identified provides a potential explanation for parts of the tax differentials between U.S. and European firms.

Chapter 3 analyzes the effects of the U.S. tax reform of 2017 on the tax avoidance behavior of U.S. MNCs and the implications for the tax-competitiveness between U.S. and European competitor-firms. The essay demonstrates that, on average, the TCJA improves the tax-competitiveness of U.S. MNCs. These firms experience an average decrease of 7.5 percentage points in their *GAAP ETRs* and an increase in their tax-competitive advantage of about 4.2 percentage points. However, the study shows that the positive effects of the reform decrease as the share of foreign activities increases. An additional analysis indicates that the profit shifting behavior of U.S. MNCs did not change due to the TCJA. However, the findings are consistent with prior literature in showing that if U.S. MNCs are affected by the new anti-tax avoidance provisions GILTI, they benefit less from the positive reform effect. Thus, this chapter provides new insights into the effects of the tax reform on the tax avoidance behavior of U.S. MNCs and the tax-competitiveness between U.S. and European competitor-firms.

Chapter 4 expands the analyses in chapter 3 to a longer time horizon and broadens the matching approach by using clustering methods to identify levels of tax avoidance in Europe and the U.S. This chapter is a significant addition to the analysis of the tax-competitive position of firms. The use of clustering in addition to the matching approach provides more informative value by considering not only an average for all firms, but also the heterogeneity in tax avoidance in the home country. The analyses demonstrate that the implementation of anti-tax avoidance rules can significantly impact the tax-competitive position of firms. However, this chapter supports the findings from chapter 3 and suggests that U.S. firms gained a significant

tax-competitive advantage after the TCJA. However, U.S. firms competing with European tax avoiders face a tax disadvantage. Interestingly, some European firms are able to avoid the application of the ATADs. These findings are crucial for policymakers. This paper suggests that the TCJA was successful in achieving its main goal. Overall, U.S. firms have gained a tax-competitive advantage. Despite the negative impact of anti-tax avoidance provisions such as GILTI or BEAT on U.S. tax avoiders, they still maintain their tax-competitive advantage. In contrast, the findings suggest that most European firms are at a tax disadvantage. However, this chapter demonstrates that over the last decade, there is a group of more than 100 European firms that have continued to engage in high levels of tax avoidance, despite recent anti-tax avoidance provisions such as the ATADs. Those high European tax avoiders maintain a tax-competitive advantage.

Overall, this thesis provides new insights on tax avoidance and tax-competitiveness of U.S. and European firms, which are of particular interest to international policymakers. It demonstrates that the U.S. management approach to tax issues has a significant impact on the ETRs of firms and may be another explanation for the tax differentials between U.S. and European firms. The thesis demonstrates that, despite being impacted by anti-tax avoidance provisions under the TCJA, U.S. firms gain a tax-competitive advantage over their European competitors on average after the TCJA. Additionally, it shows that the magnitude of the effects on tax-competitiveness vary depending on a firm's level of tax avoidance. Chapter 4 suggests that the TCJA successfully achieved one of its main goals, which was to strengthen the competitiveness of U.S. firms while also curbing international tax avoidance. However, in Europe, only high tax avoiders who were able to remain unaffected by recent anti-tax avoidance provisions maintain a tax-competitive advantage over their U.S. competitors.