Capital Market Effects of Taxes and Corporate Tax Avoidance

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Vorwort

Die vorliegende Arbeit habe ich während meiner Tätigkeit als wissenschaftlicher Mitarbeiter am Seminar für ABWL und Unternehmensbesteuerung der Universität zu Köln angefertigt. Im September 2016 ist sie von der Wirtschafts- und Sozialwissenschaftlichen Fakultät der Universität zu Köln als Dissertation angenommen worden.

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Chapter 1

Motivation and Research Questions

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1.1 Motivation

As firms, in general, want to pay as few taxes as possible, national tax rate variations have implications for a firm's management and challenge its tax consultants. This basic principle raises questions which are ultimately an empirical issue: Does the capital market react to institutional changes in tax law? Who benefits from tax rate differentials and changes? Is corporate tax avoidance a management tool to increase firm value or does it – due to reputational damage – reduce firm value?

Empirical and theoretical studies concerning capital market effects of taxes have a long history and have reached a large scope until today (for an overview see: Graham, 2008). We face nowadays a vast literature on how corporate tax rate variations affect share prices (e.g. Graham, 2000; Desai and Dharmapala, 2009; Faccio and Xu, 2015). However, until now, empirical evidence about how market participants react to personal tax rate changes is rather small. Nevertheless, finding empirical results on who benefits from tax advantages and which investor group can be considered as the marginal investor in a certain asset class remains a very important and interesting research question. Admittedly, this is a very challenging task because of share- or bondholder heterogeneity and reliable data on ownership structures for assets is hardly available. Yet, new insights to this topic are of particular relevance for future tax legislation and are also important for a firm's management whose performance is often measured by the growth path of firm value.

When speaking of market participants reacting to personal tax rate changes, prior literature has put a strong focus on the most common asset class: shares. However, corporate and government bonds are also important assets in most investors' portfolios. Moreover, capital market effects of bond prices might influence future interest payments and the valuation of debt. Empirical evidence in this field is particularly limited. Only a few papers exist which try to

sketch the influence of personal income taxes on bond prices and are solely conducted in the US (cf. Green and Odegaard, 1997; Elton, Gruber, Agrawal and Mann, 2001).

As capital market effects of taxes depend crucially on the tax status of price setters, it is also very important to know their tax status. A wide range of empirical studies, all consider only shares or a portfolio of shares as asset class, is associated with this question but empirical evidence is ambiguous. Some studies find the marginal investor being taxed (Poterba and Summers, 1984; Michaely and Vila, 1995; McDonald, 2001; Bell and Jenkinson, 2002; Graham, Michaely and Roberts, 2003; Elton, Gruber and Blake, 2005) while other papers reveal that the marginal investor is tax exempt (Kalay, 1982; Lakonishok and Vermaelen, 1986; Michaely, 1991; Boyd and Jagannathan, 1994). Moreover, as almost every study to this topic dates back 10 to even 30 years and the globalization of capital investments made huge progress in the last decades, a more recent study seems necessary to shed new light on the investors' tax status in today's capital markets.

Furthermore, another topic linked to capital market effects is the dividend payout policy by firms. As personal taxes – if applicable – mitigate dividend payments from an investor's point of view, it is documented in a survey by Brav, Graham, Campbell and Michaely (2005) that firms do consider their shareholders personal tax rates when deciding the amount which is paid out to the shareholders via dividend payments. Even though the literature on corporate tax avoidance has created well-established benchmarks to measure corporate tax avoidance (for an overview see Hanlon and Heitzman, 2010), there is – to the best of my knowledge – no study that considers a potential correlation of firms being corporate tax aggressive and firms trying to evade their shareholders' personal taxation.

More recently and considering the ongoing debate in the media about global firms being accused of not paying their fair share of taxes,[1] the large strand of literature on corporate tax avoidance has evolved. In particular, it is highly relevant for a firm's management how corporate tax avoidance influences firm value and the capital market (Penno and Simon, 1986). However, theoretical expectations about the capital market's reaction are ambiguous:

On the one hand, firms might face reputational costs or a high tax risk when strong corporate tax avoidance is revealed and perceived by the media. This might negatively affect share prices. In an event study design, Hanlon and Slemrod (2009) and Gallemore, Maydew and Thornock (2014) find weak evidence for news about tax shelter involvement leading to negative capital market effects. Moreover, the studies of Kim, Li and Zhang (2011) and Mironov (2013) also indicate a potential negative effect on firm value.

On the other hand, one might also expect a positive effect on firm value (Frischmann, Shevlin and Wilson, 2008; Wang, 2011; De Simone and Stomberg, 2012; Robinson and Schmidt, 2013). That is, investors should reward any activity which increases a firm's profit after taxes. This not only means a reported lower effective corporate tax rate but also a more transparent corporate tax avoidance strategy after revelation.

This thesis consists of four essays which contribute to the research questions motivated in the last paragraphs. Capital market effects of personal tax rate variations for shares and bonds are shown as well as capital market effects of corporate tax avoidance. Moreover, this thesis provides new insights to the tax status of the marginal investor nowadays and investigates whether there is a correlation of corporate and personal tax avoidance.

The first essay entitled *"Tax Effects on Asset Pricing – New Evidence from Tax Reform Announcements in Germany"*, co-authored with Michael Overesch, Chair of Business Taxation at

[1] Cf. https://www.theguardian.com/business/2015/dec/15/starbucks-pays-uk-corporation-tax-8-million-pounds.

the University of Cologne, not only presents price effects for German shares given rumors about lowering the German corporate tax rate but also shows price effects for bonds following a substantial cut in the German personal interest tax rate. It was presented at the *Doctoral Research Seminar in Berlin 2015*.

The second essay *"Capital Income Taxes and the Ex-Day Premium – New Evidence from a Cross-Country Analysis"*, again co-authored with Michael Overesch, presents new evidence on the tax status of the marginal investor and whether the ex-day price drop equals the dividend payment. It was presented at the *39th European Accounting Association Annual Congress in Maastricht 2016*.

The third essay *"Corporate Tax Planning and the Payout Ratio of Firms – Is the Dividend Penalty Linked to ETRs?"*, co-authored with Pia Olligs, doctoral research assistant at the University of Cologne, sheds light on the question whether corporate tax avoiding firms do also react more sensible to their shareholders' personal dividend tax rates. It was presented at the *Doctoral Research Seminar in Cologne 2016*.

The concluding essay *"Capital Market Reaction to Tax Avoidance: Evidence from LuxLeaks"*, co-authored with Birgit Hüsecken, doctoral research assistant at the University of Cologne, and Michael Overesch, shows robust evidence that the revelation of corporate tax avoidance, when there is no threat of back taxes or penalties, does increase firm value. It was presented at the *Doctoral Research Seminar in Cologne 2016 and the 6th EIASM Conference on Current Taxation in Bonn 2016.*

1.2 Tax Effects on Asset Pricing – New Evidence from Tax Reform Announcements in Germany

1.2.1 Research Question and Design

The study *"Tax Effects on Asset Pricing – New Evidence from Tax Reform Announcements in Germany"* considers German share price effects of announcements to lower the German corporate tax rate. Moreover, it also provides share and bond price effect estimates to announcements about a massive tax cut on interest income. Finally, it also investigates whether there is a tax status saving behavior of private investors over the last trading days in 2008 when a beneficial capital gains tax regime ended in Germany.

To measure asset price effects of government announcements we use an event study design and follow the seminal work of Ball and Brown (1968), Fama, Fisher, Jensen and Roll (1969) and Brown and Warner (1985). We ensure the causality that our point estimates of price changes refer to the corresponding tax reform announcements by a very short time window to measure abnormal price effects. That is, we carefully identify for each announcement the very first date when it came up in the media. This way, we find several event days and abnormal price effects are considered only for three days: the day before the event, the event day and the day after. This setting makes it very unlikely that other confounding factors drive our estimates for share and bond price changes. All of our event days occurred in the years 2005, 2006 and 2008.

We use the cumulative abnormal return (CAR) approach to calculate abnormal returns for shares. We therefore calculate for each share its correlation with the market portfolio (Euro Stoxx 50) over a 100 days time span and predict afterwards its expected return for all three event days according to the market movements on these days. The cumulated difference between each share's return and its expected return constitutes a share's CAR.

For measuring abnormal bond performance, we employ a fixed effects regression setting and, again, do only consider the abnormal price change over three event days where the day before the event is our bond price reference point. An interaction term captures the corresponding abnormal price change on the following two days.

Furthermore, we use a control group for both asset classes – shares and bonds – that covers possible events influencing the whole market on our event days. The control group consists of shares or bonds from other Economic and Monetary Union (EMU) countries. However, in the case of shares, this only accounts additionally for events which are not reflected in the whole market because we already control for market movements by benchmarking each shares performance against the market portfolio.

1.2.2 Results and Contribution to the Literature

Concerning share price movements following rumors about a lowering of the corporate tax rate, we do find only weak evidence for increasing share prices in Germany compared to the EMU control group shares. Only two of our four identified events reveal significant differences and the economic magnitude of the CAR for German firms is very small (0.7 and 0.5 percent abnormal return over three days).

Moreover, given the huge cut in the German interest tax rate of roughly 18 percentage points, our point estimates for German bond prices reveal significant but very small price reactions (10 to 20 basis points). However and as expected, we do find higher bond price reactions for bonds with a longer maturity.

Furthermore, we – as well as another study of Eichfelder and Lau (2015) – identify a significant and substantial increase in share prices at the end of 2008. This is due to the fact that private investors could save a beneficial tax status for these shares, a capital gains tax free selling

after a holding period of more than one year, when buying before 2009. Interestingly, we do not find any bond price reactions at the end of 2008 even though this grandfathering rule was also applicable to bonds.

This study contributes to the existing literature in several ways. First, we re-examine a paper of Voeller and Müller (2011) but we use a completely different empirical design and, most important, consider a control group. Thereby, our study reveals weak significant evidence for German share prices increasing after announcements to cut the German corporate tax rate. Moreover, our paper is related to a small strand of literature concerning how investor-level tax rates affect the yield spread of bonds (e.g. Green and Odegaard, 1997; Elton et al., 2001). However, we do not consider a bond's yield spread but estimate abnormal price changes following an announcement to a substantial personal interest tax rate cut. Furthermore, this paper confirms prior evidence of increasing share prices at the end of 2008 stemming from private investors who want to save the old beneficial tax status.

1.3 Capital Income Taxes and the Ex-Day Premium – New Evidence from a Cross-Country Analysis

1.3.1 Research Question and Design

The essay *"Capital Income Taxes and the Ex-Day Premium – New Evidence from a Cross-Country Analysis"* investigates by which amount a share price falls on the first day the share trades without the dividend payment (i.e. on the ex-day). Prior literature provides overwhelming evidence that the price drop on the ex-day is smaller than the dividend payment (for an overview see: Graham, 2008). This finding is closely tied to the question whether the marginal investor in shares is tax exempt or not. Namely, a major argument for share price drops on the ex-day being smaller than the dividend payment is the investor's tax rate differential between dividends and

capital gains (e.g. Elton and Gruber, 1970; Poterba and Summers, 1984; Elton, Gruber and Blake, 2005). This follows from the fact that dividends are taxed at a higher rate in most countries than are capital gains. An investor has two opportunities on the cum-day which both should, theoretically, lead to the same outcome. He can either receive the dividend payment or sell the stock on the cum-day and rebuy it on the ex-day. Equating both scenarios raises the theoretical expectation of price drops being smaller than the dividend payment. However, also other arguments exist which aim at an explanation of share prices dropping by less than the dividend payment. E.g. traders are disturbed by dividend payments and, thus, sell the stock on the cum-day and rebuy it on the ex-day (Frank and Jagannathan, 1998).

Since empirical evidence concerning the tax status of the marginal investor is ambiguous and all available studies date back 10 to 30 years, it is a main objective of our study to provide actual evidence to the topic of share price drops on the ex-day and whether it is correlated with a country's personal dividend and capital gains tax rates or not. Moreover, we take a global view and consider shares from 17 countries (G7 merged with EU15 member states[2]) and consider daily closing share prices from 2004 to 2013.

To calculate ex-day price drops it would be most compelling to take the difference between the closing price on the cum-day and the opening price on the ex-day. However, as the opening price on the ex-day is exactly the cum-day price minus the dividend payment due to pure book adjustments, this method is not reasonable. Therefore, in line with prior literature (cf. Elton, Gruber and Blake, 2005), we calculate the ex-day price as closing price adjusted by the market's movement that day and subtract it afterwards from the cum-day's closing price. The market's movement is measured by the share's country leading index.

[2] Due to implausible share price data, we have to drop Luxembourg so that we face 17 instead of 18 countries.

1.3.2 Results and Contribution to the Literature

Our calculated ex-day price drops reveal significant and robust evidence that they are smaller than the dividend payments. We find this result for almost every country and year in our sample. However, interestingly, we find that share prices drop by far less than the dividend amount – a fact which cannot be explained by any of the common arguments in the literature. Moreover, we do not find a common trend for ex-day price drops in any country but a high variance for some of the countries.

Additional fixed effects regressions reveal, as the tax argument suggests, a significant correlation of the relationship of a country's personal dividend and capital gains tax rate and the ex-day price drop. Nevertheless, in most regression specifications the corresponding coefficient remains small and thus, we cannot identify a major influence on the ex-day price drop.

These findings contribute to the existing literature by depicting an overview over 17 countries for the years 2004 to 2013. It is, to the best of our knowledge, the first study which covers a cross-country analysis in the context of personal tax rates and the ex-day price drop. Moreover, as personal tax rate variations do not appear very often within one country, we provide with our cross-country analysis a unique setting to investigate potential causal effects of personal dividend and capital gains tax rates affecting the ex-day price drop.

1.4 Corporate Tax Planning and the Payout Ratio of Firms – Is the Dividend Penalty Linked to ETRs?

1.4.1 Research Question and Design

The study *"Corporate Tax Planning and the Payout Ratio of Firms – Is the Dividend Penalty Linked to ETRs?"* examines whether there is a correlation between firms that are known to be highly engaged in corporate tax planning and firms that reduce their dividend payout when dividends become more heavily taxed relative to capital gains.

The research question is on the one hand motivated by a survey from Brav et al. (2005) which reveals that a firm's management does consider the taxes at the investors' level when deciding about the firm's payout ratio. On the other hand, a survey from Graham, Hanlon, Shevlin and Shroff (2014) shows that it is also the management of a firm that decides about the intensity of corporate tax planning.

As prior literature on corporate tax planning has developed well-established measures for corporate tax avoidance (for an overview see Hanlon and Heitzman, 2010), we use these measures to identify in a first step firms being highly engaged in corporate tax planning. Then in a second step, in terms of these firms' dividend payout, we check whether they react more to a change in the relationship of dividend to capital gains taxes in their resident country than firms being less engaged in corporate tax planning. We therefore consider firms from 18 countries (G7 merged with EU15 member states) over 10 years from 2004 to 2013.

1.4.2 Results and Contribution to the Literature

We find evidence in line with prior literature (e.g. Jacob and Jacob, 2013) that firms do consider their shareholders' tax bills when deciding about their payout. This emphasizes the previous literature's result by providing additional evidence within a different empirical setting.

That is, a firm is likely to reduce its dividend payout after a tax law change that increases the dividend relative to the capital gains tax rate.

However, with a battery of different corporate tax planning measures, we cannot find any additional effect for firms being highly engaged in corporate tax planning. Nevertheless, this finding is interesting as it shows that all firms do react to personal capital income tax rate variations and it is at least very difficult to identify firms which react stronger than others.

1.5 Capital Market Reaction to Tax Avoidance: Evidence from LuxLeaks

1.5.1 Research Question and Design

The essay *"Capital Market Reaction to Tax Avoidance: Evidence from LuxLeaks"* exploits the unique revelation of firms being engaged in corporate tax avoidance named *"LuxLeaks"*. It is ideal to study how the capital market perceives the revelation of a firm's involvement in corporate tax avoidance because it provides until today the largest number of firms being revealed at the same time – November 5, 2014 – and thus, it is an event which was quite prominent in the media.

This essay relates to previous studies about capital market effects of the revelation of corporate tax planning and, interestingly, they reveal different results. Some of them find a positive effect on firm value (e.g. De Simone and Stomberg, 2012) while others, e.g. Inger (2014), find a potential negative impact on firm value and argue that the revelation of tax planning might be associated with a higher tax risk. Adding to that, a negative effect on firm value might also stem from reputational loss as customers start to boycott firms which are not paying a fair amount of taxes (Brooks, Godfrey, Hillenbrand and Money, 2016).

Earlier, Hanlon and Slemrod (2009) and Gallemore, Maydew and Thornock (2014) find negative effects on firm value for firms already disclosing relatively low ETRs and no significant

effect for firms with higher ETRs. They conclude that this results from the fact that the capital market rewards firms for engaging in corporate tax planning which are considered to neglect the amount of corporate taxes paid each year. Moreover, they do not find overall evidence that reputational loss influences firm value.

Due to the specific case of LuxLeaks, it not only constitutes a promising event for the overall market perception of the revelation of tax avoidance but it also allows to separate different effects which might influence share prices in this context. That is, these advance tax rulings (ATRs) which lead to a reduced corporate tax burden for the involved firms were not associated with any penalties or back taxes and therefore enable us to identify reputational loss as the only explanation for negative share price reactions. Additionally, positive share price reactions would reveal that reputational loss is outweighed by a high engagement in reducing the corporate's tax bill.

To investigate firm value changes due to LuxLeaks, we consider share prices and financial information from all available listed firms which are resident in the same countries than are the LuxLeaks firms. All changes in firm value are generally measured by each firm's cumulated abnormal return over a 5 days time window around the event of LuxLeaks: the 5th November in 2014. The cumulated abnormal returns are calculated by summing up each share's actual return minus its predicted return over all considered event days. For the prediction of returns, we primarily implement the market model approach by estimating for each share its correlation with the leading index of its resident country and use the coefficients of that estimation to predict the share's return on the considered event days (cf. section 1.2.1).

1.5.2 Results and Contribution to the Literature

The key result of the paper and main contribution to the existing literature is that we find positive effects on firm value for the revelation of tax planning where no penalties or back taxes are expected. This result stays constant in several robustness tests and thereby, our setting provides clear evidence for investors appreciating that firms do engage in corporate tax planning.

Moreover, with additional tests, we are able to show that positive firm value effects are most pronounced for firms being in the highest quartile of ETRs. Thus, the capital market especially rewards firms where he did not expect any tax planning at all. Put differently, firms might be able to capitalize tax benefits by providing more details about their corporate tax planning.

Overall, as we do not find significant negative effects on firm value for the revelation of corporate tax avoidance, we conclude that reputational loss is clearly outweighed by the new information about tax avoidance and tax certainty.

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Chapter 2

Tax Effects on Asset Pricing –

Evidence from Tax Reform Announcements in Germany

Tax Effects on Asset Pricing –

Evidence from Tax Reform Announcements in Germany

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Abstract:

We analyze the impact of corporate taxes and personal capital income taxes on share prices and bond prices. Using an event study design, we consider several announcements about intended tax changes prior to a major tax reform in Germany. As control group we consider shares and bonds issued in other countries of the Economic and Monetary Union. Our results reveal share price effects for two important announcements of corporate tax cuts. Moreover, we find a response of bond prices to a significant reduction of the tax on interest income. While our findings suggest that asset prices respond to tax changes, the magnitudes of estimated tax effects are small.

Keywords: Capital Income Taxes, Market Reaction

We thank the participants of the joint Doctoral Research Seminar with FU Berlin in Berlin 2015 for their comments.

1. Introduction

Do changes in income tax law affect asset prices? This question is of particular concern for policy-makers and market participants. We consider several announcements about intended tax changes prior to a major tax reform in Germany to analyze tax effects on asset pricing. In particular, we use an event study design as identification strategy to obtain a direct empirical estimate how corporate income taxes and investor level taxes on capital income affect prices of both shares and bonds.

Corporate taxes as well as capital income taxes reduce the net income from an investment in shares or bonds. Therefore, taxes should determine firm value and bond prices. The existing empirical literature has employed different strategies to confirm the relevance of corporate taxes and capital income taxes for firm value. Several studies use firm specific marginal corporate tax rates and find evidence that lower firm-specific effective tax rates are associated with higher firm value (Graham, 2000; Desai and Dharmapala, 2009). A recent paper by Faccio and Xu (2015) considers worldwide tax rate changes and confirms a tax influence on the value of a firm's debt tax shield. A few studies consider investor-level income tax rate differentials and analyze tax effects on bond prices. These studies find that a smaller income tax rate for certain categories of bonds is associated with higher bond prices (Green and Odegaard, 1997; Elton, Gruber, Agrawal and Mann, 2001; Liu, Shi, Wang and Wu, 2007).

An important concern with empirical studies of value relevance is, however, the influence of unobserved confounding factors. We therefore conduct an event study design building on the seminal work of Ball and Brown (1968), Fama, Fisher, Jensen and Roll (1969) and Brown and Warner (1985) and analyze how tax changes affect firm value. An event study design considers the immediate response to an unexpected change in the institutional environment as a quasi-

experiment. Due to the short event window of only a few days, the likelihood of price changes determined by unobserved confounding factors is low.

We consider announcements of intended tax changes prior to a major German tax reform during a period from 2005 to 2009. In 2008 and 2009, a major German business tax reform ("Unternehmensteuerreform") came into force after a long and controversial discussion and a change of the German government in the meantime. The first part of the reform dealt with corporate tax changes. In particular, the corporate tax rate was reduced by 10 percentage points. The second part of this tax reform included changes of the personal taxation of capital income. Primarily, the personal income tax rate for coupon income decreased significantly by almost 18 percentage points for top income taxpayers while dividend tax rates remained almost unchanged. Moreover, capital gains realized by personal investors became subject to personal income taxes. We consider the rumor and political announcements related to the German business tax reform in the period from 2005 to 2009.

As a requirement for identification, we suppose that investors respond by adjusting their expectations about the future income after taxes and do not anticipate news about the German tax reform. We therefore carefully select the dates when news about intended tax changes were announced for the first time. While a short event window helps to avoid the influence of unobserved confounding factors, we additionally consider asset prices of other firms from Economic and Monetary Union (EMU) countries as a control group.

First, we analyze effects of announcements of corporate tax changes on share prices. We implement a standard approach using cumulative abnormal returns (CARs). We check with a simple treatment and control group setting for abnormal returns for German shares. We find evidence that share prices respond to two important announcements of a massive reduction of the corporate tax rate. We estimate price effects of about 0.7 percent for the first announcement of a

corporate tax reform in 2005 and of about 0.5 percent for the detailed announcement of the new corporate tax rate in 2006 after a long discussion and a change of the German government in the meantime.

Moreover, we also investigate if a strong investor-level interest tax cut, which was an integral part of the German tax reform, affects share prices. While we are aware of a vast literature that analyzes if investor-level dividend taxes and capital gains taxes are capitalized into share prices (e.g. Erickson and Maydew, 1998; Lang and Shackelford, 2000; Blouin, Raedy and Shackelford, 2003; Guenther and Sansing, 2010; Edwards and Shevlin, 2011), we do not know of any study which explicitly analyzes the impact of an exogenous interest tax rate variation on share prices. Share prices might respond because alternative investments became more attractive after the reduction of the tax rate on interest income. However, we do not find any significant share price changes related to announcements about a massive reduction of the investor-level interest tax rate.

In additional analyses, we also investigate whether bond prices respond to the strong tax cut on interest income. Using again a small event window and a control group, we ensure that identified effects are linked to the relevant tax announcement. Our results suggest that the announcement of a massive reduction of the personal interest income tax rate leads to an increase in bond prices of 10 to 20 basis points.

While we mostly analyze price effects of announcements of tax changes, we also analyze the response to one tax change when it becomes effective. We analyze whether asset prices were affected by last minute portfolio adjustments of private investors just before a new capital gains tax as part of the German tax reform became effective. Our results suggest positive share price effects. While this finding confirms results by Eichfelder and Lau (2015), we also analyze bond prices. Interestingly, we do not find any bond price reaction to the substantial change in capital gains taxes.

Our analysis relates to previous studies that also exploit an event study design to confirm tax effects on asset prices with different announcements about upcoming tax law reforms: e.g. a change in the amount of dividend deduction at the corporate's level (Erickson and Maydew, 1998), a capital gains tax reduction for private investors (Lang and Shackelford, 2000), an abolishment of tax benefits of Canadian income trusts for certain investor groups (Edwards and Shevlin, 2011; Doidge and Dyck, 2015). The paper of Faccio and Xu (2015) uses an event study design to analyze share price effects of tax reforms in several countries.

Most related to our analysis is a working paper by Voeller and Müller (2011) that considers news in 2006 and 2007 prior to the German tax reform and investigates share price responses as well. Interestingly, they do not find robust evidence that share prices respond to the announcements prior to the German tax reform. We use a completely different study design and, in particular, consider a control group. Moreover, we extend our study to additional events in 2005 and 2009. Our study reveals significant asset pricing effects of two announcements prior to the German tax reform. Moreover, we analyze potential price effects of bonds because changes of the taxes on interest income were an integral part of that reform.

Furthermore, our analysis of tax effects on bond prices relates to a small strand of literature which notes that investor-level taxes affect the rate spread of bonds (Green and Odegaard, 1997; Elton et. al., 2001; Liu et al., 2007; Ang, Bhansali and Xing, 2010). These papers provide evidence that investor-level taxes affect (increase) the yield spread of bonds compared to tax favored bonds. We, however, are the first that use an event study design and employ announcements of changes in personal income tax rates to check for bond price effects.

Moreover, our study is also linked to the discussion about salience of taxes by (individual) investors. Previous studies find that taxpayers are not always fully informed about upcoming changes or respond only little (e.g. Chetty, Looney and Kroft, 2009; Finkelstein, 2009 and

Alstadsaeter and Jacob, 2013). As investors are heterogeneous in their grade of tax awareness, tax changes do not fully affect asset prices at the announcement's date and, consequently, may leave room for arbitrage. Though we identify some significant price effects as a response to tax reform announcements, these effects are small in economic terms.

The remainder of the paper is organized as follows. Section 2 describes the institutional background to understand and develop the hypotheses. Section 3 shows the methodology applied to test for the different hypotheses and gives information about the data used in this study. Results are presented in section 4. Section 5 concludes.

2. Institutional Background and Pricing Effects

We consider announcements about changes of the German tax legislation prior to a major German tax reform in 2008/2009. The tax reform was discussed at different stages and details evolved during a time period from 2005 to 2008. Tax changes refer to both corporate taxation but also to capital income taxation of personal investors. In this section, we sketch the development of the institutional details related to the German tax reform and provide a brief discussion of the expected price effects. Table 1 depicts an overview of the different announcements.

2.1 Corporate Tax Reform

The first important date was March 13, 2005, when rumors from the ministry of finance about an upcoming corporate tax reform emerged. In particular, a significant corporate tax cut of five percentage points (from 25 to 20 percent tax rate) was announced. The announced tax reform, however, was not adopted by parliament before the new election of the German government in September 2005. On June 23, 2005, newspapers like the "Stuttgarter Zeitung" stated that the discussion about lowering corporate tax rates had been stopped.

After the German election the new government revisited ideas of the corporate tax reform. The plans for a tax reform were documented in the coalition agreement from November 11, 2005. A few months later on April 8, 2006, the newspaper "Die Welt" got news from the ministry of finance that the corporate tax rate was reduced by approximately 8 percentage points. On July 2, 2006, the governing parties confirmed the reduction of the corporate tax rate.

The next important announcement from the government was on November 2, 2006, when it definitely decided to reduce corporate and trade taxes to a combined tax level of about 30%.

On May 25, 2007 the German parliament adopted the tax reform. Finally, the first part of the reform, the corporate tax reform, came into force on January 1, 2008.

2.2 Personal Tax Reform

The mentioned German tax reform also affects taxation of capital income. Prior to the tax reform, dividends and interest income of individual persons were taxed at totally different rates. The idea was to tax dividends at a lower rate because dividends are distributed profits that have already been subject to the corporate income tax and the German trade tax. Therefore, interest payments carried approximately the same total tax burden (personal income tax) as dividends (corporate taxes and trade taxes as well as dividend taxes). Moreover, most capital gains associated with the disposal of shares were tax exempt after a holding period of one year.

The distinction between different sources of capital income was difficult to enforce. Therefore, after an ongoing discussion, all types of capital income are subject to the same tax rate of 25% since 2009. The tax imposed on interest income was significantly reduced while the tax level of dividend income remained almost unaffected.

Moreover, capital gains from selling shares and bonds became subject to income taxes. Previously, this was not the case if an individual investor held financial assets for more than one

year. However, the German tax reform introduced a grandfathering rule. Shares and bonds bought until December 31, 2008 are still subject to the former beneficial tax treatment of capital gains.

Important dates related to the personal tax reform were July 2, and July 12, 2006. On the first date, the governing parties announced to reduce the tax rate for interest income by about 18 percentage points. On the latter date, the government settled these issues. After an ongoing discussion, the final version of a uniform tax rate for all types of capital income was presented on November 2, 2006.

Finally, the tax changes for capital income came into force on January 1, 2009. Considering the grandfathering treatment of capital gains from shares and bonds acquired before 2009, the last interesting date linked to the personal tax reform is the end of 2008 (December 28 to 30, 2008). If private investors wanted to preserve the preferable tax status of tax exempt capital gains, they had to buy shares and bonds until December 31, 2008.[3]

[3] We are aware of the special norm in the former German tax law (§22 Abs. 2 Nr. 4 EStG a.F.) which already stated a quasi capital gains taxation for zero bonds and bonds with small coupons. However, as all bonds in our sample are officially named "straight coupon paying bond" with an average coupon yield of 11 percent, this special rule should not significantly affect our results.

Table 1: Event Overview

Date	Event
13-Mar-2005	First rumors about a corporate tax reform and reduction of the corporate tax rate from 25% to 19%.
23-Jun-2005	The discussion between the political parties regarding the corporate tax rate failed before the election of a new government.
11-Nov-2005	The newly elected governing coalition states in its coalition contract a reduction of the corporate tax rate.
08-Apr-2006	The ministry of finance announced details about the corporate tax reform. In particular, the combined corporate and trade tax rate should fall from 38% to about 30%.
02-Jul-2006	Announcement of the reform of the personal income tax for capital income. A reduction of the personal coupon income in two stages from about 44% to 32% and thereafter to 26.38%. Additionally, the government confirmed its plans to lower the corporate tax rate.
12-Jul-2006	The federal cabinet agrees on the plans for the new tax system for personal capital income.
02-Nov-2006	Details of the new tax system were decided, especially a 18 percentage points tax rate cut for personal coupon income. Additionally, the cut of the corporate tax rate was ultimately decided.
25-May-2007	The German federal parliament adopts the new tax law.
28 to 30-Dec-2008	Last trading days in 2008. Private investors could preserve the beneficial tax treatment of capital gains if they invest in shares or bonds before the end of the year 2008.

2.3 Expected Price Changes

According to standard valuation models, firm value is determined by future dividends and retained earnings net off corporate and shareholder taxes. Therefore, a reduction of the corporate tax rate should be associated with higher share prices which leads to our first hypothesis:

H1: *Prices of German shares increase if the German government announces a reduction of the corporate tax rate.*

While the German tax reform did not significantly change the amount of dividend taxes for individual persons that are in the top income tax brackets, the tax rate for interest income was significantly reduced. A reduction of the tax on interest income should affect share prices if individual investors consider shares and bonds as alternative investments. Investors at the margin sell shares and invest in bonds. Therefore, we test the following hypothesis:

H2: *German share prices fall if a tax cut for interest income is announced.*

Regarding bond prices, we expect an adverse effect of announced tax cuts on interest income. The net coupon income after taxes increases. Thus, an investment in bonds becomes more attractive compared with alternative investments like shares.

H3: *Bond prices increase if a cut in the personal tax rate for coupon income is announced.*

However, gains from a tax cut for interest income differ across bonds because coupons and maturity differ. The tax advantage of a tax cut is determined by the amount of the annual coupon and the time for which the coupon is paid. A higher annual coupon and a longer remaining time to maturity should be associated with a more pronounced price effect of a tax cut.

H4: *Bond prices respond more (less) to an announcement of lowering the personal income tax if the present value of future coupon payments of the bond is high (small).*

Analyzing possible price effects in H1-H4, the introduction of the capital gains taxation on January 1, 2009 might be an additional confounding factor. While capital gains from shares or bonds were not subject to tax until the end of 2008, capital gains are subject to tax under the new tax law. However, due to a grandfathering rule investors could preserve the former tax treatment of capital gains if they buy shares or bonds until the end of 2008. The new capital gains taxation applies only on assets bought after December 31, 2008, while all relevant event dates linked to H1 to H4 took place before January 1, 2009. Therefore, we do not expect significant price effects during the tax reform discussion.

Private investors could still benefit from the grandfathering rule if they respond by last-minute portfolio adjustments during the last trading days of 2008, just before the new tax regime became

effective. Therefore, we also test the following hypothesis concerning investor's response to a definite tax law change:

H5: *Prices of shares and bonds increase in the last trading days of 2008 due to last-minute investments of private investors.*

3. Empirical Design

3.1 Research Design

For the empirical identification of the expected tax effects, we employ an event study methodology and consider the aforementioned tax reform announcements. Moreover, we always consider two different groups: German financial assets and assets from EMU countries except Germany. Shares or bonds issued by German firms or the German government are our treatment group while shares and bonds issued by foreign firms or a foreign government are rather unaffected by tax changes in Germany. We argue that assets from other EMU countries are a relevant control group because base rate announcements through the European Central Bank affect those shares and bonds equivalently.

German firms and German investors are subject to the German tax reform. Nevertheless, the focus on financial instruments issued by German firms as our treatment group might be ambiguous with respect to investor level taxes. A German investor is also subject to the German income tax if he invests in foreign bonds or shares. Previous studies however found a strong evidence for a home-bias of investment (French and Poterba, 1991; Mondria and Wu, 2010). We therefore assume that German investors account for a significant part of investment in German shares and bonds.

3.1.1 Tax Effects on Share Prices

For our analysis of share price responses to tax law announcements, we implement a common event study methodology considering cumulative abnormal returns (CARs) as proposed by MacKinlay (1997) and Kothari and Warner (2007).

CARs are computed using the market model (MacKinlay, 1997). We use the following simple linear model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad \textbf{(1)}$$

The variables represent the daily return (R_{it}) of share i and the daily return of the market portfolio (R_{mt}). ε_{it} is a zero mean disturbance term. As market portfolio we consider the Euro Stoxx 50 index. For each share, we estimate equation (1) using a window of 100 days ending 6 days before the event of interest took place to ensure that no pricing information related to the event affects the predicting factors (cf. MacKinlay, 1997). Then, we use our estimates to predict each share's return ($R_{it}^{predicted}$) for each day belonging to the event window. Assuming an event took place on day t_0, the CAR is calculated for three days t_{-1}, t_0 and t_{+1} [4]:

$$CAR_i = \sum_{t=t_{-1}}^{t=t_{+1}} (R_{it} - R_{it}^{predicted}) \qquad \textbf{(2)}$$

Finally, we apply a mean difference test to check whether the German treatment group has significantly different CARs compared with the control group of EMU firms. Therefore we use a simple two-sample *t*-test.

[4] The event window is kept small to separate the effect of the given tax law announcement from other economic effects which might disturb the securities' prices. Any events in this study which occurred on a Saturday or Sunday are considered as if they took place on the following Monday.

3.1.2 Tax Effects on Bond Prices

For the analysis of bond prices, we use a slightly different setting. Bonds have a fixed date of maturity and are not strongly tied to future earnings perspectives of each firm (or government). We therefore compare daily bond prices prior to tax announcements and after the announcement. We use a fixed effects regression model to control for time invariant determinants of bond prices ($BONDPRICE$). The event study setting is again very compelling and we do not need to take care of the risk and the term structure of a bond.

We consider a window of 3 days. A dummy variable *POST* is introduced to capture all price effects induced by the considered event. *POST* equals zero the day before the event and is set to one on the two following days.

Moreover, we compare German bond prices with prices of bonds issued in EMU countries. A variable *GERMAN* indicates if a considered bond is issued in Germany. Using a standard difference-in-differences approach, we consider an interaction term *GERMANxPOST* to identify a potential effect of a tax change announcement in Germany on bond prices. Our baseline regression is the following:

$$BONDPRICE_{it} = \alpha_i + \beta_1 POST_{it} + \beta_2 GERMANxPOST_{it} + \varepsilon_{it} \quad \textbf{(3)}$$

α_i is a bond-fixed effect and also nests the plain dummy indicating bonds issued in Germany. The treatment effect of interest is captured by β_2.

3.2 Data

For our analysis we consider data taken from *Datastream*. Sample A includes share data of about 6,400 firms. About 1,600 firms are from Germany while the remaining firms are from EMU countries.

Sample B includes 11,000 bonds. About 9,400 of these bonds were German government bonds or were issued by German firms. The rest stems from firms or governments from EMU countries. We consider only bonds that pay coupons. Most of the bonds are issued by financial firms. This fact should however not bias our results because German income tax legislation does not treat interest payments by financial institutions differently. About 7,500 bonds (6,700 issued by German firms) matured before January 1, 2009 and thus were not at all affected by the new tax law. Therefore we exclude this data and are left with about 2,600 German bonds of German and 950 bonds from EMU countries.

We collect daily stock and bond closing prices from Monday to Friday for each week from 2005 to 2009 for all firms in both samples.

4. Results

4.1 Share Price Effects

Table 2 presents our baseline results for tax effects on share prices. We follow the empirical design described in Section 3.1 and compare the mean CARs of German shares (treatment group) and shares of EMU firms (control group).[5] We present *t*-test results for all tax reform events outlined in Section 2.1.

[5] Given the possibility that the variances of the treatment and control group might differ from each other, we checked for this fact with a two-sample Welch-test. However, this is not leading to much different results when looking for significance so we do not provide the results herein.

Table 2: Share Prices – Baseline Results

Panel A. Events 13-Mar-2005 to 08-Apr-2006

Event:	*13-Mar-2005*	*23-Jun-2005*	*11-Nov-2005*	*08-Apr-2006*
Expected effect (treatm. - control):	+	-	+	+
Difference CAR (treatm. - control):	0.0071**	0.1144	0.0016	0.0053*
	(0.0033)	(0.2192)	(0.0015)	(0.0040)
Observations treatment group	1,292	1,303	1,337	1,382
Observations control group	4,335	4,383	4,456	4,541

Panel B. Events 02-Jul-2006 to 29-Dec-2008

Event:	*02-Jul-2006*	*02-Nov-2006*	*25-May-2007*	*29-Dec-2008*
Expected effect (treatm. - control):	+	-	+	+
Difference CAR (treatm. - control):	*0.0002*	*0.0002*	*0.0000*	*0.0247***
	(0.0020)	*(0.0027)*	*(0.0016)*	*(0.0048)*
Observations treatment group	*1,431*	*1,502*	*1,627*	*1,821*
Observations control group	*4,620*	*4,697*	*4,806*	*5,020*

Notes: Table 2 presents the sample's mean difference in cumulated abnormal returns of the treatment group (German firms) and control group (EMU firms). The CARs for each group are computed for a 3 days window. Standard errors are shown in parentheses. The parametric test performed is a (two-sample) *t*-test. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

Our results suggest significant effects only for the first announcement of a corporate tax rate reduction in Germany (*13-Mar-2005*) and the announcement of the new corporate tax rate (*08-Apr-2006*)**.** Our analysis reveals no statistically significant effects for the preliminary end of the reform discussion (*23-Jun-2005*) before the German election in 2005 or the new reform plans stated in the coalition contract (*11-Nov-2005*). Moreover, we find no significant price effect for the final decision to definitely lower the corporate tax rate (*02-Nov-2006*).[6] The latter event however also includes confounding news about the tax cut on interest income.

[6] In an additional unreported analysis, we have also checked the personal tax reform event July 12, 2006. However, we did not find any significant difference for the two groups of firms.

Our results suggest that the rumors about lowering the German corporate tax rate were associated with share price changes.[7] Primarily, share prices responded to the two precise announcements of large tax rate changes. The additional information about different stages of the reform process was however not associated with significant abnormal returns.

The first corporate tax reform announcement in March 2005 is associated with a positive and significant cumulative abnormal return for German firms of 0.0071 compared with EMU firms. Thus, share prices of German firms have a 0.7 percentage points higher abnormal return than the other EMU firms over the considered 3 days event period. The second precise announcement of a corporate tax rate cut of a new German government one year later in April 2006 was associated with abnormal returns of about 0.5 percentage points relative to those of other EMU firms

A comparison of these CARs with the expectations about the price effects associated with the tax rate cut illustrates the economic magnitude of the estimated effects. For example, in March 2005, the first announcement of corporate tax reform includes a reduction of the corporate tax rate by 6 percentage points. This tax cut translates into a reduction of the total income tax for German corporations from 38.6% percent to 33.4 percent.[8] Thus, expectations about the amount of after tax profits increased by about 8.6 percent. We however find only (cumulated) abnormal returns of about 0.5 percentage points. The observed price response might be smaller than expected for different reasons: Investors might anticipate a corporate tax reform or did not immediately respond to every single announcement during the tax reform process. Moreover, expectations about the tax

[7] Even though Voeller and Müller (2011) have looked at the tax reform, our findings are difficult to compare. We consider both German firms and a control group of other EMU firms while they only analyze abnormal returns of German firms. Moreover, the sample sizes of the two studies are very different. We consider 1,300 German firms (and roughly 4,500 other EMU firms) while Voeller and Müller use 347 German firms in their basic regressions.
[8] In Germany a corporation is not only subject to the corporate income tax but also to a surcharge tax and the German trade tax.

benefit of a tax cut might be significantly smaller because profits of foreign subsidiaries are not subject to the German corporate tax or due to tax shields related to debt financing.[9]

The last event (*29-Dec-2008*) is a check for the investor's awareness of the upcoming capital gains tax change. Private investors could preserve the old beneficial tax status by buying shares until December 31, 2008. We find a significant price effect with economic significance. The results also confirm previous findings by Eichfelder and Lau (2015) and suggest a strong reaction of (German) investors to a definite change in tax treatment of capital gains.

4.2 Bond Price Effects

In a further analysis we test whether tax reform announcements also affect bond prices. We employ the empirical design described in Section 3.1.2. Table 3 shows our baseline results for the difference-in-differences estimations. The coefficient of the interaction *GERMANxPOST* depicts a potential tax announcement effect. Our results in Table 3 show significant announcement effects for the agreement of a personal income tax reform (*12-Jul-2006*) and the announcement of the tax cut for interest income (*02-Nov-2006*). Interestingly, the first announcement of a personal tax reform *(02-Jul-2006*) does not affect bond prices significantly.

The results support our expectations that a smaller tax rate for personal coupon income increases the prices of coupon paying bonds (H3). All coefficients reflect an absolute price change in bond prices. For example, the point estimator in column 3 of Table 3 reveals a highly significant and economically important result for *GERMANxPOST* of 0.1544. Therefore, we find evidence supporting H3.

[9] Voeller and Müller (2011) have run a multivariate regression with proxy variables for high leverage firms. However, they find puzzling results. Their regressions show higher abnormal returns for firms which are more heavily leveraged.

The marginal effect is twice as much as the average daily bond price change of 0.072. The effect can be interpreted as a change in percent of the bond prices. Evaluated at sample mean of 103.4, the significant coefficients in the baseline regression of *GERMANxPOST* can be interpreted as a positive price change of 16 basis points (0.16 = 103.4 * 0.1544). Past literature (for an overview see Bessembinder, Kahle, Maxwell and Xu, 2009) documents event effects from 20 to over 100 basis points.

As a further benchmark for the obtained abnormal bond returns, we calculated the expected price change using a standard bond valuation formula (i.e. discounting coupon payments and the face value). Plugging in the sample's mean coupon of 4.6 percent of a face value equal to one hundred and a mean remaining term to maturity of 7.2 years, the calculated bond price increases by 5.22 percent.[10] Again market response might be smaller due to different reasons. Again, the capital income tax changes might be anticipated or were not always taken seriously. Moreover, only private German investors a affected by the tax reform. Nevertheless, we conclude that the magnitude of the abnormal bond return of 0.16 percent is a fairly small effect.

[10] This result depends additionally on the assumptions of an average share return of 4.5 percent and that only shares are considered as alternative investment to bonds.

Table 3: Bonds – Baseline Regressions of Personal Tax Reform Events

		02-Jul-2006	12-Jul-2006	02-Nov-2006	29-Dec-2008
	expectation	(1)	(2)	(3)	(4)
POST	-/+	-0.0205**	-0.0305***	-0.0551***	0.0723**
		(0.0099)	(0.0061)	(0.0114)	(0.0335)
GERMANxPOST	+	-0.0016	0.0558***	0.1544***	-0.013
		(0.0116)	(0.0101)	(0.013)	(0.0342)
Constant		102.7***	102.6***	103.3***	101.5***
		(0.0034)	(0.0042)	(0.0037)	(0.0065)
Observations		10,215	10,215	10,272	10,319
R-squared		0.9999	0.9999	0.9999	0.9998

Notes: Table 3 presents results of OLS bond-fixed effects regressions with *BONDPRICE* as dependent variable. Robust standard errors clustered by firms are shown in parentheses. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

Regarding the change in the treatment of capital gains (*29-Dec-2008*), our result in column 4 of Table 3 does not confirm extraordinary price effects for bonds. The coefficient for German bonds is insignificant. Thus, we are unable to identify a price effect raised by investors who invested in bonds at the end of 2008 to preserve the old tax status under the grandfathering rule. The perception of the upcoming capital gains tax reform is only associated with shares. Bonds are often held to maturity. Therefore, private investors might not consider possible capital gains when investing in bonds but do so when buying shares.

In Table 4 we provide additional analyses considering only those events that have revealed significant effects in our baseline regressions shown in Table 3. The first additional check is depicted in columns 1 and 3 of Table 4. We distinguish between bonds that quote above par (*ABOVEPAR*=1) and bonds quoting below par (*ABOVEPAR*=0). The interaction *GERMANxPOSTxABOVEPAR* is significant for the event of *02-Nov-2006.* Our results support our hypothesis of an additional positive price impact on German bonds carrying a higher net present value of future coupon payments (H4).

In a second analysis we again refer to the expected positive impact of a high net present value of future coupon payments (H4). We consider a variable *MATURITY* which yields the remaining years to maturity for each bond (measured in years). The reasoning behind this analysis is as follows: the longer a bond's maturity, the more coupon payments will be received by the investor under the new beneficial personal tax law. The results are depicted in columns 2 and 4 of Table 4. The interaction term *GERMANxPOSTxMATURITY* is for both events highly significant. The signs of the corresponding coefficients confirm our expectations. Given the sample's mean remaining term to maturity of 7.2 years, the mean price effect for November 2, 2006 was 0.185 (=7.2 * 0.0257). The effect is even higher if the remaining term to maturity is more than 7.2 years.

Table 4: Bonds – Additional Regression Analyses

		12-Jul-2006		02-Nov-2006	
	expectation	(1)	(2)	(3)	(4)
POST		-0.0316***	0.029**	-0.0201	0.122***
		(0.0092)	(0.0122)	(0.0209)	(0.0285)
GERMANxPOST	+	0.0658***	-0.0086	0.108***	-0.0501
		(0.0099)	(0.0247)	(0.0216)	(0.0377)
POSTxABOVEPAR		0.0016		-0.0479	
		(0.013)		(0.0297)	
GERMANxPOSTxABOVEPAR	+	-0.0188		0.0668**	
		(0.0201)		(0.0318)	
POSTxMATURITY			-0.0073***		-0.0218***
			(0.0014)		(0.004)
GERMANxPOSTxMATURITY	+		0.008***		0.0257***
			(0.0026)		(0.0054)
Constant		102.6***	102.6***	103.3***	103.3***
		(0.0042)	(0.0042)	(0.0037)	(0.0036)
Observations		10,215	10,215	10,272	10,272
R-squared		1.000	1.000	1.000	1.000

Notes: Table 4 presents results of OLS bond-fixed effects regressions with *BONDPRICE* as dependent variable. Robust standard errors clustered by firms are shown in parentheses. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

5. Conclusion

We have analyzed whether corporate taxes as well as capital income taxes affect asset pricing. Using an event study design, we consider several announcements about intended tax changes prior to a major tax reform in Germany. As a control group we consider asset prices of other firms or governments from the Economic and Monetary Union (EMU).

Our results suggest that share prices respond only to announcements of significant corporate tax cuts. We find significant abnormal returns of share prices after two precise announcements about a massive reduction of the German corporate tax rate. For additional announcements about different stages of the reform process we are unable to find significant abnormal returns. The economic magnitudes of the price effects are however small. Our results suggest relative cumulated abnormal price changes of less than one percentage point even for an announced tax rate cut of more than 8 percentage points.

Moreover, we have investigated price effects of a massive tax cut on interest income which was also an integral part of the German tax reform. Our results suggest an increase in bond prices. Furthermore, bond prices increase more for those bonds carrying a relatively high value of future coupon payments under the new beneficial tax law. However, economic magnitudes of the obtained results are again small.

Finally, we have analyzed price effects associated with a definite tax change for the tax treatment of capital gains. We find highly significant and economically important abnormal returns for share prices at the end of 2008. Our results suggest significant price effects due to last minute portfolio adjustments just before the new tax treatment became effective. Interestingly, this behavior is not found for bonds that were also affected by the new tax treatment of capital gains.

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Chapter 3

Capital Income Taxes and the Ex-Day Premium – New Evidence from a Cross-Country Analysis

Capital Income Taxes and the Ex-Day Premium – New Evidence from a Cross-Country Analysis

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Abstract:

This paper revisits the influence of capital income taxes on the stock price reduction when a stock goes ex dividend. While previous literature has considered tax reforms in a single capital market, we use a large cross-country sample of 17 countries (G7 countries merged with the EU15 member states). Our results provide evidence for a broad set of capital markets and several tax reforms. The corresponding findings suggest that the ex-day price response is significantly smaller than the dividend paid. Moreover, we find weak evidence that the ratio between dividend taxes and capital gains taxes can explain part of the ex-day premium.

Keywords: Ex-Day Premium, Stock Price Reaction, Capital Income Taxes

We thank the conference participants at the EAA Annual Congress in Maastricht for their comments.

1. Introduction

A compelling approach to investigate how investor level taxes affect firm value is to exploit the share price response to yearly or even quarterly recurring profit distributions of firms via dividend payments. When a stock goes ex-dividend, firm value should fall by exactly the distributed amount. However, the ex-day share price reduction might deviate from the paid dividend if different tax rates apply to dividends and capital gains for the marginal investor. That follows from the fact that an investor can either choose to receive a dividend payment or to realize capital gains and both scenarios should yield the same payoff (cf. Elton and Gruber, 1970).

Though, as most countries impose different capital income tax rates to different investor groups, trading amongst them might eliminate the tax disadvantage of dividend payments and push ex-day price changes back to the amount of the dividend. This might occur because most countries have an investor group which is tax-exempt concerning dividends or capital gains (e.g. incorporated investors or pension funds) and one which is not and, thus, faces the national statutory capital income tax rates (e.g. private investors). Therefore, theory is ambiguous because it suggests in a first step ex-day price drops smaller than the dividend according to a private shareholder's tax rates. However, in a second step, trading amongst different investor groups might eliminate the ex-day premium and lead to ex-day price drops equal to the dividends paid. Hence, this study aims to shed new light on the question if a share's ex-day price change is smaller than the dividend and if it is correlated with the relationship of dividend to capital gains tax rates.

Since the seminal work of Elton and Gruber (1970), most studies find an ex-day price reduction smaller than the dividend payment but they differ in the explanation and the observed magnitude of ex-day downticks.

Several studies find that the tax rate differential between dividend and capital gains taxes, which is usually valid for private investors, is reflected by the ex-day price change of shares (Poterba and Summers, 1984; Michaely and Vila, 1995; McDonald, 2001; Bell and Jenkinson, 2002; Graham, Michaely and Roberts, 2003; Elton, Gruber and Blake, 2005; and for an overview see Graham, 2008). Thus, these studies provide evidence that the marginal share price-setter is not tax exempt and potentially a private investor of the stock corporation's resident country. Adding to that and consistent with the tax argument, Lakonishok and Vermaelen (1986) and Michaely and Vila (1995; 1996) find an abnormal trading volume around ex-days.

Frank and Jagannathan (1998) cast doubt on the tax hypothesis implying that, from their point of view, the ex-day price change is not correlated with the relationship of dividend to capital gains tax rates. They argue that dividends are a nuisance for certain shareholders who sell the stock just before the ex-day to the market maker and rebuy it afterwards. Therefore, the stock's price is on the bid on the cum-day (the last day before the ex-day) and on the next day on the ask, leading to a price drop less than the dividend paid.

Another, different, argument is proposed by Bali and Hite (1998). They argue that the ex-day premium is due to discrete stock prices. That is, earlier, share prices were constrained to be a multiple of discrete ticks but dividends were always continuous. Thus, if dividends per share were not exactly a multiple of discrete ticks, it was impossible that a share's price drop was equal to the dividend payment. Even though this might be a source of explanation for the existence of an ex-day premium, it is somewhat unsatisfying as it can hardly account for the clear evidence of abnormal trading volumes around the ex-day (cf. Michaely and Vila, 1996). Moreover, as we face nowadays continuous stock prices and if their argument was true, we should find an ex-day price change equal to the dividend payment.

However, according to other studies, the ex-day price drop estimated is almost exactly the amount of the dividend (Michaely, 1991; Boyd and Jagannathan, 1994). Thus, following these studies' results, tax-free institutions might be the marginal price-setters and taxable private investors just hold their shares over long periods of time.

Kalay (1982) suggests that ex-day price drops are roughly one and deviations mainly arise because of transaction costs. He estimates ex-day price drops below – but not significantly different from – one.

Therefore, considering ambiguous prior literature results, it is still unclear how share prices react on the ex-day and if there is a correlation with tax rates. Moreover, theoretical considerations do not lead to a clear cut expectation. That is, whether an ex-day price drop equal to or below the dividend payment reflects that the marginal price-setter is tax exempt or not, depends primarily on the assumption about whether trading among tax exempt and taxable investors takes place or not. On the one hand, if only tax exempt investors trade around the ex-day, the ex-day price drop should equal the dividend payment according to arbitrage theory and thus, implies that the marginal investor is tax exempt. On the other hand, if only taxable investors trade around the ex-day, the ex-day price drop should equal the relationship of net tax yields from dividend to capital income. However, if both – tax exempt and taxable – investor groups trade around the ex-day, the share's price change on the ex-day depends completely on the bargaining power of the involved parties. Therefore, to draw any causal conclusions from observed ex-day premiums, it is necessary to exploit a country's tax reforms affecting the relationship of dividend to capital gains tax rates.

All prior studies are conducted in a single country setting and often refer to a single tax reform event.[11] We, however, not only consider a single country but use a large cross-country sample and

[11] For an overview of past empirical studies on the ex-day behavior of shares see Dasilas (2009). He shows that more than half of all empirical ex-day studies examine the US market and overall, these studies are conducted in 15

revisit the ex-day price response of shares. Specifically, we consider share prices and tax rates from 17 countries (G7 countries merged with the EU15 member states[12]) from 2004 through 2013. Thereby, we observe the behavior of firms on over 300,000 ex-days during this period. Moreover, by employing a cross-country analysis we do not only dramatically enlarge our sample but also gain many more tax rate variations available for identification of tax effects on ex-day premiums. Our sample includes 44 variations of the relationship of dividend to capital gains taxes in the sample period. Furthermore, as our estimates of ex-day premiums show (and which are in line with Boyd and Jagannathan (1994)), ex-day premiums vary a lot over time and, thus, are difficult to measure. Thus, it is again very helpful to tackle this empirical challenge with a large cross-country setting to obtain reliable estimates.

For our cross-country sample we find for most countries and years that ex-day premiums are smaller than the dividend paid. Thus, we confirm the aforementioned findings in the financial literature. Moreover, we collect tax rate information and construct expected values for the ex-day share price reduction according to the tax hypothesis. While tax arguments suggest that the ex-day premium is given by the relationship of dividend and capital gains tax rates, we obtain ex-day premiums being smaller as expected. This result does not even change if we apply another set of possible tax rates or if we focus on shares belonging to a country's leading index.

Moreover, our analysis for selected countries around major tax reforms suggests an ambiguous correlation of tax rates and ex-day premiums. However, regression analyses of our sample suggest weak influence of the ratio of dividend and capital gains tax rates on ex-day premiums. These results stay constant when applying different control variables and fixed effects.

different countries (Canada, Chile, China, Finland, Germany, Greece, Hong Kong, Italy, Japan, Oman, Portugal, Spain, Sweden, UK, US). Additionally, note that no other study is designed as a cross-country analysis.

[12] Originally, this would lead to 18 countries but we have to drop observations from Luxembourg due to implausible data.

Our results contribute to the existing literature in several ways. To the best of our knowledge, we are the first to provide such an extensive set of consecutive and cross-country estimates of the ex-day premium. Thus, our results provide evidence for a broad set of important capital markets and capture a substantial number of major tax rate changes. This leaves us with many variations over time to test our tax hypotheses. Moreover, we can separate general time trends from tax rate variation and we make explicit use of our cross-country sample with different regression analyses exploiting many tax rate variations in different countries.

Furthermore, we show new evidence for more recent years. This is important given the ongoing process of globalization over the past decades and keeping in mind that investors consider more and more worldwide investment opportunities.

The remainder of the paper is organized as follows. Section 2 describes the theoretical background and develops hypotheses. Section 3 describes the data and section 4 provides a broad explorative analysis of the ex-day premium in different markets. In Section 5, we analyze the influence of capital income taxes on the ex-day premium using our cross-country sample. Section 6 concludes.

2. Theoretical Background and Development of Hypotheses

The payout policy of a firm in a perfect market does not affect firm value (cf. Miller and Modigliani, 1961). However, when taxes come into play, things become different.

Let us assume, for example, an investor who originally bought a share at the price P_o. Further, assume that P_{cum} is the price on the last day before the share goes ex-dividend and P_{ex} is the ex-dividend stock price. Moreover, we consider an economy with tax exempt investors and taxable (private) investors. The latter face strictly positive tax rates m^d for dividend income and m^{cg} for capital gains income and it holds that: $m^d > m^{cg}$. Next, valid for both types of investors, each investor values the stock on the last day before the share goes ex-dividend and on the ex-dividend day after receiving the dividend payment D. As various papers point out (e.g. Elton and Gruber, 1970; Elton, Gruber and Blake, 2005), the investor is indifferent between dividend and capital gains income if the following equation holds:

$$(1 - m^{cg}) * (P_{cum} - P_o) + P_o = (1 - m^d) * D + (1 - m^{cg}) * (P_{ex} - P_o) + P_o \qquad \textbf{(1)}$$

Herein, the investor is either subject to capital gains tax rate m^{cg} (which is zero for tax exempt investors) selling the share on the last day before it goes ex-dividend or alternatively, the investor is subject to dividend tax rate m^d (which, again, is zero for tax exempt investors) and avoids capital gains taxes on the ex-dividend premium $(P_{ex} - P_{cum})$ (right hand side of the equation). Rearranging terms leads to the well-known formula of the ex-day premium expected by tax arguments:

$$\frac{P_{cum} - P_{ex}}{D} = \frac{1 - m^d}{1 - m^{cg}} \qquad \textbf{(2)}$$

Now, let us assume that *only taxable investors trade around the ex-day*. Then, from (2) it is straightforward to conclude that a firm's payout policy affects firm value. Moreover, in this scenario we expect equation (2) to hold perfectly.

However, if we assume that *only tax exempt investors trade around the ex-day*, we expect an ex-day price change equal to the dividend payment and thus, a firm's payout policy does not affect firm value. Furthermore, we expect the relationship of $\frac{P_{cum}-P_{ex}}{D}$ to be equal to one.

Hence, assuming that *both types of investors trade around the ex-day*, both share price reactions are theoretically plausible. Moreover, the expected share price reaction crucially depends on one more determinant: Which investor group has the bargaining power.

Let us assume, that *tax free investors have all the bargaining power*. To simplify the following calculations, we additionally assume that taxable investors now face $m^{cg} = 0$ which allows us to neglect the notation of capital gains tax effects. This is reasonable as things would remain basically the same if we were to account additionally for capital gains taxes. To evade the unfavorable dividend tax, taxable investors sell their shares on the cum-day to tax exempt investors. On the next day, tax exempt investors sell the shares back to the former taxable owner. As tax exempt investors completely dominate the bargaining process, taxable investors sell at the price P_{cum} and buy back at the price $P_{cum} - (1 - m^d) * D$. Thus, they remain at their unfavorable tax position as their capital gain equals the net dividend payment: $P_{cum} - [P_{cum} - (1 - m^d) * D] = (1 - m^d) * D$. However, tax exempt investors realize a capital gain from tax arbitrage: $-P_{cum} + D + [P_{cum} - (1 - m^d) * D] = m^d * D$. In this scenario, the ex-day price changes by $(1 - m^d) * D$ and we expect the equation of (2) to hold. Note, that all tax rates refer to those of taxable investors. Furthermore, following tax arguments, it is implausible to expect that tax exempt investors are selling their shares on the cum-day to taxable investors and buy them back on the ex-day. This way, they would suffer a capital loss because they had to compensate the taxable investors for their relatively higher dividend tax rate compared to their capital gains tax rate.

Now, we assume that *taxable investors have all the bargaining* power. The direction of trade due to tax arguments is again from taxable investors to tax exempt investors on the cum-day and vice versa on the ex-day. Taxable investors are selling at the price P_{cum} and buying back on the ex-day at the price $P_{cum} - D$. This way, they improve their tax status and are left with the gross amount of the dividend payment: $P_{cum} - [P_{cum} - D] = D$. In this scenario, tax exempt investors remain indifferent without any profit or loss due to: $-P_{cum} + D + [P_{cum} - D] = 0$. Moreover, this time, ex-day prices change by the gross amount of the dividend and we expect the relationship $\frac{P_{cum}-P_{ex}}{D}$ to be equal to one.

Now, summing up, one should consider that the explanations in the last paragraphs are corner solutions. Nevertheless, they show that empirical ex-day premiums equal to one or equal to the relationship shown in (2) cannot be directly linked to a convincing tax story. However, when we think of a bargaining process which does not lead to corner solutions, we are able to introduce the following hypothesis:

H1: *If dividends are subject to a higher (lower) tax rate than capital gains, share prices should fall by less (more) than the amount of the dividend on the ex-day.*

To be more precise, the extreme cases described above show the lower and upper boundary for the ex-day price changes according to tax arguments. Therefore, we expect the ex-day price change to be less than the dividend payment but higher than the net dividend for taxable, private investors. In terms of the relationship $\frac{P_{cum}-P_{ex}}{D}$, this leads to our second hypothesis:

H2: *The ex-day premium should be in the interval of* $\left(\frac{1-\mathrm{m^d}}{1-\mathrm{m^{cg}}}; 1\right)$ *if the dividend tax rate is higher than the capital gains tax rate and otherwise in the interval of* $\left(1; \frac{1-m^d}{1-m^{cg}}\right)$.

3. Data Sample

3.1 Capital Market Data

We analyze stock price reactions around dividend dates using a broad sample of firms from 17 countries. Specifically, we consider the G7 and EU15 countries which are listed in Table 1. Due to implausible stock price data, we drop Luxembourg in all our analyses. We consider firm-level data for 10 years, i.e. from January 2004 until December 2013.

We collect stock prices and information about dividend payments from *Compustat* and *Compustat Global.* Share prices are daily closing prices from Monday to Friday each week in the considered period. For additional analyses, we identify shares that belong to the leading stock index constituents' lists provided by *Compustat.*[13]

Our initial sample includes more than 300,000 observations of dividend payments by more than 18,000 firms. Table 1 depicts the distribution of our sample across capital markets. Most observations are from the US, Japan, Canada and the UK.

We use information on stock prices and dividend payments to compute adjusted ex-day premiums in accordance with the literature (e.g. Kalay, 1982; Elton, Gruber and Blake, 2005). Basically, the ex-day premium is given by the difference between the stock price on the last day before the dividend payments, P_{cum}, and the price when the share goes ex dividend P_{ex}. The premium is normalized by the dividend amount *D*. As the opening price on the ex-day is biased because of pure book adjustments, it is common to use closing prices. Moreover, it is necessary to adjust the closing price for general market movements on the ex-day. We consider information of the leading stock index taken from *Datastream.* A detailed calculation of the ex-day premium is provided in the Appendix.

[13] For the index of Ireland there is no constituent information available.

Table 1 – Capital Market Data Summary

	# Firms	# Obs.
Austria	92	505
Belgium	148	980
Canada	1,534	40,916
Denmark	158	785
Finland	130	916
France	685	4,114
Germany	730	3,593
Greece	278	1,320
Ireland	95	1,501
Italy	272	1,502
Japan	4,143	44,027
Netherlands	185	1,396
Portugal	41	236
Spain	156	1,789
Sweden	318	1,591
United Kingdom	1,966	21,194
US	7,266	173,864
Total	18,197	300,229

Notes: Table 1 presents the number of firms and the number of ex-day premium observations per country for the whole sample from 2004 – 2013.

3.2 Tax Rate Data

As we are interested in a potential influence of capital income taxes on the ex-day premium, we collect information about the tax systems applied in our 17 considered countries. In particular, we collect personal tax rates applied to dividends and capital gains for each year during the period from 2004 until 2013. Table 2 lists dividend tax rates and capital gains tax rates for each country in 2013.

The personal tax rates used in this study are collected from the European Tax Handbook, KPMG Individual Income Tax Rate Survey, PricewaterhouseCoopers Worldwide Individual Tax Summaries and Ernst and Young Worldwide Personal Tax Guide.

For reasons of consistency, we consider only personal tax rates according to the highest personal income tax bracket in countries where no flat tax on capital income applies. Additionally, if a country imposes different tax rates for dividends or capital gains according to how long the investor is holding the share, we, for most of our analyses, assume that the investor is entitled for the long term tax rates.

Although we are aware of the fact that shares are owned by a variety of national and international shareholders facing different dividend and capital gains tax rates, we believe the national benchmark $\frac{1-m^d}{1-m^{cg}}$ to be most compelling because earlier studies have found a significant home-bias of investment for shares (French and Poterba, 1991; Mondria and Wu, 2010). Accordingly, we assume that each country's private shareholders account for a large part of investment in their own country.

We employ the information about capital income taxation and calculate the term $\frac{1-m^d}{1-m^{cg}}$ in accordance with expression (2). As outlined in Section 2, this term reflects the potential tax effect on the ex-day premium. Table 2 provides values for the ratio $\frac{1-m^d}{1-m^{cg}}$ in 2013.

Moreover, Table 2 shows that personal dividend and capital gains tax rates differ across the 17 sample countries. Dividend taxes range between 10% (Greece) and 42% (Denmark) and capital gains taxes between 0% (Austria, Netherlands) and 42% (Denmark). However, the value $\frac{1-m^d}{1-m^{cg}}$ for the ex-day premium is sometimes equal to one because some countries in our sample apply the same tax rate to dividend and capital gains income. The highest ex-day premium in 2013 is expected for Finland and Ireland ($1.14 * Div$), while we expect the ex-day premium to be lowest in Austria and the Netherlands ($0.75 * Div$).

During the whole sample period and across all countries, there are 70 tax rate variations (41 changes in dividend taxes; 29 changes in capital gains taxes). As some countries change tax rates

for both dividends and capital gains by the same factor, the tax rate variations lead to 44 changes in $\frac{1-m^d}{1-m^{cg}}$ available for identification.

Table 2 – Tax Rates 2013

	m^d	m^{cg}	$\frac{1-m^d}{1-m^{cg}}$
Austria	0.25	0.00	0.75
Belgium	0.25	0.33	1.12
Canada	0.36	0.25	0.85
Denmark	0.42	0.42	1.00
Finland	0.22	0.32	1.14
France	0.37	0.30	0.90
Germany	0.26	0.26	1.00
Greece	0.10	0.20	1.13
Ireland	0.20	0.30	1.14
Italy	0.20	0.20	1.00
Japan	0.10	0.10	1.00
Netherlands	0.25	0.00	0.75
Portugal	0.28	0.28	1.00
Spain	0.21	0.21	1.00
Sweden	0.30	0.30	1.00
United Kingdom	0.31	0.28	0.96
US	0.20	0.15	0.94

Notes: Table 2 shows personal dividend and capital gains tax rates for each country in 2013.

Accounting for the fact that some countries tax income from capital at different tax rates according to how long the investor is holding a given share, we additionally calculate an alternative value for expression (2). The values obtained assume that the investor is holding shares only for a very short time and, thus, he is not entitled for the beneficial long term tax rates. However, we only refer to these alternative tax rates in additional analyses.

3.3 Firm-Level and Country-Level Controls

Our firm-level control variables are also obtained from *Compustat* and *Compustat Global*. We consider annual accounting data for our controls and, thus, we merge accounting information of year *t* to security information of year *t+1*. Although some accounting information gets out to the capital market over the year, it is only after the publication of the financial statement that the capital market gets fully renewed insight into the firm's accountancy. This results in consecutive accounting data for the years of 2003 to 2012 for all 17 countries.

The country-level control variables used in this study stem from *The World Bank*. We employ the time series data sets of *World Development Indicators* for the years of 2004 to 2013. That is, as opposed to accounting data, we link a country's economic parameters of year *t* to security information of year *t*. The ratio behind this simultaneous linkage is that, following the efficient market hypothesis, share prices are directly influenced by the economic development during the year.

4. Explorative Analysis

4.1 Overview on Ex-Day Premiums

In this subsection, we provide an explorative analysis of our cross–country sample. In order to avoid a biased analysis, we exclude extreme outliers. More precisely, we eliminate observations in the first and last percentile of the ex-day premium distribution.

Table 3 shows mean values of the ex-day premium for each country and year during our research period. It depicts that ex-day premiums vary a lot over time and across countries. Moreover, the mean values suggest – for most country-year observations – that the price of a share does not decrease by the full amount of the dividend.

This finding also confirms previous results in empirical finance literature. For example, for the US in 2004, we find a mean ex-day premium of 0.85. Elton and Gruber (1970) find, for stocks listed on the New York Stock Exchange in the years 1966 – 1967, an ex-day premium of 0.79. Kalay (1982) rebuilds the study of Elton and Gruber and indicates an ex-day premium of 0.82. For the period 1997 – 2001 Elton, Gruber and Blake (2005) find an ex-day premium of 0.89 for closed-end funds in the US and Canada.

Table 3: Ex-Day Premiums 2004 – 2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	**0.30**	**0.45**	**0.53**	0.64	0.43	0.78	**0.29**	**0.59**	**0.51**	0.66
Belgium	0.75	**0.59**	**0.74**	**0.60**	**0.53**	**0.25**	**0.45**	**0.43**	0.83	0.78
Canada	**0.84**	**0.62**	**0.75**	**0.70**	**0.56**	**0.74**	**0.70**	**0.52**	**0.75**	1.02
Denmark	0.79	0.74	**0.65**	**0.19**	0.71	0.90	**0.61**	**0.22**	0.72	0.82
Finland	**3.75**	0.94	0.97	**0.81**	**0.63**	**0.30**	**0.81**	0.90	**0.69**	**0.78**
France	1.01	**0.74**	**0.83**	**0.81**	**0.69**	**0.73**	**0.72**	**0.83**	**0.76**	**0.79**
Germany	**0.57**	**0.67**	0.82	**0.73**	**0.65**	**0.65**	**0.61**	**0.73**	0.87	0.91
Greece	**0.39**	**0.64**	**0.68**	**0.55**	**0.58**	**0.42**	**0.61**	**0.61**	**0.59**	**0.21**
Ireland	**0.54**	1.33	**0.46**	0.88	**-0.02**	**0.34**	**0.47**	0.99	**0.66**	**0.69**
Italy	0.74	**0.44**	1.07	**0.46**	**0.20**	**0.33**	**0.57**	**0.73**	**0.64**	**0.37**
Japan	**1.43**	**1.42**	0.95	**0.90**	0.94	0.94	**0.62**	**0.44**	**0.67**	**0.85**
Netherlands	1.03	0.91	0.99	**0.77**	0.78	0.82	**0.80**	0.83	0.92	**0.68**
Portugal	0.60	**0.41**	1.16	**0.56**	0.94	**0.46**	**0.51**	**0.36**	**0.47**	**0.66**
Spain	**0.72**	1.07	1.05	0.78	0.86	0.78	**0.76**	**0.77**	0.85	**0.54**
Sweden	1.33	1.09	0.86	**0.61**	**0.69**	**0.68**	**0.62**	0.87	0.87	**0.69**
United Kingdom	1.02	**1.22**	1.04	1.00	**0.65**	**0.86**	**0.66**	**0.63**	**0.69**	**0.77**
US	**0.85**	0.97	**0.88**	**0.95**	**1.06**	**1.13**	1.02	**0.93**	**0.92**	0.97

Notes: Table 3 shows the mean of the ex-day premium for all firm-level observations. The data for the lowest and highest percentile is excluded. The parametric test performed is a (one-sided) *t*-test with a null hypothesis of the form: $\frac{P_{cum}-\widehat{P_{ex}}}{D} = 1$. Bold numbers indicate that the mean is significantly different from one at the level of 5%.

In addition, we test if ex-day premiums do significantly differ from one, i.e. the ex-day price response differs from the dividend payment. We use a simple one-sided *t*-test having the null hypothesis: $\frac{P_{cum}-\widehat{P_{ex}}}{D} = 1$ (following Graham, Michaely and Roberts, 2003). Bold numbers in Table 3 indicate that the mean ex-day premium differs from one at a significance level of 5%. We conclude from Table 3 that the mean ex-day premium is significantly smaller than one for most countries and years at the level of 5%.

Moreover, Table 3 shows that estimated ex-day premiums in the considered countries do vary significantly across countries and across time. However, each bold number indicates that the ex-day price change is probably lower than the dividend payment. Generally, it should be noted that

sampling such a huge cross-country data set underlies some shortcomings. The most important is that, even though data is collected as carefully as possible, there remains a potential bias in the estimated ex-day premiums as the daily share prices cannot be securely checked. That is, we control share prices and dividend payments for each country by samples from other data sources and sometimes find for each different data source a different closing day price and/or a different dividend payment. Nevertheless, we aim to control for these issues by dropping extreme outliers and even whole countries (Luxembourg) when the estimated ex-day premiums seem to be completely implausible.

4.2 Overview on Deviations from Theory

As outlined in Section 2, capital income taxes might explain that ex-day premiums differ from – and are in general smaller than – the dividend payment. We therefore compare observed ex-day premiums $\frac{P_{cum}-\widehat{P_{ex}}}{D}$ with the tax term $\frac{1-m^d}{1-m^{cg}}$ reflecting the tax influence on the ex-day premium. For each observation we compute the difference $\frac{P_{cum}-\widehat{P_{ex}}}{D}-\frac{1-m^d}{1-m^{cg}}$.

If the tax incentive is fully capitalized into the ex-day premium, we expect a zero mean value for $\frac{P_{cum}-\widehat{P_{ex}}}{D}-\frac{1-m^d}{1-m^{cg}}$. However, according to *H2* of Section 2, we expect an ex-day premium in the interval of $\left(\frac{1-m^d}{1-m^{cg}};1\right)$ for all countries where private shareholders face $\frac{1-m^d}{1-m^{cg}}<1$ and an ex-day premium in the interval of $\left(1;\frac{1-m^d}{1-m^{cg}}\right)$ for countries where private shareholders face $\frac{1-m^d}{1-m^{cg}}>1$. Yet, the latter case is only true for Belgium (2004 – 2013), Finland (2004 – 2013), Greece (2013), Ireland (2009 – 2013) and the United Kingdom (2004 – 2007).

Table 4 shows mean values for $\frac{P_{cum}-\widehat{P_{ex}}}{D}-\frac{1-m^d}{1-m^{cg}}$ for all considered capital markets and years. Moreover, we again employ simple *t*-tests using the null hypothesis $\frac{P_{cum}-\widehat{P_{ex}}}{D}-\frac{1-m^d}{1-m^{cg}}=0$. Bold values in Table 4 indicate that mean values are different from zero at the 5% level.

Table 4 – Ex-Day Premiums Adjusted By Tax Rates 2004 – 2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	**-0.45**	-0.30	-0.22	-0.11	-0.32	0.03	**-0.46**	-0.16	**-0.24**	-0.09
Belgium	**-0.52**	**-0.53**	**-0.38**	**-0.52**	**-0.59**	**-0.87**	**-0.82**	**-0.84**	**-0.44**	-0.34
Canada	-0.05	**-0.27**	**-0.24**	**-0.28**	**-0.44**	**-0.20**	**-0.18**	**-0.35**	**-0.10**	**0.17**
Denmark	-0.21	-0.26	**-0.35**	**-0.81**	-0.29	-0.10	**-0.39**	**-0.78**	-0.28	-0.18
Finland	**2.34**	**-0.23**	-0.15	**-0.31**	**-0.48**	**-0.82**	**-0.30**	-0.21	**-0.45**	**-0.36**
France	0.12	**-0.19**	-0.10	-0.11	**-0.27**	**-0.27**	**-0.25**	**-0.13**	**-0.21**	-0.11
Germany	**-0.19**	-0.10	0.04	-0.03	-0.12	**-0.35**	**-0.39**	**-0.27**	-0.13	-0.09
Greece	**-0.61**	**-0.36**	**-0.32**	**-0.45**	**-0.42**	**-0.48**	**-0.39**	-0.22	-0.20	**-0.91**
Ireland	-0.19	**0.61**	-0.26	0.14	**-0.76**	**-0.68**	**-0.60**	-0.07	**-0.48**	**-0.45**
Italy	-0.26	**-0.56**	0.07	**-0.54**	**-0.80**	**-0.67**	**-0.43**	**-0.27**	**-0.36**	**-0.63**
Japan	**0.43**	**0.42**	-0.05	**-0.10**	-0.06	-0.06	**-0.38**	**-0.56**	**-0.33**	**-0.15**
Netherlands	0.28	0.16	**0.24**	-0.01	0.03	0.07	0.05	0.08	0.17	-0.07
Portugal	-0.20	**-0.39**	0.36	-0.24	0.14	**-0.43**	-0.38	**-0.62**	**-0.53**	**-0.34**
Spain	-0.18	0.16	0.14	-0.22	-0.14	-0.22	**-0.24**	**-0.23**	-0.15	**-0.46**
Sweden	0.33	0.09	-0.14	**-0.39**	**-0.31**	**-0.32**	**-0.38**	-0.13	-0.13	**-0.31**
United Kingdom	**-0.23**	-0.03	**-0.21**	**-0.25**	**-0.27**	-0.06	**-0.12**	**-0.26**	**-0.20**	**-0.20**
US	**-0.15**	-0.03	**-0.12**	**-0.05**	**0.06**	**0.13**	0.02	**-0.07**	**-0.08**	0.03

Notes: Table 4 shows the mean of the value: $\frac{P_{cum}-\widehat{P_{ex}}}{D}-\frac{1-m^d}{1-m^{cg}}$ for each country and year over the whole sample period (2004 – 2013). The data for the lowest and highest percentile is excluded. The parametric test performed is a (one-sided) *t*-test with a null hypothesis of the form: $\frac{P_{cum}-\widehat{P_{ex}}}{D}-\frac{1-m^d}{1-m^{cg}}=0$. Bold numbers indicate that the mean is significantly different from zero at the level of 5%.

Table 4 shows that we cannot reject the null of a mean value of zero for several capital markets and years, i.e. all non-bold numbers. This finding is in accordance with the expectation that the tax rate differential between dividend taxes and taxes on capital gains determines the ex-day premium. It thus might support *H1* and *H2*.

However, Table 4 also shows that in many country-year cells (93) the ex-day premium is significantly smaller than expected. Even though, the negative outcome is reasonable for countries whose private shareholders face $\frac{1-m^d}{1-m^{cg}} > 1$ (for example in Belgium and Finland), it is definitely not in line with *H2* for countries like Canada, Denmark, France, Italy and the US.

While our findings suggest that taxes might influence the ex-day premium, our results also indicate that there is at least another unobserved mechanism leading to ex-day price reductions below the dividend paid. Moreover, as many results are even significantly below zero, we cannot confirm *H2*.

One might argue that in Table 4 many firms are considered which are not in an active investor's focus. Therefore, they are potentially often just held in a portfolio without any intentions to trade. However, untabulated results where only firms of a country's leading index are considered show a similar tableau as Table 4. Indeed, the number of ex-day premiums being significantly smaller than the one expected from theory decreases by 32 but still, there remain 61 significantly smaller results for the ex-day price drop. That is, a lower level of trading volume or a less internationally renowned firm is not a conclusive explanation for the results shown.

4.3 Overview on an Alternative Theoretical Explanation

A major objection to the theory that ex-day price drops should be determined by each firm's resident country's personal tax rates is that a firm's shareholders are heterogeneous in their tax status and thus, in their applicable personal tax rates. As we assume foreign investors to be resident in a country which has concluded a double tax treaty with the firm's resident country, we employ in the following the usual treaty tax rate on dividends and capital gains in the formula $\frac{1-m^d}{1-m^{cg}}$ to obtain another proxy for the firms' shareholder tax rates. As representative tax rates for all

concluded double tax treaties we consult the OECD's model tax convention which reveals a treaty tax rate of 15 percent for dividends and 0 percent for capital gains.[14]

The following Table 5 shows the results for the changed null hypothesis of the one-sided *t*-test: $\frac{P_{cum}-\widehat{P_{ex}}}{D} - 0.85 = 0$ (bold numbers indicate a significant difference from zero).

Table 5 – Ex-Day Premiums Adjusted By Treaty Tax Rates

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	**-0.55**	-0.40	**-0.32**	-0.21	-0.42	-0.07	**-0.56**	-0.26	**-0.34**	-0.19
Belgium	-0.10	**-0.26**	-0.11	**-0.25**	**-0.32**	**-0.60**	**-0.40**	**-0.42**	-0.02	-0.07
Canada	-0.01	**-0.23**	**-0.10**	**-0.15**	**-0.29**	**-0.11**	**-0.15**	**-0.33**	**-0.10**	**0.17**
Denmark	-0.06	-0.11	-0.20	**-0.66**	-0.14	0.05	-0.24	**-0.63**	-0.13	-0.03
Finland	**2.90**	0.09	0.12	-0.04	-0.22	**-0.55**	-0.04	0.05	**-0.16**	-0.07
France	0.16	-0.11	-0.02	-0.04	**-0.16**	**-0.12**	**-0.13**	-0.02	**-0.09**	-0.06
Germany	**-0.28**	**-0.18**	-0.03	-0.12	**-0.20**	**-0.20**	**-0.24**	**-0.12**	0.02	0.06
Greece	**-0.46**	**-0.21**	-0.17	**-0.30**	-0.27	**-0.43**	-0.24	-0.24	**-0.26**	**-0.64**
Ireland	**-0.31**	**0.48**	-0.39	0.03	**-0.87**	**-0.51**	**-0.38**	0.14	-0.19	-0.16
Italy	-0.11	**-0.41**	**0.22**	**-0.39**	**-0.65**	**-0.52**	**-0.28**	**-0.12**	**-0.21**	**-0.48**
Japan	**0.58**	**0.57**	**0.10**	0.05	**0.09**	**0.09**	**-0.23**	**-0.41**	**-0.18**	0.00
Netherlands	0.18	0.06	0.14	-0.08	-0.07	-0.03	-0.05	-0.02	0.07	**-0.17**
Portugal	-0.25	**-0.44**	0.31	**-0.29**	0.09	**-0.39**	-0.34	**-0.49**	**-0.38**	-0.19
Spain	-0.13	0.22	0.20	-0.07	0.01	-0.07	-0.09	-0.08	0.00	-0.31
Sweden	0.48	**0.24**	0.01	**-0.24**	**-0.16**	-0.17	**-0.23**	0.02	0.02	-0.16
United Kingdom	**0.17**	**0.37**	**0.19**	**0.15**	**-0.20**	0.01	**-0.19**	**-0.22**	**-0.16**	**-0.08**
US	0.00	**0.12**	0.03	**0.10**	**0.21**	**0.28**	**0.17**	**0.08**	**0.07**	**0.12**

Notes: Table 5 shows the mean of the value: $\frac{P_{cum}-\widehat{P_{ex}}}{D} - 0.85$ for each country and year over the whole sample period (2004 – 2013). The data for the lowest and highest percentile is excluded. The parametric test performed is a (one-sided) *t*-test with a null hypothesis of the form: $\frac{P_{cum}-\widehat{P_{ex}}}{D} - 0.85 = 0$. Bold numbers indicate that the mean is significantly different from zero at the level of 5%.

Table 5 reveals that, again, only few countries (e.g. Denmark, Finland and Netherlands) show ex-day premiums being not significantly different from the expected value according to the tax

[14] This dividend tax rate applies to shareholders which do not hold an influential stock of a given share. The capital gains tax rate assumes that in the shareholder's resident country these foreign capital gains are not subject to tax which is usually the case for incorporated foreign investors.

rates from tax treaties. Most of the countries still show ex-day price drops which are significantly less than those which are expected. Although the total number of country-year observations decreases (now 67) compared to Table 4, treaty tax rates constitute an unsatisfying explanation for the ex-day price behavior of shares.

However, the analysis provided in Tables 4 and 5 is not completely contradictory to theory. The tax rate differential between dividend taxes and taxes on capital gains might explain part of the ex-day premium. Nevertheless, without exploiting tax rate variations we are not able to disentangle possible time trends from the estimated ex-day premiums. Moreover, as non-bold values do not reveal much insight whether the observed ex-day premium is equal to $\frac{1-m^d}{1-m^{cg}}$ or in the expected interval – according to *H2* – of $\left(\frac{1-m^d}{1-m^{cg}}; 1\right)$, another empirical approach is needed to get more insight in the correlation of ex-day premiums and the relationship of $\frac{1-m^d}{1-m^{cg}}$. We will therefore provide additional analyses in Section 5 to obtain evidence for the influence of capital income taxes on the ex-day premium.

5. Analysis of Treatment Effects

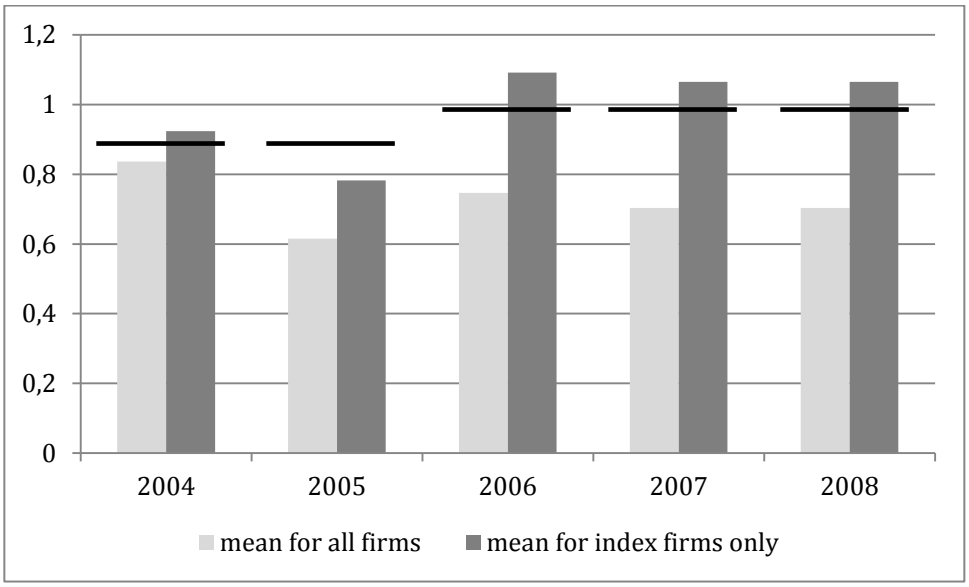
5.1 Explorative Analysis of Selected Tax Reforms

Identification of an impact of capital income taxes on the ex-day premium crucially depends on within country variation of the ratio between the tax rates applied to dividends and capital gains.

In order to get a deeper insight if and how taxes affect share prices around ex-days, we show, in the following, how ex-day premiums change around major tax rate variations across countries and years. For our 17 considered countries, we identify 44 changes in the tax ratio $\frac{1-m^d}{1-m^{cg}}$ during our sample period from 2004 – 2013.

In a first step, we examine three tax changes: in Canada in 2006, in Germany in 2009 and in the United Kingdom in 2008. Each tax reform was associated with a substantial variation of $\frac{1-m^d}{1-m^{cg}}$ for private shareholders. Figure 1 depicts ex-day premiums of Canadian firms during a five-year period around the tax rate change in 2006. The light gray bar includes all Canadian firms, the gray bar includes only firms belonging to the country's leading index while the black bar depicts the expected ex-day premium according to the ratio $\frac{1-m^d}{1-m^{cg}}$.

Figure 1 – Canada: Tax Reform in 2006



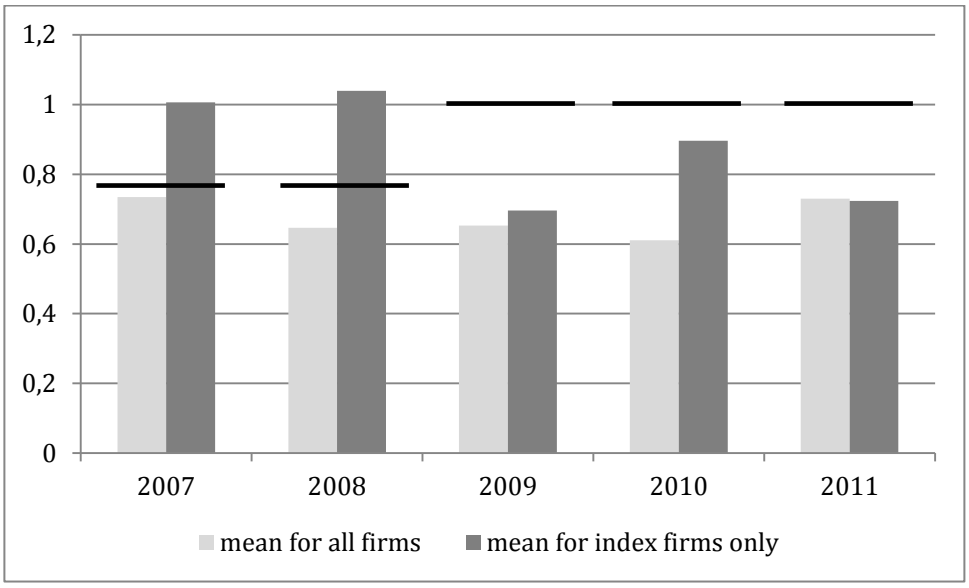
Notes: Figure 1 shows ex-day premiums for Canadian firms. Light gray bars depict mean values for the ex-day premium $\frac{P_{cum}-\widehat{P_{ex}}}{D}$ for all Canadian firms in our sample; the gray bars depict mean values for the ex-day premium of firms belonging to TSX Composite Index. Black lines depict the expected ex-day premium according to the ratio $\frac{1-m^d}{1-m^{cg}}$.

Due to a significant cut of the Canadian dividend tax[15], the expected ex-day premium, according to $\frac{1-m^d}{1-m^{cg}}$, increased in 2006 from 0.887 to 0.985. The expected ex-day premium by theory is shown for each year as a horizontal black line in all Figures 1-3. Figure 1 suggests that the mean ex-day premium for Canadian firms belonging to the leading Canadian stock index increased simultaneously from just below 0.8 to almost 1.1. The development of the mean ex-day premium for all Canadian firms is however less pronounced.

Figure 2 examines ex-day premiums surrounding a major tax reform in Germany in 2009. The tax reform increased dramatically the capital gains tax rate from 0% (2008) to 26% (2009). Thus, the expected ex-day premium according to $\frac{1-m^d}{1-m^{cg}}$ increased from 0.763 (2008) to 1.0 (2009).

[15] In 2006, the dividend tax rate decreased from 32% (2005) to 24.4% (2006).

Figure 2 – Germany: Tax Reform in 2009

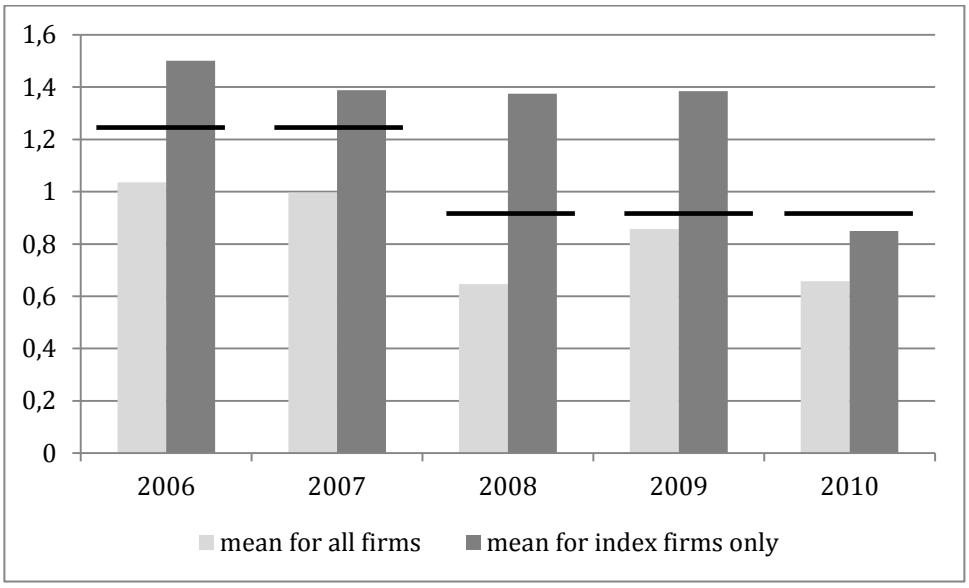


Notes: Figure 2 shows ex-day premiums for German firms. Light gray bars depict mean values for the ex-day premium $\frac{P_{cum}-\widehat{P_{ex}}}{D}$ for all German firms in our sample; the gray bars depict mean values for the ex-day premium of firms belonging to the DAX. Black lines depict the expected ex-day premium according to the ratio $\frac{1-m^d}{1-m^{cg}}$.

Figure 2 does not support the view that ex-day premiums respond to the changing tax environment in Germany. Interestingly, observed ex-day premiums fell from over 1.0 to about 0.7 for firms belonging to the DAX index and remains almost constant considering all German firms in our sample.

Figure 3 depicts ex-day premiums surrounding the UK tax reform in 2008. The tax reform includes a substantial cut in the capital gains tax rate of 22 percentage points. Consequently, the expected ex-day premium according to $\frac{1-m^d}{1-m^{cg}}$ decreased from 1.23 (2007) to 0.92 (2008). This strong decrease in the theoretically expected ex-day premium is only reflected by the development of the ex-day premiums of all firms while the index firms' ex-day premiums remain almost unaffected. The mean ex-day premium of all UK firms, however, decreased by almost 40 percentage points from 1.0 in 2007 to approximately 0.6 in 2008.

Figure 3 – United Kingdom: Tax Reform in 2008



Notes: Figure 3 shows ex-day premiums for UK firms. Light gray bars depict mean values for the ex-day premium $\frac{P_{cum}-\widehat{P_{ex}}}{D}$ for all UK firms in our sample; the gray bars depict mean values for the ex-day premium of firms belonging to the FTSE. Black lines depict the expected ex-day premium according to the ratio $\frac{1-m^d}{1-m^{cg}}$.

Given the examination of selected tax reforms, we cannot draw a clear-cut conclusion whether a variation in the tax ratio $\frac{1-m^d}{1-m^{cg}}$ affects ex-day premiums. Moreover, confounding unobserved time effects might hide the correlation of tax reform effects on ex-day premiums. Therefore, we exploit our cross-country sample in the following to run panel regressions.

5.2 Empirical Analysis of Tax Reforms

Baseline Regression

We are interested in a potential tax effect on the ex-day premium $\frac{P_{cum}-\widehat{P_{ex}}}{D}$ of stock *i* in year *t*. We estimate models of the following type:

$$\frac{P_{cum}-\widehat{P_{ex}}}{D}_{it} = \alpha_0 + \beta_1 \frac{1-m^d}{1-m^{cg}}_{it} + \theta_t + \gamma_i + \varepsilon_{it} \qquad \textbf{(3)}$$

Our cross-country sample allows identification of a marginal effect for the tax ratio $\frac{1-m^d}{1-m^{cg}}$ while controlling for unobserved time fixed effects θ_t. Moreover, we control either for country or firm fixed effects γ_i. ε_{it} is a zero mean disturbance term. We stick to this simple regression design for our baseline regression because adding control variables can lead to significant results for the coefficient of interest without any economic cause. Therefore, this specification lacks – despite fixed effects – any control variables.

The regression results are presented in Table 6. The variable of interest, the tax ratio $\frac{1-m^d}{1-m^{cg}}$, varies for our identification only within country-year cells. Note, that we employ in columns (3) and (4) an alternative tax ratio $\frac{1-m^d}{1-m^{cg}}$. This is due to the fact that some countries have different tax rates (m^d and m^{cg}) according to how long the personal investor is holding a selected share. Moreover, Moulton (1990) and Bertrand, Duflo and Mullainathan (2004) show that the presence of a common random effect at the country-year level has to be taken into account. Thus, we use a variance-covariance matrix allowing for random group effects by clustering in country cells. While we control for country fixed effects in columns (1) and (3), we consider firm fixed effects in columns (2) and (4).[16]

[16] Note that firm-fixed effects nest country-fixed effects.

Table 6 – Baseline Regression

	(1)	(2)	(3)	(4)
THEORETICAL_CUM_EX_DIFF	0.6465*	0.4934*		
	(0.3187)	(0.2546)		
THEORETICAL_CUM_EX_DIFF (Alt.)			0.5997	0.4344
			(0.3757)	(0.3155)
Year Fixed Effects	√	√	√	√
Country Fixed Effects	√		√	
Firm Fixed Effects		√		√
Observations	294,237	294,237	294,237	294,237
Adjusted R-squared	0.0017	0.0514	0.0017	0.0514

Notes: Table 6 presents OLS regression results. The dependent variable is $\frac{P_{cum}-\widehat{P_{ex}}}{D}$ and data for the lowest and highest percentile is excluded. Columns (3) and (4) show coefficient estimates for alternative national tax rates of m^d and m^{cg}. Robust standard errors clustered in country cells are shown in parentheses. A star depicts significance at the 10% level.

In columns (1) and (2), both specifications reveal a positive impact of the tax ratio $\frac{1-m^d}{1-m^{cg}}$ on observed ex-day premiums. The effects are, however, only weakly significant. Our alternative measure of the tax ratio $\frac{1-m^d}{1-m^{cg}}$ in columns (3) and (4) reveals no significant results. Therefore, we conclude that the ex-day price drop is better explained by the capital income tax rates from long term investors.

Hence, Table 6 provides weak evidence that taxes do play a role when determining ex-day premiums. The magnitudes of the point estimates suggest that only part of the variation is absorbed by tax arbitrage. For example, the point estimator in column (2) indicates that 50% of an exogenous variation in $\frac{1-m^d}{1-m^{cg}}$ is reflected by ex-day price changes. Admittedly, as Table 6 has no specific country- or firm-level control variables, there might exist an omitted variable bias.

Country- and Firm-Level Controls Regression

In the following, we employ two vectors of country- and firm-level control variables to account for a possible omitted variable bias. Our country-level control variables are the growth of GDP, inflation, logarithm of GDP per capita and the logarithm of the total market capitalization of all listed firms. All information is directly taken from *The World Bank* except our calculation of logarithms of the corresponding data.

The vector of firm-level control variables is built-up by the logarithm of total assets, the logarithm of the net amount of sales and the logarithm of *Tobin's Q*. The latter is calculated in the following way: We add the firm's debt liabilities to the firm's value at the end of the year and divide this amount by the firm's total assets. All variables are measured in US dollars.

As there is no prior literature standard to build on, we select control variables in this study by taking into account that we have year and country or firm fixed effects in our regressions. Therefore, we implement known control variables from finance and accounting literature which are likely to change significantly over time. Otherwise, we cannot improve our baseline regression because country or firm specific control variables that do not change (much) over time are likely to result in (nearly) perfect collinearity with our fixed effects dummy variables.

The following Table 7 shows results of our baseline regression extended by country- and firm-level control variables:

Table 7 – Country- and Firm-Level Controls Regression

	(1)	(2)	(3)	(4)
THEORETICAL_CUM_EX_DIFF	0.4488**	0.3729*	0.3602	0.3422
	(0.1985)	(0.1911)	(0.3119)	(0.2908)
Country-Level Controls	√	√	√	√
Firm-Level Controls	√	√	√	√
Year Fixed Effects	√	√	√	√
Country Fixed Effects		√		√
Firm Fixed Effects	√		√	
Industry Fixed Effects		√		√
Observations	58,098	58,087	58,098	58,087
Adjusted R-squared	0.0882	0.0093	0.0882	0.0093

Notes: Table 7 presents OLS regression results. The dependent variable is $\frac{P_{cum}-\widehat{P_{ex}}}{D}$ and data for the lowest and highest percentile is excluded. Robust standard errors clustered in country cells are shown in parentheses. *, and ** show significance at the levels of 10 %, and 5 %, respectively.

Table 7 still shows weakly positive significant point estimates for the tax ratio $\frac{1-m^d}{1-m^{cg}}$ on observed ex-day premiums. Compared to our baseline regression with firm fixed effects, the magnitude of the coefficients only slightly decreased by 0.0232 and 0.0908. Again, the results reveal weak evidence for ex-day premiums being affected by a country's tax ratio of $\frac{1-m^d}{1-m^{cg}}$ but leave a large part unexplained. Thus, even with several additional control variables we cannot show that ex-day premiums are highly affected by an exogenous variation of the relationship $\frac{1-m^d}{1-m^{cg}}$. For reasons of completeness, we show in columns (3) and (4) again the results for the alternative theoretical expectation of $\frac{1-m^d}{1-m^{cg}}$ (valid for short term holding periods). However, as already revealed in Table 6, we do find a positive but not significant coefficient.

6. Conclusion

We revisit the influence of capital income taxes on the stock price reduction when a stock goes ex dividend. We use a large cross-country sample and analyze whether ex-day premiums are affected if different tax rates apply to dividend and capital gains.

An explorative analysis provides striking results that the stock price reduction on the ex-day is smaller than the dividend amount paid. Further tests support the view that capital income taxes affect the ex-day premium. For several countries and years, ex-day premiums do not significantly differ from the expected value for the ex-day premium according to the ratio between the tax rates applied to dividends and capital gains. However, for almost half of the considered countries and years, the ex-day premium is not only significantly smaller than the dividend paid but also smaller than the value determined by capital income taxes. We therefore conclude that some additional unobserved factors affect ex-day premiums.

In additional analyses, we employ within-country and cross-country variation in the ratio of income tax rates applied to dividends and capital gains for identification. Our large sample of almost 300,000 ex-dividend observations from 17 capital markets also allows controlling for unobserved common time effects. The regression results reveal weak evidence that capital income taxes affect the ex-day premium. To this extent, our findings confirm previous evidence derived from tax reforms in single country studies. Furthermore, the results in this study suggest that taxes matter for firm valuation and that the marginal investor in shares around the ex-day is not tax-exempt. Additionally, this study's evidence suggests that changes of capital income taxes and in a firm's distribution policy affect firm value.

However, the results shown in this paper also point out that taxes do affect firm value less than what is expected by theory and found in prior literature. Even more important, we do not find a conclusive explanation for the very low observed ex-day price drops of shares although we have

run different *t*-test and OLS regression specifications. Therefore, we highly appreciate future research to this topic.

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Appendix

Calculating the Ex-Day Premium

We denote daily closing prices on the cum- and ex-day for each share as P_{cum} and P_{ex}. Then, we account for market movements on the ex-day by discounting each share's ex-day return by its expected return:

$$\widehat{P_{ex}} = \frac{P_{ex}}{1+E[r_{i,ex}]} \qquad \textbf{(A.1)}$$

Expected return is obtained by estimating each share's correlation with the market portfolio over a period of 100 working days, ending 6 days before the share's ex-day. Thereby, we use the market model which gives us the following equation to be estimated:

$$r_{i,t} = \alpha_i + \beta_i * r_{m,t} + \varepsilon_{it} \qquad \textbf{(A.2)}$$

The variables represent the daily return ($r_{i,t}$) of share *i* and the daily return of the market portfolio ($r_{m,t}$). ε_{it} is a zero mean disturbance term. The daily market portfolio is represented by each country's leading index. With the estimated coefficients of α_i and β_i for each share, we calculate the expected return on the ex-day with the observed market return on each share's ex-day:

$$E[r_{i,ex}] = \alpha_i + \beta_i * r_{m,ex} \qquad \textbf{(A.3)}$$

Thereafter, we are able to compute the adjusted ex-day premium for each share: $\frac{P_{cum}-\widehat{P_{ex}}}{D}$.

Chapter 4

Corporate Tax Planning and the Payout Ratio of Firms – Is the Dividend Penalty Linked to ETRs?

Corporate Tax Planning and the Payout Ratio of Firms – Is the Dividend Penalty Linked to ETRs?

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Abstract:

This study investigates whether firms being highly engaged in corporate tax planning react more sensitive to an exogenous variation of the relationship between personal dividend and capital gains tax rates than firms which are less engaged in corporate tax planning. We compile a large cross-country data set from 18 countries (G7 merged with the EU15 member states) over ten years with several tax rate variations. Our findings confirm prior research by showing that a firm's payout decreases if dividends are more heavily taxed than capital gains. However, applying a wide range of different measures for corporate tax planning behavior, we cannot identify significant differences in payout policy between those firms being more engaged in tax planning and other firms as reaction to the relationship of dividend to capital gains taxation.

Keywords: Corporate Tax Planning, Effective Tax Rate, Capital Income Taxes

We thank the participants of the joint Doctoral Research Seminar with FU Berlin in Cologne 2016 for their comments.

1. Introduction

Prior research extensively investigates all facets of corporate tax avoidance a firm uses to reduce its overall tax bill. Besides the scientific debate, the general public has drawn considerably attention to aggressive tax avoidance of multinational entities (MNEs) recently. The debate has been stimulated by very low effective tax rates (ETRs) disclosed in consolidated financial statements of well-known firms. For example, according to its 10-k filings, Google Inc. paid only $2,598 billion taxes on its worldwide profits in 2012, resulting in an ETR of 19.4 %.[17] As statutory tax rates on corporate income are mostly higher than 19 % in most industrialized countries, Google's ETR does not reflect common expectations about the tax level imposed.

Therefore, one may conclude that taxes have become more and more important for firms and the general public. The recent debate primarily focuses on corporate taxes. However, as a big party of the debate – the public – consists of potential investors, the discussion should consequently also take the investor's personal tax burden into account. In most countries corporate earnings are not only reduced by taxation at the corporate's level, but also at the investor's level in terms of capital income taxes. As all involved parties nowadays seem to be more sensitive to corporate tax burdens, we wonder whether firms being highly engaged in corporate tax planning react stronger to a country's tax law change regarding the relationship of personal dividend to capital gains taxation than other firms. The ratio behind this research question is given by the fact that a firm's management on the one hand influences the intensity of the firm's corporate tax planning (cf. Graham, Hanlon, Shevlin and Shroff, 2014) and on the other hand also decides about the amount of cash which is distributed to its shareholders via dividend payments where according to Brav, Graham, Campbell and Michaely (2005) personal shareholder taxation has an impact.

[17] https://www.sec.gov/Archives/edgar/data/1288776/000119312513028362/d452134d10k.htm#toc1452134_9.

Having this link between firms' ETRs and their payout policies in mind, it is straightforward to investigate whether dividend tax planning comes along with or follows corporate tax planning. Moreover, a deeper understanding of firms' personal tax planning behaviors also might lead to a more distinct view of a management's impact on the tax planning policy. Thereby, it might lighten the consequences of a tax rate variation regarding dividend or capital gains taxation for dividend payout in a given country.

We compile a large cross-country data set from 18 countries (G7 and the EU15 member states)[18] over ten years (from 2004 through 2013) in this study. Considering this research design, we are left with 49 variations of the relationship of dividend to capital gains tax rates and about 70,000 firm-year observations. This allows us to capture the effect of many changes in the relationship of dividend to capital gains taxation and therefrom to see whether corporate tax sensitive firms react stronger to these changes. However, our findings only show – in accordance with Jacob and Jacob (2013) – a general negative effect of the relationship of dividend to capital gains tax rates on firm payout. Thus, employing various different measures for corporate tax sensitivity, we do not identify any significant deviation from the average effect.

We contribute to the existing literature in several ways. First, we provide additional evidence and confirm prior literature findings. Firms consider existing differences in personal tax rates for dividends and capital gains when they choose the amount of dividends paid to their shareholders (Brav et al., 2005; Chetty and Saez, 2005, 2006; Brown, Liang and Weisbenner, 2007; Jacob and Jacob, 2013). Accordingly, the often met dividend tax penalty[19] in a country affects all dividend paying firms. This emphasizes the importance of the relationship of dividend to capital gains tax

[18] Table 1 lists the corresponding 18 countries.
[19] The term dividend tax penalty was first introduced by Poterba and Summers (1984). It implicates a tax system in which the personal dividend tax rate is higher than the personal capital gains tax rate. Thus, dividends exhibit a "tax penalty".

rates for all firms. Second, we provide several tests whether firms being relatively more engaged in corporate tax planning do react more sensitive to their investors' personal taxation when determining their level of payout. Our contribution ties on prior literature's surveys which indicate that a firm's management influences both corporate tax planning and the level of dividend payments where personal tax rates do play a role (Brav et al., 2005; Graham et al., 2014). However, the results of this paper indicate that a firm's sensitivity for its shareholders' personal tax burden does not necessarily go hand in hand with its corporate tax planning attitude.

The remainder of the paper is organized as follows. Section 2 presents prior literature and outlines the theoretical framework. Section 3 describes the methodology, identification strategy and the data used in this study. In Section 4, we depict our results and section 5 concludes.

2. Theoretical Considerations

2.1. Prior Literature

The question whether the way private shareholders are taxed affects a corporate's payout policy, is linked to different empirical finance literature's strands (for an overview see Allen and Michaely, 2003). To dedicate oneself to this question, it is important to know the tax status of a firm's investors.[20] More specifically, it is of interest whether an investor is tax-exempt or not. Although empirical findings are not unambiguous, strong evidence for investors not being fully tax-exempt exists (Michaely and Vila, 1995; Dhaliwal, Erickson and Trezevant, 1999; Graham, 2008) and therefore personal capital income taxation has an impact for a private investor receiving a MNE's payout.

[20] For reasons of simplicity and following equilibrium arguments, we consider all investors of a given firm as marginal investors in this study. For a discussion whether to speak of investors or of a specific marginal investor in this context, cf. Guenther and Sansing (2010), p. 850.

Prior literature identifies that the difference in taxation of dividends and capital gains is reflected in firms' payout policies (Chetty and Saez, 2005, 2006; Brown, Liang and Weisbenner, 2007; Jacob and Jacob, 2013). Additionally, a survey of Brav et al. (2005) reveals that a firm's management cares about its shareholders' personal tax burden. Moreover, prior research finds that rather firms than investors react to changes in dividend and capital gains taxation (Korkeamaki, Liljeblom and Pasternack, 2010). As financial executives generally classify share repurchases and dividends as equally attractive for most investors (Brav et al., 2005), a top executive paying attention to shareholders' tax burden should react sensitive to changes in the proportion of dividend to capital gains tax rates. Hence, a firm's dividend payout ratio should change accordingly.

Considering a firm's own tax bill, it is well known that firms engage in different types of tax planning to lower their corporate tax burden (for an overview see Hanlon and Heitzman, 2010). A broad literature has already analyzed different tax planning strategies used by MNEs to reduce their overall tax bill. MNEs exploit international tax rate differentials by means of transfer pricing for intra-firm sales and intra-firm royalties (Clausing, 2003; Karkinsky and Riedel, 2012; Griffith, Miller and O'Connell, 2014) as well as subsidiaries located in tax havens or other low-tax countries (Hines and Rice, 1994; Desai, Foley and Hines, 2006; Huizinga and Laeven, 2006; Klassen and LaPlante, 2012a, 2012b; Blouin, Robinson and Seidman, 2015).

Adding to this, prior literature not only reveals channels used for profit-shifting, but also shows ample evidence that the level a firm engages in corporate tax planning depends on individual top executives. For example, Dyreng, Hanlon and Maydew (2010) find that individual top executives have a decisive influence on firms' ETR measures that cannot be explained by firm characteristics. More specifically, they identify a difference of approximately 11 percent in effective tax rates between the top and the bottom quartiles of executives. Moreover, Graham et al. (2014) find in a survey that answers from 600 corporate tax executives are pointing towards firms'

managements being highly interested in corporate tax planning. Besides reducing a firm's overall tax burden, from a management's point of view, corporate tax planning is seen as a source to increase earnings per share (Graham, Campbell and Rajgopal, 2005; Graham et al., 2014).

Even though prior literature shows ample evidence executives conduct corporate tax planning as well as personal tax planning, so far – to the best of our knowledge – no study has analyzed whether at a firm's high engagement in corporate tax planning is associated with a particularly high sensitivity to personal capital income taxation. Put differently, this study analyzes whether a management being highly engaged in corporate tax planning is also committed to reduce the personal tax bill of its investors.

2.2. Theoretical Framework

The relationship of dividend to capital gains taxation is important for a firm's payout policy, because investors face the following simple trade-off game: An investor can either receive a dividend payment of a firm while just holding the stock in his portfolio around the ex-day or sell the stock one day before the ex-day cum dividend and rebuy it the next day when the stock trades ex dividend. The investor receives the dividend amount in cash and finally owns the corresponding stock in both scenarios, yet the tax rate for each scenario might differ. The reason for this is that in the first case the dividend tax rate is applicable whereas in the second case the capital gains tax rate is applicable. Hence, if a firm's investor is not fully tax-exempt, he should not be indifferent between receiving the same amount of cash via dividend payments or via capital gains. An investor should rather prefer the alternative which yields a lower tax burden. Therefore, firms should adapt their payout policy to private tax rate changes for dividends or capital gains, if they care about their shareholders' tax burden. Thus, they should react to the given dividend tax penalty.

Beyond that, a management survey from Brav et al. (2005) reveals that personal tax rates for dividend and capital gains matter for the determination of a firm's level of payout dedicated to dividend payments. Moreover, a study from Desai and Jin (2011) uses a sample of institutional shareholders which are heterogeneous in their tax characteristics to analyze whether firms adapt their payout policy due to exogenous tax changes. They find convincing evidence that firms adjust their payout policy in these cases.

As already outlined in section 2.1, existing studies show some firms engage in corporate tax planning while others do not (Weisbach, 2002). Prior literature results clearly show that the (top) management cares noticeably about the amount of corporate taxes paid (Dyreng, Hanlon and Maydew, 2010; Graham et al., 2014). Accordingly, the level of corporate tax avoidance depends on the individual managers' preferences and behavior.

Linking these findings to those of Brav et al. (2005) mentioned above, we conclude that a firm's management not only cares about its corporate tax burden, but also considers its shareholder's personal tax payments. Therefore, if a firm's management is relatively more involved in reducing its corporate tax burden, we suggest that it is also more engaged in reducing their shareholders' tax bills.

3. Research Design

3.1. Empirical Model

In this study, we employ an OLS regression with industry-year and firm fixed-effects. Our dependent variable is firm i's dividend yield at time *t+1* (*DIVYIELD*). We use *DIVYIELD* at time *t+1*, because the *t+1* year's dividend payment is usually linked to the accounting results of year *t*. Hence, we employ the following difference-in-differences approach to explain our dependent variable *DIVYIELD*:

$$DIVYIELD_{i,t+1} = \alpha_0 + \alpha_1 PENALTY_{i,t+1} + \alpha_2 PENALTY_{i,t+1} x\, TAXPL_i + \alpha_3 LEV_{i,t} + \alpha_4 SALES_{i,t} + \alpha_5 TOBINSQ_{i,t} + \alpha_6 EBITDA_{i,t} + \alpha_7 CASH_{i,t} + \alpha_8 SIZE_{i,t} + \alpha_9 GDP_{i,t} + j_{s,t} + \gamma_i + \varepsilon_{i,t} \quad (1)$$

PENALTY is defined as a simplified version of the dividend penalty introduced by Poterba and Summers (1984), which is reduced in this paper to $PENALTY_{i,t} = \frac{m^d{}_{i,t} - m^{cg}{}_{i,t}}{(1 - m^{cg}{}_{i,t})}$. It varies across countries and time as m^d and m^{cg} are the corresponding personal dividend and personal capital gains tax rates for year *t* according to firm *i*'s resident country. We believe this measure to be appropriate, because it reflects the relationship of personal dividend and capital gains tax rates in a rather intuitive way as it is negative if $m^d < m^{cg}$ (or positive if $m^d > m^{cg}$) and thus, its coefficient α_1 is easy to interpret. We use this measure as a proxy for the firms' shareholders' tax rates. Certainly, we recognize that shares are owned by several types of national and international shareholders facing different dividend and capital gains tax rates. However, we believe this benchmark to be most compelling, because earlier studies have found a significant home-bias of investment in shares (French and Poterba, 1991; Mondria and Wu, 2010). Accordingly, we assume that each country's private shareholders account for a large part of investment in their own country. Consequently, we expect α_1 to be negative and statistically significant, if firms care on average about their investors' personal tax burden.

Our coefficient of interest is α_2 of the interaction term *PENALTY x TAXPL*. *TAXPL* is a dummy variable that equals one for firms that are considered as caring more about their corporate tax burden than other firms and zero, if this is not the case. Thus, the coefficient α_2 captures the specific effect of a country's dividend penalty for corporate tax sensitive firms on firm payout. Accordingly, if those firms caring more about their corporate tax burden also care more intense about their shareholders' tax burden, we expect α_2 to be negative and statistically significant.

Corporate tax planning literature has implemented a huge variety of proxies to measure firms' engagement in corporate tax planning. Therefore, this paper follows different, well-established strategies to measure a firm's tax planning behavior and hence to define *TAXPL*.

One of the most popular ways to assess a firm's tax planning activity is the use of its ETR which can be calculated in different ways (cf. Hanlon and Heitzman, 2010). ETR measures are considered as being volatile on a year-to-year basis, but using ETRs of more than one fiscal year is considered as a good measure for a firm's long-term tax planning behavior (Dyreng, Hanlon and Maydew, 2008; Hanlon and Heitzman, 2010). Therefore, we start our analysis by applying 10-year averages of *GAAP ETR* and *GAAP ETR Current* to separate the calculated averages into two groups for the definition of *TAXPL*.

In our second approach, we draw on a convincing measure developed by Balakrishnan, Blouin and Guay (2012). They assess a firm's engagement in corporate tax planning by comparing its ETR with the average ETR of its size and industry peers. Once again, we separate the resulting ETR difference for all firms into two groups to define our dummy variable *TAXPL*.

Finally, an even more sophisticated approach to identify a firm's level of corporate tax planning is to run a pre-regression of a firm's ETR on different firm-level variables that are linked to corporate tax planning opportunities. Afterwards the actual level of tax planning is benchmarked by using the residuals of this pre-regression. This procedure follows the assumption that leaving variables being associated with aggressive tax avoidance out of the pre-regression shapes the resulting residuals in such a way that one can easily select those firms which are more likely to be engaged in corporate tax planning (cf. Wooldridge, 2009: p. 31).

Other studies show that certain firm characteristics are associated with tax avoidance. Especially a firm's affiliation to industries which are known as being more likely engaged in corporate tax planning than other industries are commonly used characteristics. This is usually

expressed by scaled research and development expenditures (Harris, 1993; Grubert, 2003) or dummy variables that account for a firm's affiliation to industries that typically generate the most profits from intellectual property (De Simone, Mills and Stomberg, 2014). Therefore, we assume that a firm's engagement in corporate tax planning and thus our *TAXPL* variable can be defined using these characteristics.

Introduced by prior literature (Jensen, 1986; La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1997; Allen, Bernardo and Welch, 2000; Denis and Osobov, 2008; Skinner 2008; Jacob and Jacob, 2013), the independent variables *LEV*, *SALES*, *TOBINSQ*, *EBITDA*, *CASH*, *SIZE* and *GDP* represent firm-level or country-level control variables which potentially determine a firm's dividend yield. Their definitions are all explained in appendix 1. Additionally, to prevent the influence of outliers, we omit observations of our independent variable that are not within the 1st and the 99th percentile of observations. The terms $j_{s,t}$ and γ_i represent industry-year and firm-fixed effects whereas $\varepsilon_{i,t}$ is a zero mean disturbance term. Robust standard errors are clustered by country.

3.2. Data Description

As we are interested in a potential influence of the relationship of personal dividend taxation to capital gains taxation on the payout policy of firms which are heterogeneous in their intensity of corporate tax avoidance, we collect information about the personal dividend and capital gains tax rates applied in the 18 considered countries (G7 merged with the EU15 member states). In particular, we collect these tax rates for each year during the period from 2004 until 2013. For reasons of consistency, we consider only personal tax rates according to the highest personal income tax bracket for countries where no flat tax on capital income applies. The personal tax rates used in this study are carefully collected from the European Tax Handbook, KPMG Individual

Income Tax Rate Survey, PricewaterhouseCoopers Worldwide Individual Tax Summaries and Ernst and Young Worldwide Personal Tax Guide. Table 1 lists dividend tax rates and capital gains tax rates for each country in 2013.

Table 1: Personal Capital Income Tax Rates 2013

Country	m^d	m^{cg}
Austria	0.25	0.00
Belgium	0.25	0.33
Canada	0.36	0.25
Denmark	0.42	0.42
Finland	0.22	0.32
France	0.37	0.30
Germany	0.26	0.26
Greece	0.10	0.20
Ireland	0.20	0.30
Italy	0.20	0.20
Japan	0.10	0.10
Luxembourg	0.22	0.44
Netherlands	0.25	0.00
Portugal	0.28	0.28
Spain	0.21	0.21
Sweden	0.30	0.30
United Kingdom	0.31	0.28
United States	0.20	0.15

Notes: Table 1 shows personal dividend (m^d) and capital gains (m^{cg}) tax rates for each country in 2013.

Accounting data, dividend information and stock prices used in this study are collected from *Compustat* and *Compustat Global.* All share prices are daily closing prices from Monday to Friday

each week in the considered period.[21] The corresponding accounting information belongs to each firm's prior fiscal year end, i.e. firm *i*'s dividend and stock price information of the year 2010 is linked to its accounting information of December 31, 2009 when its fiscal year corresponds with the calendar year.

Our final sample consists of 72,623 firm-year observations. It includes 13,106 distinct firms located in 18 distinct countries. Table 2 presents summary statistics for our dependent and independent variables of equation (1).

Table 2: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	25th Percentile	75th Percentile
DIVYIELD	72,623	0.0192	0.0210	0.0000	0.0286
PENALTY	72,623	0.0096	0.0875	0.0000	0.0000
LEV	72,623	0.1973	0.1676	0.0492	0.3073
SALES	72,623	0.2959	0.5057	0.0196	0.4096
TOBINSQ	72,623	1.1009	0.9099	0.5319	1.3420
EBITDA	72,623	0.1136	0.0696	0.0644	0.1498
CASH	72,623	0.1121	0.1110	0.0291	0.1582
SIZE	72,623	6.3767	1.8265	5.0637	7.5441
GDP	72,623	29.1916	1.0933	28.6105	30.2032

Notes: Table 2 shows descriptive statistics for all variables included in equation (1). Variables are defined in appendix 1.

[21] However, if a given daily share price information stems from a feast day in the corresponding country, the price information actually reflects the price from the last trading day.

4. Results

4.1. Measuring Corporate Tax Planning Affinity by ETRs

Average ETR Measures

In a first step, we use the most intuitive way to define our dummy variable *TAXPL* by using the averages of our ETR measures *GAAP ETR* and *GAAP ETR Current* between 2003 and 2012.[22] Prior research shows that firms usually sustain their tax position over time (Guenther, Matsunaga and Williams, 2013). However, ETR measures are considered as being volatile. As we are interested in a firm's general stance on tax planning, we smooth our ETRs by their 10-year average. Table 3 reports summary statistics for our average *GAAP ETR* and average *GAAP ETR Current* by firm. The total number of observations varies accordingly to missing values for *GAAP* or *GAAP ETR Current* information. Furthermore, our results face no sample selection bias, because all coefficient estimates are of similar magnitude across all specifications.

Table 3: Average ETR Measures – Summary Statistics

Variable	Obs.	Mean	Std. Dev.	25^{th} Percentile	75^{th} Percentile
GAAP ETR	12,403	0.3331	0.1304	0.2632	0.4057
GAAP ETR Current	9,761	0.3039	0.1534	0.2033	0.4003

Notes: Table 3 shows descriptive statistics for our 10-year average ETR measures by firm. Variables are defined in appendix 1.

Table 3 shows a 10-year average *GAAP ETR* (*GAAP ETR Current*) of all sample firms of 33.31 (30.39) percent and reasonable values for the lowest and the highest quartile.

The next table shows our first regression results. In Column (1) our interaction term *PENALTY x TAXPL* is not included. Thereby, column (1) depicts that our coefficient estimates are in line with prior literature. In particular, the sign and magnitude of all control variables which are

[22] Note that in some cases the ETR measure is not provided by *Compustat* for some of the years in our sample period. In these cases, we use the average of the years provided by *Compustat*.

significantly different from zero is reasonable. In columns (2) – (5) we include our interaction term and define *TAXPL* in two different ways: In columns (2) and (4) of table 4 *TAXPL* is equal to one for all firms that have an average ETR measure that belongs to the lowest 5 percentiles and zero otherwise. In columns (3) and (5) we use the lowest 25 percentiles instead. The used ETR measures are *GAAP ETR Current* (columns (2) and (3) of table 4) and *GAAP ETR* (columns (4) and (5) of table 4). All specifications are augmented with industry-year and firm fixed-effects. Robust standard errors are clustered by country.

Table 4: Low Average ETR Measures – Regression Results

	(1)	(2)	(3)	(4)	(5)
PENALTY	-0.0091**	-0.0100**	-0.0087**	-0.0090**	-0.0092**
	(0.0040)	(0.0035)	(0.0035)	(0.0039)	(0.0033)
PENALTY x TAXPL		0.0010	-0.0051	-0.0247	-0.0005
		(0.0149)	(0.0041)	(0.0179)	(0.0068)
LEV	-0.0087*	-0.0099**	-0.0099**	-0.0098**	-0.0098**
	(0.0041)	(0.0040)	(0.0040)	(0.0038)	(0.0038)
SALES	0.0002	0.00001	0.00002	0.0001	0.0001
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
TOBINSQ	-0.0017**	-0.0017**	-0.0017**	-0.0018**	-0.0018**
	(0.0006)	(0.0007)	(0.0007)	(0.0006)	(0.0006)
EBITDA	0.0227	0.0208	0.0209	0.0224	0.0224
	(0.0130)	(0.0128)	(0.0129)	(0.0131)	(0.0131)
CASH	0.0055**	0.0054*	0.0055*	0.0052*	0.0052*
	(0.0025)	(0.0028)	(0.0028)	(0.0025)	(0.0025)
SIZE	0.0023*	0.0023	0.0023	0.0020	0.0020
	(0.0012)	(0.0015)	(0.0015)	(0.0014)	(0.0014)
GDP	-0.0004	0.0009	0.0009	-0.0001	-0.0002
	(0.0036)	(0.0051)	(0.0050)	(0.0038)	(0.0038)
CONSTANT	0.0175	-0.0216	-0.0216	0.0089	0.0108
	(0.1030)	(0.1450)	(0.1440)	(0.1090)	(0.1070)
Industry-Year FE	√	√	√	√	√
Firm FE	√	√	√	√	√
N	72,623	58,504	58,504	66,025	66,025
R^2	0.710	0.681	0.681	0.698	0.697

Notes: Table 4 shows results of OLS fixed-effects regressions with *DIVYIELD* as dependent variable. The definition of *TAXPL* differs in columns (2)-(5). The *TAXPL* dummy is one for all firms whose average 10-year *GAAP ETR Current* is equal to or below the 5th (column (2)) or 25th (column (3)) percentile. The *TAXPL* dummy is one for all firms whose average 10-year *GAAP ETR* is equal to or below the 5th (column (4)) or 25th (column (5)) percentile. Robust standard errors clustered by country are shown in parentheses. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

As all columns of table 4 show a clearly negative coefficient for *PENALTY*, we confirm the results of prior research who found that a positive increase of *PENALTY* reduces the dividend yield of firms in the corresponding country, i.e. on average firms react to more unfavorable dividend taxation by reducing their payout. Moreover, the magnitude of our effect is reasonable and in line with prior literature. Given an assumed increase of 0.1 for *PENALTY*[23] and our sample's mean average *DIVYIELD* of 0.0192, from column (1) follows a relative change of dividend yield of -4.6 percent or a decrease of 0.0009 in *DIVYIELD*.[24] The results for *PENALTY* are robust in columns (2) to (5) as neither the coefficients nor the level of significance do distinctly vary.

Considering our research question, the interaction term of *PENALTY x TAXPL* does not show any significance at all. Thus, we cannot conclude from table 4 a particularly stronger effect of *PENALTY* for firms being more engaged in corporate tax planning. Consequently, we cannot affirm that if a firm's management cares relatively more about its corporate taxes, it is also more engaged in reducing their shareholders' tax bills.

The coefficients of our other control variables are in line with our expectations and economically reasonable. Similar to prior literature, we find a statistically significant and negative influence of *TOBINSQ* and *LEV* (Jensen, 1986; Allen, Bernardo and Welch, 2000) as well as a positive influence of *SIZE* and *CASH* (Denis and Osobov, 2008; Skinner, 2008).

Deviation from Size and Industry Peers

In the following, we identify firms as being relatively more engaged in corporate tax planning through their ETRs' deviation from their size and industry peers' ETR. Thereby, we follow an

[23] For example, an increase of 0.1 in *PENALTY* would result, if a tax system which primarily taxed dividends at a 10 percent rate changed to a tax rate of 20 percent without taxing capital gains at all.
[24] Assuming the same *PENALTY* increase of 0.1, the corresponding coefficient and average dividend yield of Jacob and Jacob (2013) leads to an average decrease in a firm's dividend yield of 6.2 percent.

approach introduced by Balakrishnan, Blouin and Guay (2012). We calculate each firm's deviation from its corresponding peer group's ETR with the subsequent routine:

For each firm we gather a benchmark portfolio of firms which either belong to the same industry or are in the same quintile of firm size measured by total assets. Afterwards, we calculate the mean ETR of all firms belonging to this benchmark portfolio. In a next step, we subtract each firm's ETR measure from the respective average portfolio ETR.

Finally, we consider the resulting difference to define our dummy variable *TAXPL*. It is equal to one if the difference belongs to the highest 5 percentiles (columns (1) and (3) of table 5) or the highest quartile (columns (2) and (4) of table 5) and zero otherwise. Once again, the ETR measures used in this calculation are the 10-year average *GAAP ETR* and the 10-year average *GAAP ETR Current*. Besides the changed definition for *TAXPL*, we do not change any other detail in our regression. Table 5 shows the corresponding results:

Table 5: ETR Deviation from Size and Industry Peers – Regression Results

	(1)	(2)	(3)	(4)
PENALTY	-0.0120	-0.0145*	-0.0076	-0.0083*
	(0.0088)	(0.0074)	(0.0065)	(0.0046)
PENALTY x TAXPL	0.0003	0.0006	-0.0002	-0.0002
	(0.0014)	(0.0013)	(0.0012)	(0.0009)
LEV	-0.0099**	-0.0099**	-0.0098**	-0.0098**
	(0.0040)	(0.0040)	(0.0038)	(0.0038)
SALES	0.00001	0.0001	0.0001	0.0001
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
TOBINSQ	-0.0017**	-0.0017**	-0.0018**	-0.0018**
	(0.0007)	(0.0007)	(0.0006)	(0.0006)
EBITDA	0.0208	0.0208	0.0224	0.0224
	(0.0128)	(0.0128)	(0.0131)	(0.0131)
CASH	0.0054*	0.0054*	0.0052*	0.0052*
	(0.0028)	(0.0028)	(0.0025)	(0.0025)
SIZE	0.0023	0.0023	0.0020	0.0020
	(0.0015)	(0.0014)	(0.0014)	(0.0014)
GDP	0.0009	0.0009	-0.0002	-0.0002
	(0.0051)	(0.0051)	(0.0038)	(0.0038)
CONSTANT	-0.0216	-0.0220	0.0112	0.0110
	(0.1450)	(0.1450)	(0.0108)	(0.0108)
Industry-Year FE	√	√	√	√
Firm FE	√	√	√	√
N	58,504	58,504	66,025	66,025
R^2	0.681	0.681	0.697	0.697

Notes: Table 5 shows results of OLS fixed-effects regressions with *DIVYIELD* as dependent variable. The definition of *TAXPL* differs in all columns. The *TAXPL* dummy is one for all firms whose 10-year average *GAAP ETR Current* difference from its size and industry peers' is equal to or above the 75th (column (1)) or 95th (column (2)) percentile. In columns (3) and (4) the similar definition for TAXPL is applied with the 10-year average GAAP ETR as measure for a firm's tax planning affinity. Robust standard errors clustered by country are shown in parentheses. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

In line with prior literature and the prior results of this paper, table 5 depicts a negative and, in columns (2) and (4), also a significant effect of *PENALTY*.[25] Once again we do not find any significant results for our interaction term *PENALTY x TAXPL*. Hence, we again identify a negative effect of a discriminating dividend tax relative to a country's capital gains taxation. However, our results do not reveal a particularly stronger negative effect for firms which we declare through our *TAXPL* dummy to be relatively more engaged in corporate tax planning.

Pre-Regressions

In the last approach using the ETR measures to identify firms being more concerned about their corporate tax burden, we use an OLS (pre-)regression with the respective ETR as dependent variable. We include only general firm characteristics influencing a firm's ETR measure that are not considered as being part of aggressive tax planning as independent variables in our equation (2)[26]:

$$ETR_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 CAPINT_{i,t} + \beta_3 LEV_{i,t} + \beta_4 ROA_{i,t} + j_{s,t} + w_i + u_{i,t} \quad (2)$$

Therefore, this regression leaves the aggressive part of tax planning unexplained. In other words, firms with low (i.e. negative) predicted residuals are more involved in additional tax planning than firms with higher residuals.[27] As we are specifically interested in tax aggressive firms

[25] However, the fact that *PENALTY* is not significantly negative in columns (1) and (3) of table 5 only shows that *PENALTY* and the interaction term *PENALTY x TAXPL* are correlated in such a way that considering both of them as independent variables reduces the significance of both terms.

[26] Note that we cannot consider tax loss carry forward as independent variable for non-U.S. firms, because *Compustat Global* does not provide this variable. Therefore, even though we consider an existing tax loss carry forward as an explanatory independent variable without being linked to aggressive corporate tax planning, we do not include it in our regression for consistency reasons.

[27] Summary Statistics for the variables used for the OLS regression of equation (2) are reported in appendix 2. The respective OLS regression results can be found in appendix 3.

and prior research shows that firms usually sustain their tax position over time (Guenther, Matsunaga and Williams, 2013), we identify these firms as those having an average residual in our sample period lower than or equal to the 5th percentile (columns (1) and (3) of table 6) or the 25th percentile (columns (2) and (4) of table 6). For these firms our dummy variable *TAXPL* is defined as one whereas it is zero for all other firms in our sample. In columns (1) and (2) *GAAP ETR Current* is used as dependent variable for the regression of equation (2) whereas *GAAP ETR* is used in columns (3) and (4). All other independent variables (*SIZE*, *CAPINT*, *LEV* and *ROA*) are explained in appendix 1. The terms $j_{s,t}$ and w_i represent industry-year and firm-fixed effects, respectively. $u_{i,t}$ is a zero mean disturbance term.

Table 6: Pre-Regression Approach – Regression Results

	(1)	(2)	(3)	(4)
PENALTY	-0.0099**	-0.0108***	-0.0089*	-0.0111***
	(0.0039)	(0.0036)	(0.0044)	(0.0037)
PENALTY x TAXPL	-0.0022	0.0045	-0.0088	0.0045
	(0.0077)	(0.0030)	(0.0087)	(0.0026)
LEV	-0.0099**	-0.0099**	-0.0098**	-0.0098**
	(0.0040)	(0.0040)	(0.0038)	(0.0038)
SALES	0.0000	0.0000	0.0001	0.0001
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
TOBINSQ	-0.0017**	-0.0017**	-0.0018**	-0.0018**
	(0.0007)	(0.0007)	(0.0006)	(0.0006)
EBITDA	0.0208	0.0208	0.0224	0.0223
	(0.0128)	(0.0128)	(0.0131)	(0.0131)
CASH	0.00543*	0.0054*	0.0052*	0.0052*
	(0.0028)	(0.0028)	(0.0025)	(0.0025)
SIZE	0.0023	0.0023	0.0020	0.0020
	(0.0015)	(0.0015)	(0.0014)	(0.0014)
GDP	0.0009	0.0008	-0.0002	-0.0001
	(0.0050)	(0.0050)	(0.0038)	(0.0038)
CONSTANT	-0.0216	-0.0196	0.0107	0.0099
	(0.1450)	(0.1440)	(0.1080)	(0.1090)
Industry-Year FE	√	√	√	√
Firm FE	√	√	√	√
N	58,504	58,504	66,025	66,025
R^2	0.681	0.681	0.697	0.697

Notes: Table 6 shows results of OLS fixed-effects regressions with *DIVYIELD* as dependent variable. The dummy variable *TAXPL* is defined by using the average residuals after regression (2). In columns (1) and (2) *GAAP ETR Current* was used for the regression of equation (2) whereas *GAAP ETR* was used in columns (3) and (4). The *TAXPL* dummy is one for all firms whose average residuals are equal to or below the 5th (columns (1) and (3)) or 25th (columns (2) and (4)) percentile. Robust standard errors clustered by country are shown in parentheses. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

Similar to all other specifications of *TAXPL*, we can confirm our expectations regarding *PENALTY* and our other control variables. However, we cannot confirm that firms caring relatively more about their corporate tax burden care also more about their shareholders' personal tax burden than other firms.

4.2. Alternative Measures for Corporate Tax Planning Affinity

Previous studies have confirmed that the mobility of income increases for firms with high intangible asset ownership or high expenses for R&D (Harris, 1993; Grubert, 2003; De Simone, Mills and Stomberg, 2014). This increase in mobility of income reflects in lower ETR measures and therefore potentially leads to tax aggressiveness. Hence, we use these attributes in the following for another definition of our dummy variable *TAXPL*.

Firms in high-tech and pharmaceutical industries mostly possess significant intellectual property and products with global demand. As the assignment of intellectual property to affiliates located in low-tax jurisdictions is – depending on the type of intellectual property – associated with limited effort, these firms are seen as having more opportunities to shift profits to low-tax jurisdictions via transfer pricing and hence are more sensitive about their corporate tax burden. According to De Simone, Mills and Stomberg (2014), we use three-digit SIC codes to compute *TAXPL* (column (1) of table 7) which equals one if the industry membership of the parent is supposed to be have more profit shifting opportunities.[28]

[28] We classify the following three-digit SIC codes as income mobile industries: 283 (Pharmaceutical), 357, 367, 737 (Computers) and 738 (Services).

In columns (2) and (3) of table 7, we use the average of R&D expenses (*xrd*) scaled by total assets (*at*) between 2003 and 2012.[29] Similar to the average ETR measures used in section 4.1, we use 10-year averages to smooth the effect of outliers. In column (2) (column (3)), *TAXPL* equals one for all firms that belong to the highest 5 (25) percent concerning R&D expenditures and zero otherwise.

[29] We require companies to have non-missing values for all components of our variables. However, visual inspection of several Form 10-k filings reveals that many of the missing values, especially for R&D expenses, in Compustat should be coded as zero. Therefore, we set missing values of the variable R&D to zero.

Table 7: Industry Affiliation and R&D Activities – Regression Results

	(1)	(2)	(3)
PENALTY	-0.0092**	-0.0092**	-0.0109*
	(0.0040)	(0.0041)	(0.0054)
PENALTY x TAXPL	0.0007	0.0024	0.0073
	(0.0031)	(0.0052)	(0.0069)
LEV	-0.0087*	-0.0087*	-0.0087*
	(0.0041)	(0.0041)	(0.0041)
SALES	0.0002	0.0002	0.0002
	(0.0005)	(0.0005)	(0.0005)
TOBINSQ	-0.0017**	-0.0017**	-0.0017**
	(0.0006)	(0.0006)	(0.0006)
EBITDA	0.0227	0.0227	0.0227
	(0.0130)	(0.0130)	(0.0130)
CASH	0.0055**	0.0055**	0.0056**
	(0.0025)	(0.0025)	(0.0025)
SIZE	0.0023*	0.0023*	0.0023*
	(0.0012)	(0.0012)	(0.0012)
GDP	-0.0004	-0.0004	-0.0005
	(0.0036)	(0.0036)	(0.0036)
CONSTANT	0.0176	0.0176	0.0208
	(0.1030)	(0.1030)	(0.1040)
Industry-Year FE	√	√	√
Firm FE	√	√	√
N	72,623	72,623	72,623
R^2	0.713	0.713	0.713

Notes: Table 7 shows results of OLS fixed-effects regressions with *DIVYIELD* as dependent variable. The definition of *TAXPL* differs. In column (1) *TAXPL* equals one if a firm belongs to an industry being associated with more profit shifting opportunities and zero otherwise. The definition of income mobile industries follows De Simone, Mills and Stomberg (2014). The *TAXPL* dummy is one for all firms whose average 10-year R&D expenditure scaled by total assets is equal to or above the 95th percentile (column (2)) or respectively the 75th percentile (column (3)) and zero otherwise. Robust standard errors clustered by country are shown in parentheses. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

Similar to the results presented in our other tables, we are able to confirm prior research's findings regarding the coefficient of *PENALTY*, but we cannot confirm our additional suggestion that firms identified as being relatively more engaged in corporate tax planning are also more sensible to their shareholders' tax rates.

5. Conclusion

This study contributes to the existing literature by providing additional evidence and confirming prior literature that firms consider existing personal tax rates for dividends and capital gains when they choose the amount of dividends paid to the shareholders (Brav et al., 2005; Chetty and Saez, 2005, 2006; Brown, Liang and Weisbenner, 2007; Jacob and Jacob, 2013). Moreover, it provides additional tests whether this reaction is related to firm's corporate tax planning affinity.

Thereby, this paper merges prior accounting and finance literature and investigates whether a firm's corporate tax planning activity constitutes a criterion by which firms can be separated concerning their level of awareness for their shareholders' tax burden. However, applying a huge variety of specifications to identify those firms being relatively more involved in corporate tax planning activities, we conclude that firms overall care about their shareholders' dividend and capital gains taxation, but that this is not only or even more typical for firms having relatively low ETRs or relatively large possibilities for income shifting.

With this finding, we confirm prior literature. Our results show that a firm's dividend yield decreases, if dividends are more heavily taxed compared to capital gains. Moreover, the magnitude of our measured negative effect is similar to previous findings from finance literature.

However, we cannot unambiguously show that all firms are equally sensitive to the relationship of dividend to capital gains taxation. Having employed several different corporate tax planning measures, we find that a higher degree of corporate tax planning is not a valid separation

criterion to identify firms whose dividend yield will react stronger to changes in the relationship of dividend to capital gains taxation. Nevertheless, as the knowledge of firms' shareholder tax sensitivity might be important to estimate firm payout consequences following a personal capital income tax variation, we are looking forward to further investigations to that topic by future research.

Appendix

Appendix 1: Variable Definitions

CAPINT	Property, Plant and Equipment scaled by total assets (*ppegt* / *at*)
CASH	The amount of cash divided by total assets (*ch* / *at*)
DIVYIELD	Total amount of dividends paid by one firm divided by its average share price in this year.
EBITDA	The actual EBITDA divided by total assets (*ebitda* / *at*)
GAAP ETR	Quotient of total tax expense and pre-tax income in which extraordinary items are not included (*txt* / (*pi*-*xi*))
GAAP ETR Current	Quotient of current taxes and pre-tax income in which extraordinary items are not included (*txc* / (*pi*-*xi*))
GDP	Natural logarithm of a country's gross domestic product in U.S. Dollars
LEV	Sum of long- and short-term leverage scaled by total assets ((*dlc*+*dltt*) / *at*)
PENALTY	Difference between a country's personal dividend tax rate and a country's personal capital gains tax rate scaled by one minus this country's personal capital gains tax rate ((m^d-m^{cg}) / (*1*-m^{cg}))
ROA	Pre-tax income divided by total assets (*pi* / *at*)
SALES	The increase of sales (*sale*) over two years divided by the amount of sales two years ago.
SIZE	Natural logarithm of total assets (*at*)
TOBINSQ	Number of shares outstanding times the share price at the end of the year plus the sum of long- and short-term leverage scaled by total assets (((*csho***prccdat*) + (*dlc*+*dltt*)) / *at*)

Appendix 2: Pre-Regression – Summary Statistics

Variable	Obs.	Mean	Std. Dev.	25th Percentile	75th Percentile
SIZE	59,641	6.3876	1.8218	5.0696	7.5628
LEV	59,641	0.1747	0.1671	0.0441	0.3084
ROA	59,641	0.0656	0.0617	0.0371	0.1090
CAPINT	59,641	0.4893	0.3919	0.2209	0.8313

Notes: This table shows descriptive statistics for all independent variables of our pre-regression. Variables are defined in appendix 1.

Appendix 3: Pre-Regression – Regression Results

	(1)	(2)
SIZE	0.0087	0.0404***
	(0.0081)	(0.0121)
LEV	-0.0332	-0.138*
	(0.0268)	(0.0788)
ROA	-0.480**	-0.710***
	(0.0218)	(0.222)
CAPINT	0.0225	-0.0103
	(0.014)	(0.0348)
CONSTANT	0.318***	0.162***
	(0.0526)	(0.0353)
Industry-Year FE	√	√
Firm FE	√	√
N	59,641	45,846
R^2	0.556	0.54

Notes: This table shows results of OLS fixed-effects regressions with *GAAP ETR* (column (1)) and *GAAP ETR Current* (column (2)) as dependent variable. Variables are defined in appendix 1. Robust standard errors clustered by country are shown in parentheses. *, **, and *** show significance at the level of 10%, 5% and 1%, respectively.

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Chapter 5

Capital Market Reaction to Tax Avoidance:

Evidence from LuxLeaks

Capital Market Reaction to Tax Avoidance: Evidence from LuxLeaks

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Abstract:

This empirical study analyzes the capital market reaction to news about tax avoidance. We study the event known as LuxLeaks, through which hundreds of advance tax rulings were released on November 5, 2014. Advance tax rulings provide tax certainty. Consequently, the LuxLeaks revelation was not associated with any penalties or back taxes and we can isolate reputational loss as the only potential reason for a negative market response. Using an event study methodology, we find significant positive cumulated abnormal returns for the involved firms. Our results show that market participants reward this specific disclosure of certain tax avoidance and cast doubts on significant reputational effects. Further analysis suggests that the capital market especially rewards additional news about a firm's engagement in certain tax avoidance.

Keywords: Tax Avoidance, Tax Certainty, Market Reaction

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1. Introduction

It is well known that corporations engage in various forms of tax avoidance. The financial accounts of S&P 500 firms show that corporate taxes reduce pretax income by approximately 30 percent. Tax avoidance is associated with additional after-tax profits and should therefore increase firm value. Nevertheless, tax avoidance is also associated with the risks of tax litigation and reputational losses. For this reason, prior literature has difficulties identifying precise effects of tax avoidance on firm value. This study also analyzes the capital market reaction to news about tax avoidance. However, we use a unique setting to resolve prior issues as we employ a disclosure of special tax avoidance structures that were perfectly legal and provided tax certainty. This setting allows us to clearly show a positive effect of tax avoidance on firm value.

On November 5, 2014, the International Consortium of Investigative Journalists (ICIJ) published, on its website, information about hundreds of advance tax rulings regarding MNCs. This unexpected dissemination of confidential tax documents was publicly dubbed Luxembourg Leaks (LuxLeaks). Several years prior to the leak, the MNCs had engaged in private tax deals in the form of advance tax rulings (ATRs) with the Luxembourg fiscal authority. As ATRs are usually not disclosed, the revelation provided new information to the capital market. Thus, this event offers a rare opportunity to scrutinize the capital market reaction to unexpected news about tax avoidance and to determine whether MNCs are able to capitalize the competitive advantage of tax avoidance.

Most importantly, ATRs are, in general, perfectly legal and thus, provide tax certainty. Compared to the evidence used in previous studies, investors do not associate the investigated news about tax avoidance with penalties or back taxes which allows us to attribute potential negative capital market reactions to reputational losses and to have less hampered positive effects. Furthermore, the LuxLeaks publications provide a large sample of more than one hundred firms, all revealed as having engaged in tax planning. This unusually high number of firms made tax

planning behavior a particularly salient issue once the revelation was announced. Moreover, all firms were revealed on the same date, and therefore media coverage was substantially higher than for a compilation of firms revealed on very different dates.

We apply an event study methodology to identify the capital market response to this news about tax avoidance. Considering each MNC's share prices around the particular event day (November 5, 2014) and the development of its respective market, we calculate the cumulated abnormal returns. We find significant and positive cumulated abnormal returns across several specifications. LuxLeaks firms achieved a return that was, on average, 0.55% higher than the market. Furthermore, our results suggest that market participants reward tax avoidance under certainty – a finding that casts doubts on significant reputational effects.

In additional tests, we find a more pronounced positive capital market reaction to LuxLeaks for firms with extraordinarily low effective tax rates (ETRs) and also for firms with extraordinarily high ETRs. The former finding is consistent with the view that the capital market rewards information about tax certainty for those MNCs that are perceived as particularly tax-aggressive. The latter finding is in line with the argument that the capital market rewards new information about a firm's commitment to tax avoidance, particularly if new information about involvement in secure tax planning is detected that had not already been disclosed by the ETR.

Our paper contributes to the existing literature in the following ways. First, we extend the available literature on the impact of tax avoidance on firm value. Revelations of tax planning behavior can, of course, lead to a positive capital market reaction because the mere reduction of tax payments increases a firm's profit. Yet, only a few studies provide evidence of the general positive effect on firm value. Bryant-Kutcher, Guenther, and Jackson (2012) find a positive effect of reduced foreign taxes on the firm values of U.S. firms, and De Simone and Stomberg (2012) find that the capital market values tax avoidance through mobile income. Desai and Dharmapala

(2009) show that strong corporate governance can lead to a positive market response. In line with that, Wang (2011) shows a positive effect that is, however, repealed if transparency is reduced. Generally, previous event studies have had difficulty identifying clear positive capital market reactions. One explanation might be the fact that news about tax avoidance often includes information about tax sheltering or tax litigation. Thus, additional uncertainty about future tax payments or penalties might reverse the positive effects of reduced tax payments (Frischmann, Shevlin, and Wilson, 2008; Jacob and Schütt, 2013; Inger, 2014). The LuxLeaks publications however address ATRs that reduce the uncertainty associated with aggressive tax avoidance strategies and are, furthermore, not associated with back taxes. Another argument for a positive capital market reaction to news about tax avoidance is provided by Hanlon and Slemrod (2009). They argue that firms are rewarded for their commitment to tax planning beyond their mere disclosure of ETRs in their financial accounts. Accordingly, they find capital market losses only for tax sheltering firms with low ETRs, while for high-ETR firms they find no negative capital market responses. In our study, we find a clear and robust positive effect of tax avoidance on firm value in a setting in which penalty risks can be excluded. Additionally, we show that the effect is most pronounced for firms at the lowest level of tax aggressiveness.

Second, we contribute to the literature on reputational costs and their effect on firm value. Popular sentiment, mirrored by excessive media coverage of tax-related scandals, generally disapproves of firms apparently not paying their fair share of taxes. Accordingly, worldwide news, which described LuxLeaks as Luxembourg rubber-stamping tax avoidance and MNCs cutting their tax bills[30], shaped a clearly negative image of the firms named by the ICIJ (ICIJ, 2014a). In line

[30] For example: *The Guardian* (2014, November 5), available at http://www.theguardian.com/business/2014/nov/05/-sp-luxembourg-tax-files-tax-avoidance-industrial-scale, and *The New York Times* (2014, November 6), available at http://www.nytimes.com/2014/11/07/world/europe/head-of-european-commission-under-pressure-over-luxembourg-tax-revelations.html?_r=4.

with this notion, a recent survey among managers of U.S. firms suggests that managers consider potential reputational effects if tax avoidance is perceived as too aggressive (Graham, Hanlon, Shevlin, and Shroff, 2014). Interestingly, prior event studies of tax revelations show that investors barely contemplate reputational effects and find no overall evidence of shareholders perceiving tax sheltering as a corporate misdeed (Hanlon and Slemrod, 2009; Gallemore, Maydew, and Thornock, 2014). In particular, previous literature only provides weak evidence that potential reputational losses lead to negative capital market reactions even when a company'a name is mentioned in the context of a tax related scandal. Brooks, Godfrey, Hillenbrand, and Money (2016) consider the example of Starbucks. The media outcry about the firm's drastically reduced ETR initially led to customer boycotts. However, within a short time, most customers returned and Starbucks' business is now flourishing. Thus, even in the case of seemingly bottomless tax avoidance, reputational damage occurs only temporarily. Our results also suggest that reputational effects are small. Finding a positive effect on firm value, we conclude that reputational damage does not outweigh the positive effects that tax avoidance exerts on firm value.

Generally, aggressive tax avoidance is associated with risk, i.e., uncertainty about back taxes and penalties (Dyreng, Hanlon, and Maydew, 2014; Hasan, Hoi, Wu, and Zhang, 2014). Therefore, the negative share price effects of news about tax avoidance can be attributed not only to reputational losses but also to the additional effect of risk of penalties or back taxes (Graham et al., 2014). However, the LuxLeaks revelation was not associated with any penalties or back taxes because all involved firms had signed ATRs with the tax authority in Luxembourg. ATRs represent binding tax deals between fiscal authorities and firms whose tax consequences are also set out in the ruling (OECD, 2015). Due to these specific properties of ATRs, LuxLeaks is, to the best of our knowledge, the first event that provides information about a sample of MNCs that engaged in tax avoidance without uncertainty; consequently, any potentially negative capital market reaction can

be exclusively attributed to reputational effects. Therefore, unlike the events used in previous studies, the LuxLeaks publications allow us to isolate reputational losses as explanations of a potentially negative capital market response.

Even though the ATRs released in the course of LuxLeaks represent binding tax agreements with the tax authority in Luxembourg, in the aftermath of the leak a debate arose over whether special tax agreements with tax authorities might conflict with European law. On October 21, 2015, the European Commission ruled on the question of illegal state aid in the cases of Fiat in Luxembourg and Starbucks in the Netherlands (European Commission, 2015). Prior to this decision, the two MNCs had been granted tax advantages by the fiscal authorities that were very similar to ATRs released in the course of LuxLeaks. As this decision may lead to further investigations of other firms, it poses a potential threat to the LuxLeaks firms. In additional analyses, we therefore use this second event to scrutinize the potential removal of tax benefits associated with ATRs. However, we find only limited evidence for a capital market response to the possibility of back taxes.

Moreover, our results also contribute to the ongoing debate on base erosion and profit shifting (BEPS) and country-by-country reporting because we find positive effects on firm value as the publicly available level of tax information, i.e., tax transparency, increases. Consequently, we are able to show that it is beneficial for MNCs to disclose their consideration of tax certainty while reducing corporate tax payments.

The remainder of the paper is organized as follows. In Section 2, we describe the LuxLeaks event in detail and develop our hypotheses according to prior literature. Section 3 presents our data and research methodology. Empirical results are provided in Section 4. Section 5 concludes.

2. Event and Hypotheses Development

2.1. Luxembourg Leaks

On November 5, 2014, the ICIJ released, on its website, information about hundreds of advance tax rulings regarding multinational firms (ICIJ, 2014a/2014b). As the documents contained private tax deals between MNCs and Luxembourg fiscal authorities, the event became publicly known as LuxLeaks. In October 2010, a former employee of PricewaterhouseCoopers discovered the documents, which would only be released later. His contact with the press led to a French TV broadcast in May 2012. Afterwards, it took almost two more years until the ICIJ began its investigation and another seven months until the documents and the names of the respective firms were finally published online. As most incidents are not clearly identified, we cannot use them in our event study design. Furthermore, although these incidents spread rumors throughout the capital market, they did not explicitly name the involved corporations. Importantly, the rumor did not hint at a later release of all involved MNCs. The French TV broadcast named only two MNCs included in our sample: GlaxoSmithKline and Wendel. Considering their share prices as well as those of the French leading index CAC40, we find no abnormal movements in the stock charts.[31]

Following the leak on November 5, 2014, news reports worldwide quickly criticized Luxembourg who "rubber-stamped tax avoidance on an industrial scale"[32] and acted "as a haven for hundreds of companies seeking to drastically reduce their tax bills"[33]. Marian (2016) analyzes

[31] On May 11th, 2012, the French TV channel France 2 showed a report titled "Paradis Fiscaux: les petits secrets des grandes entreprises" (Tax Havens: the little secrets of the big companies), in which they cover some of the applied structures involved in the LuxLeaks documents. As the TV show did not include a list of firm names, and as the show was broadcast in French, we do not anticipate a reaction by global capital markets.
[32] *The Guardian* (2014, November 5), available at http://www.theguardian.com/business/2014/nov/05/-sp-luxembourg-tax-files-tax-avoidance-industrial-scale.
[33] *The New York Times* (2014, November 6), available at http://www.nytimes.com/2014/11/07/world/europe/head-of-european-commission-under-pressure-over-luxembourg-tax-revelations.html?_r=4.

how Luxembourg became "a tax-haven by administrative practices". In December 2014, a few additional documents were made public. However, those represent only a small fraction of the total of 345 MNCs that were exposed.[34]

The published ATRs had already been issued between 2002 and 2010. Huesecken and Overesch (2015) confirm that MNCs achieved a significant reduction in their worldwide ETRs after they agreed on an ATR. ETRs are disclosed as part of the financial reporting of a firm and provide some general information about the firm's tax position. However, particular information about tax avoidance behavior is not disclosed. Moreover, Luxembourg, as well as most fiscal authorities, do not disclose their issued ATRs. Consequently, the revelation on November 5, 2014 provided the capital market with new information about the ATR usage of particular MNCs. We can therefore use this event - an unexpected dissemination of confidential tax documents - to capture capital market reactions. [35]

ATRs "are specific to an individual taxpayer and provide a determination of the tax consequences of a proposed transaction on which the particular taxpayer is entitled to rely" (OECD, 2015, p. 47). As the Luxembourg Ministry of Finance clarifies, ATRs constitute legal documents that comply with the law.[36] Thus, LuxLeaks not only released information about tax avoidance to the capital market but also revealed a certain form of tax planning, i.e., legally assured tax avoidance. Put differently, the information about ATRs did not trigger penalties, as ATRs provide tax certainty. Hence, the event examined in this study captures the reaction to past corporate tax avoidance, which will apparently persist in the future.

[34] On December 9, 2014, only eight firms were newly revealed and for some, already mentioned, firms additional documents became available.

[35] A capital market reaction to a specific event can only be captured if the capital market does not anticipate the event (Doidge and Dyck, 2015) because investors only trade if they are provided with new information (Bauer and Klassen, 2016). Particularly changes in tax policies that allow or hinder tax planning are often widely anticipated. In contrast, we analyze the unexpected dissemination of confidential tax documents.

[36] *Luxembourg Government* (2014, November 7), available at http://www.gouvernement.lu/4160549/07-luxleaks-EN.

2.2. Development of Hypotheses

Public firms are subject to capital market pressure. Consequently, shareholders' reactions are essential for firms (Penno and Simon, 1986) because fulfilling shareholders' expectations, particularly increasing their earnings is how firms cope with capital market pressure (Burgstahler and Dichev, 1997; Beatty, Ke, and Petroni, 2002). Prior literature analyzes the market response to taxes and tax-related corporate decisions. Several studies investigate the influence of tax law changes (e.g., Ayers, Cloyd, and Robinson, 2002; Edwards and Shevlin, 2011). They find a decline in stock prices coinciding with the announcement of unfavorable tax laws. Their findings already suggest that less tax expenses are associated with higher firm value. Unlike these studies, we do not investigate the effect of a fiscal reform but of the corporation's conscious decision to engage in tax avoidance.

Tax avoidance can exert positive effects on firm value (Frischmann et al., 2008; Wang, 2011; De Simone and Stomberg, 2012; Robinson and Schmidt, 2013). First, shareholders could reward any additional information about managers' commitment to tax avoidance because lower tax expenditures increase the financial resources available for distribution. For example, Bryant-Kutcher et al. (2012) find increased firm value in relation to decreased foreign taxes. Similarly, Chyz, Leung, Li, and Rui (2013) show that abnormal returns decrease if labor unions are elected, as they usually reduce the firm's level of corporate tax avoidance.

Second, the capital market wants "the company to be optimally aggressive" (Hanlon and Slemrod, 2009, p.126). Put differently, shareholders want managers to reduce corporate tax payments without the risk of additional costs such as tax litigation and back taxes. Rego and Wilson (2012) also state that appropriate risks are desired. Our study reveals whether considering tax certainty while reducing tax payments allows corporations to capitalize tax avoidance. Prior literature shows that if tax avoidance adds uncertainty, the positive effects of reduced tax payments

might be reversed (Inger, 2014; Jacob and Schütt, 2013). Frischmann et al. (2008) show that initial positive effects were reversed upon a later Senate inquiry into FIN48 disclosures. Blaufus, Möhlmann, and Schwäbe (2016) find positive capital market reactions to tax avoidance but negative reactions to illegal tax evasion. Furthermore, Koester (2011) finds positive firm values associated with uncertain tax planning, but only if the firm has strong corporate governance that evidently reduces the involved risk. Prior literature finds that strong corporate governance can even lead to a positive market response to tax sheltering (Desai and Dharmapala, 2009; Wilson, 2009). Consequently, the capital market also reacts positively if the risk is minimized.

Our study relates to the above-mentioned strands of literature because ATRs represent a firm's decision to engage in enhanced tax planning, but the revelation of such planning - and its possible implications - embody an exogenous event. The revelation should induce a capital market reaction. In contrast to previous studies, our setting includes an important additional feature. LuxLeaks provides news about a particular tax avoidance strategy – advance tax rulings. An ATR is an agreement between a tax authority and a tax payer about the application of tax law in the context of a special arrangement. By definition, ATRs provide tax certainty as fiscal authorities have to comply with the consequences set out in the ATR (Givati, 2009; Diller, Kortebusch, Schneider, and Sureth, 2016; Hoke, 2015). The risk of future payments is eliminated. Thus, an ATR not only helps implement structures to avoid taxes (first positive effect), it also provides tax certainty (second positive effect).

We test the following hypothesis:

H1. *The capital market reaction to LuxLeaks should be positive if the shareholders reward tax avoidance structures which are associated with a high level of tax certainty*.

In the particular case of LuxLeaks, positive effects have to be attributed either to a capital market reward for a commitment to engaging in tax avoidance or to news about the tax certainty associated with an ATR. We aim to disentangle the two effects by considering previous literature which suggests that the capital market response to news about tax avoidance depends on the level of tax avoidance already disclosed. In particular, previous studies differentiate between high- and low-ETR firms (Hanlon and Slemrod, 2009; Hill, Kubick, Lockhart, and Wan, 2013; Brooks et al., 2016).

A low ETR is perceived as a result of aggressive tax avoidance strategies. Moreover, Dyreng et al. (2014) find that low ETRs are associated with additional uncertain tax positions. Therefore, the capital market should anticipate a higher risk of back taxes and penalties for these tax-aggressive firms.[37] Studying the effect of lobbying, Hill et al. (2013) show that the generally positive effect of a firm's engagement in tax planning does not hold for firms with low ETRs. Brooks et al. (2016) as well as Guenther, Matsunaga, and Williams (2013), find a relation between high levels of tax avoidance and tax risk, respectively, with high stock price risk.

The ATRs disclosed by the LuxLeaks publications, however, eliminate at least part of the uncertainty associated with aggressive tax avoidance strategies. In line with this argument, Diller et al. (2016) show that ATRs, which eliminate the uncertainty of the otherwise risky tax planning, should attract tax-aggressive firms. Consequently, news about a firm having an ATR with Luxembourg provides information to the capital market about a sustainable form of tax planning without the risk of back taxes.

While for low-ETR firms the LuxLeaks publications do not reveal much information about the firms' general commitment to tax avoidance, the capital market should reward MNCs because

[37] Hasan et al. (2014) show, for example, that banks associate tax avoidance of MNCs with significant risks.

they suffer less tax risk than originally expected. Therefore, the positive effect associated with the information about reduced tax uncertainty should be especially distinct for firms with extraordinarily low ETRs. We test the following hypothesis:

H1a. *The capital market reaction to LuxLeaks should be particularly positive for firms with extraordinarily low ETRs because LuxLeaks provides new information about tax certainty.*

In contrast, MNCs with high ETRs are believed to engage in less tax avoidance. In fact, the market does not expect any tax planning from them. In their study of capital market reactions to tax shelter involvement, Hanlon and Slemrod (2009) find no negative capital market effect for high-ETR firms. They argue that the market rewards the fact that those firms are "not as tax-passive as previously believed" (Hanlon and Slemrod, 2009, p. 127). This is in line with the undersheltering puzzle (Weisbach, 2002), according to which investors wonder why not all firms engage in tax avoidance. Consequently, any new information about involvement in tax planning should positively influence the capital market reaction for those firms that are perceived as passive in terms of tax avoidance. In the case of LuxLeaks, the capital market receives information that the MNC is not only involved in international tax avoidance but that it has a legally assured tax avoidance structure. Thus, we hypothesize the following:

H1b. *The capital market reaction to LuxLeaks should be particularly positive for firms with extraordinarily high ETRs because LuxLeaks provides new information about their involvement in a secure tax planning structure.*

So far we assumed that tax avoidance is associated with a higher firm value, however, tax avoidance might as well have negative effects on firm value. Thomas and Zhang (2014) investigate different determinants that impact the opposing results with regard to the value relevance of tax expenses. In the matter of tax avoidance, MNC's strategies might be associated with penalties and

back taxes or reputational losses. Excessive tax avoidance may be perceived as a firm's willingness to lie to its shareholders (Desai, Dyck, and Zingales, 2007) or may lead to reputational consequences, such as consumers choosing to buy from the firm's competitors (Klein and Leffler, 1981). In this context, prior literature shows negative reactions to corporate misdeeds (Karpoff and Lott, 1993; Palmrose, Richardson, and Scholz, 2004).

Using an event study design, Hanlon and Slemrod (2009) and Gallemore et al. (2014) find weak evidence that news about tax shelter involvement, i.e., the most aggressive form of tax planning, yields capital market losses. Other studies reveal a potentially negative effect of tax avoidance on firm value (Kim, Li, and Zhang, 2011; Mironov, 2013; O'Donovan, Wagner, and Zeume, 2016). For example, Kim et al. (2011) identify an increase in stock price crash risk as a result of tax avoidance and Mironow (2013) finds that income diversion reduces firm performance. In addition to that, Graham et al. (2014) and Gordon (1989) show that managers anticipate potential reputational concerns when they make tax avoidance decisions. However, Gallemore et al. (2014) find no overall significant reputational effect of tax sheltering.

As ATRs are, in general, perfectly legal and provide tax certainty, LuxLeaks was not associated with any expectations about penalties or back taxes. Previous literature shows that fines and penalties influence the market response (e.g., Karpoff and Lott, 1993). Unlike prior examinations of tax avoidance detections (e.g., Hanlon and Slemrod, 2009; Gallemore et al., 2014), our innovative setting therefore allows us to isolate a potential negative effect due to reputational losses from a collaborating effect caused by penalties. As the MNCs investigated in this study elicited severe public criticism, the capital market might view LuxLeaks in the same negative light as the press presented it, due to a loss of reputation.

Taking the different potential effects into account, we cannot predict with certainty how the capital market will react to tax avoidance. Unlike the two positive effects, a potential negative

capital market reaction can be exclusively attributed to reputational loss effects. Aiming to shed light on the impact of these different effects, we test the following to H1 contrarian hypothesis:

H2. *The capital market reaction to LuxLeaks should be negative if the reputational effects of tax avoidance predominate.*

As mentioned above, the LuxLeaks revelation was not associated with any penalties or back taxes. Thus, we extend our analysis to a second event to scrutinize the potential effect of back taxes. On October 21, 2015, the European Commission released information about a judgment on illegal state aid in the cases of Starbucks and Fiat (European Commission, 2015). Starbucks and Fiat were granted tax advantages by fiscal authorities in the Netherlands and Luxembourg, respectively, which were not available to other MNCs. Thus, the European Commission delivered a judgment requiring the recovery of millions of euros in back taxes. Similar to the LuxLeaks firms, Fiat and Starbucks had secured their tax planning through ATRs and were believed to have achieved tax certainty. According to the European Commission (2015), ATRs – in general – remain legal, however, these special cases lack an economic justification leading to unfair competitive advantages.

While Fiat and Starbucks were not involved in the LuxLeaks publications, worldwide news immediately predicted additional judgments for other MNCs involved in tax agreements with fiscal authorities and made connections to LuxLeaks.[38] Marian (2016) explains in detail the applied (artificial) structures in Luxembourg ATRs. Thus, the capital market might anticipate judgments for LuxLeaks firms even though the latter had previously secured tax certainty. As the LuxLeaks firms were not named by the European Commission in October 2015, we argue that reputational

[38] For example, The New York Times (October 21, 2015) available at http://www.nytimes.com/2015/10/22/business/international/starbucks-fiat-eu-tax-netherlands-luxembourg.html, and BloombergBusiness (October 21, 2015) available at http://www.bloomberg.com/news/articles/2015-10-21/starbucks-fiat-first-in-firing-line-as-eu-orders-tax-repayments-ig0kk625.

effects are very unlikely for this second event. Moreover, no additional information about an involvement in tax planning was revealed in October 2015. Consequently, the effect of back taxes can be isolated. If the capital market anticipates similar future judgments, i.e., an ex post amendment for LuxLeaks firms and their ATRs, we expect a negative capital market reaction.

H3. *The capital market reaction to the European Commission's judgment of ATRs as potential illegal state aid in October 2015 should be negative for LuxLeaks firms.*

3. Sample and Research Design

3.1. Data and Sample Selection

The information needed to perform our analysis is gathered from different data sources. In addition to the information revealed by the ICIJ, the stock prices and accounting data used in this study stem primarily from *Compustat* and *Compustat Global*. We augment the data by filling in missing values with corresponding information from *Datastream* and consolidated financial reports. All index price information is taken from *Datastream*.

We apply the following data selection process. We start from 345 firm names released by the ICIJ on November 5, 2014. In a first step, we only retain public firms that we can identify as being listed on a capital market. We use either the corresponding *Compustat/Compustat Global* identifier (gvkey) or the international securities identification number (ISIN). We lose many firms that are not listed on the stock market (private firms) and, thus, their stock prices are not available. We drop firms if we cannot find a reliable index for their countries on *Datastream* or if the daily prices on *Security Daily* or *Datastream* are missing or incomplete. The latter are needed to appropriately calculate a firm's (cumulated) abnormal return. We retrieve all price information from Monday to Friday and use each firm's daily closing price. We further exclude firms that were revealed by the ICIJ on December 9, 2014. We do not believe that this second date conveys relevant news to the

capital market. Finally, we are left with quoted stock prices from 22 countries. This leads – for our main event (LuxLeaks on November 5, 2014) – to a baseline sample of 148 revealed firms (Sample 1).

In addition, we conduct further inquiries regarding the capital market reaction depending on the disclosed level of tax avoidance. Our requirement is financial data to calculate cash effective tax rates. Due to missing firm-level information, we can only consider a somewhat smaller sample for these additional tests (Sample 2). Table 1 shows the sample selection process.

Table 1
Sample Selection

Table 1 describes the sample selection process of sample 1 (baseline sample) and sample 2 (ETR subsample). Starting point are the 345 firms that were revealed by the ICIJ. Data availability in the used databases as well as the focus on November 5, 2014, result in a baseline sample of 148 firms. The ETR subsample contains only firms, i.e., 103 firms, for which CASH ETR can be calculated.

Description	# of firms
Firms revealed by ICIJ	345
Less:	
Firms that cannot be identified as public firms	150
Missing identifier in *Compustat/Compustat Global* for parent company	20
Missing leading index in *Datastream* and missing data in *Security Daily*	23
Firms that were revealed on December 9, 2014	4
Sample 1	148
Less:	
Missing financial data in *Compustat/Compustat Global*	2
Missing cash effective tax rate	7
Unreasonable cash effective tax rate	36
Sample 2	103

A complete list of the MNCs included in our baseline sample, with their respective headquarters locations and industry classifications, is provided in Table A2 of the Appendix. A total of 22 countries are included in our sample. Most MNCs are located in the United States or the United Kingdom. Regarding industry distribution, 20 MNCs operate in the consumer industry

while most MNCs included in LuxLeaks operate in the financial sector, which, according to the Fama and French[39] 5 industry classification, belongs to 'Other'.

Panel A of Table 2 lists some descriptive statistics for our ETR subsample consisting of 103 LuxLeaks firms. To investigate the representativeness of our sample, Panel B of Table 2 displays statistics for all other listed firms with available firm level data located in the same 22 countries. Table 2 shows that all firms have a reasonable return on assets and are not highly leveraged. LuxLeaks firms exhibit a mean CASH ETR of 21.5 % whereas all other firms – excluding the LuxLeaks firms – report a slightly smaller CASH ETR of 18.9 %. Interestingly, in general, LuxLeaks firms seem to not avoid more taxes in terms of CASH ETR. The greatest difference occurs with regard to firm size. The MNCs involved in LuxLeaks and included in our sample seem to be rather large. Thus, even though we are operating with a small sample[40], our sample covers a significant market volume.

[39] Updated industry-classification can be downloaded from http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/changes_ind.html.

[40] Rather small samples are very common in literature that covers the capitalization of tax sheltering (i.e., aggressive tax avoidance). Hanlon and Slemrod (2009) use a sample of 108 tax shelter firms to investigate the CARs after the involvement in tax sheltering. Gallemore et al. (2014) apply a sample of 118 corporations.

Table 2
Descriptive Statistics

Table 2 shows descriptive statistics of firms included in sample 2 (ETR subsample) for which all firm specific data is available as well as for other firms located in the same countries. Financial data is taken from the consolidated financial statements 2013 available in *Compustat/Compustat Global*. CASH ETR is defined as taxes paid divided by pretax income; Size is the logarithm of total assets (before taking the logarithm, total assets are measured in million U.S. dollars); Profitability, i.e., Return on Assets (ROA) is defined as pretax income divided by total assets; Leverage is calculated as debt in current liabilities divided by total assets. Regarding the ratios, variables are left in their original currency for calculation.

Panel A: Descriptive statistics of LuxLeaks firms (Sample 2)				
Variable	# of firms	Mean	Median	Std. dev.
Cash ETR	103	0.2151	0.2155	0.1211
Size (Total Assets logged)	99	10.2799	10.0203	2.1599
Profitability (Return on Assets)	103	0.0787	0.0532	0.1043
Leverage	99	0.0504	0.0247	0.0663
Panel B: Descriptive statistics of other listed firms in the same countries				
Variable	# of firms	Mean	Median	Std. dev.
Cash ETR	5,079	0.1888	0.1867	0.1339
Size (Total Assets logged)	5,079	6.4700	6.3763	2.2287
Profitability (Return on Assets)	5,079	0.0537	0.0184	0.0916
Leverage	5,079	0.0537	0.0184	0.0916

3.2. Research Methodology

We analyze the capital market reaction, i.e., share price effects, to two events by implementing an event study methodology that considers cumulated abnormal returns (CARs) as proposed by MacKinlay (1997) and Kothari and Warner (2007). This means we investigate the abnormal returns of MNCs over a certain period surrounding the disclosure of information. A CAR is equal to the sum of daily abnormal returns. The latter is explained by the difference of the realized return and an expected return. CARs are computed using the market model in a first step (MacKinlay, 1997):

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad \textbf{(1)}$$

R_{it} represents the daily (t) return of a firm's (i) share, whereas R_{mt} symbolizes the daily return of the market portfolio. ε_{it} is a zero mean disturbance term. As a proxy for the market

portfolio, we consider the leading index of firm *i*'s country. The applied indices for each country are displayed in Table 3.

Table 3
Considered Capital Markets

Table 3 lists the 22 countries included in our baseline sample, the respective leading index which is used as a benchmark in calculating the abnormal returns of a firm *i* in that country, and the number of LuxLeaks firms considered.

Country	Leading Index	LuxLeaks firms	Country	Leading Index	LuxLeaks firms
Australia	All Ordinaries	4	Italy	FTSE MIB	6
Belgium	BEL20	4	Japan	Nikkei 225	4
Bulgaria	Sofix	1	Luxembourg	LuxX Index	6
Canada	TSX Composite	6	Norway	OBX Index	1
China	SSE Composite	1	Philippines	PSEi	1
Finland	OMX Helsinki 25	1	Russia	RTS-Index	2
France	CAC40	8	Sweden	OMX Stockholm 30	2
Germany	DAX	10	Switzerland	SMI	11
Hong Kong	Hang Seng HSI	1	Taiwan	TAIEX	1
Ireland	ISEQ Overall Index	8	UK	FTSE 100 Index	22
Israel	TA-100	2	USA	DJIA	46

By using a different index for each country, we implicitly control for any home market shocks that may affect the daily returns around our event date. For example, one day before our event, the U.S. midterm elections took place. The outcome could certainly affect corporations' share prices. However, as the effect applies to the whole U.S. market, it is incorporated into the leading share index, which then serves as the benchmark for the calculation of abnormal returns. Thus, abnormal returns should only capture effects that are specific to certain firms.

We estimate equation (1) for each share using a window of 100 days, ending 6 days before the considered event to ensure that no pricing information related to the event affects the predictive factors (MacKinlay, 1997). Then, we use our estimates to predict each share's return ($R_{it}^{predicted}$) for each day belonging to the event window. Next, we calculate the daily abnormal returns by subtracting the predicted returns from the actual returns, which we find in our databases. CARs are subsequently computed as the sum of abnormal returns over the event window (equation (2)). In

most of our analyses, we apply a five-day event window from -2 to +2 assuming our event took place on day t_0.

$$CAR_i = \sum_{t=t_{-2}}^{t=t_{+2}} (R_{it} - R_{it}^{predicted}) \qquad \textbf{(2)}$$

Finally, we exert a *t*-test to check whether the mean CAR of LuxLeaks firms is significantly different from zero. A positive and significant result would be consistent with H1, whereas a significantly negative estimator would suggest support for H2.

An alternative method to compute abnormal returns is denoted as the market adjusted model (MacKinlay, 1997). In this model, we just subtract the corresponding country's index return from the firm's actual return. Considering expression (1), α_i is set to zero and β_i is set to one for all shares. The market adjusted model therefore provides a much simpler way to predict each share's return compared to the market model. It provides an alternative approach with significant limitations (MacKinlay, 1997). We consider the market adjusted model in additional tests as this method is used by related studies investigating market responses to tax avoidance (Hanlon and Slemrod, 2009; Gallemore et al., 2014).

4. Results

4.1. Cumulated Abnormal Returns around LuxLeaks

In this section, we present our results for the capital market reaction to LuxLeaks on November 5, 2014. According to the discussion in Section 2, our prediction of the sign of the capital market reaction is ambiguous. On the one hand, shareholders may reward the same MNCs as, through LuxLeaks, new information about their commitment to tax avoidance and, in particular, to an involvement in legally assured tax avoidance, became publicly known (H1). On the other

hand, shareholders may punish the revealed MNCs, as stock prices mirror possible reputational losses (H2). We test which effect dominates using the methodology described in Section 3.

Table 4 presents the mean cumulated abnormal returns for the LuxLeaks firms. Across several event windows, we find positive and statistically significant CARs for the LuxLeaks firms. Considering an event window of 5 days (-2/+2) yields a CAR of 0.0055. This result suggests that LuxLeaks firms, on average, show CARs of 0.55%[41] over the five days surrounding the LuxLeaks announcement. This effect means that LuxLeaks firms achieve an abnormal return that is 0.55 percentage points higher than the market return.[42] The effect size is also economically meaningful. For example, the U.S.-based firm Procter & Gamble has approximately 2.7 billion shares outstanding, which had a closing price of roughly $87 three days prior to LuxLeaks leading to a firm value of $235 billion. Considering the mean CAR of LuxLeaks firms of 0.55 %, Procter & Gamble was able to increase firm value by $1.3 billion more than an average U.S. corporation listed in the Dow Jones within the five days surrounding November 5, 2014. Considering the firm specific CAR of 1.18%, this abnormal increase actually amounts to $2.8 billion.

[41] In absolute values, the effect size is similar in magnitude to the CARs found in previous event studies, e.g., Hanlon and Slemrod (2009) reported 0.53% and Gallemore et al. (2014) 0.75%. Even though our effect is positive whereas other studies mainly find negative effects.

[42] Please note that, in this context, market return is a stylized expression for the term $\beta_i * R_{mt}$. Consequently, the abnormal return is determined for each firm by its individual correlation with the return of the respective leading index.

Table 4
CARs for Different Window Lengths

Table 4 presents the results of the *t*-test that is applied to test H1 and H2. CARs are the mean cumulated abnormal returns for the baseline sample of 148 firms. The results are shown for varying window lengths. Due to missing data the sample is reduced by two firms if the window is extended. Table 4 differentiates between two methods of calculating abnormal returns: the market model and the market adjusted model. *, **, and *** show significance at the level of 10 %, 5 %, and 1 %, respectively.

CARs		market model		market adjusted model	
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
Window length: -2/+2	148	0.0055**	0.0030	0.0041*	0.0030
Window length: -3/+3	147	0.0121***	0.0041	0.0072**	0.0041
Window length: 0/+3	147	0.0057**	0.0028	0.0032	0.0027

Extending the event window to 3 days before and after the event still results in highly significant positive CARs (0.0121). The increased CAR implies that the returns of LuxLeaks firms are also positively affected on the additional days. Nevertheless, to mitigate a possible bias from other events influencing the results, we primarily consider a shorter event window. Even excluding all days prior to LuxLeaks indicates a positive capital market reaction. The exclusion obviously leads to smaller CARs, as it must be assumed that some rumors prior to the leak had already affected market returns.

To check the robustness of our results, we alternatively apply the market adjusted model to calculate expected returns because it is used by related studies. The results are also displayed in Table 4. We reveal similar positive CARs using the alternative method. Only the result of 0 to 3 falls just short of being significant.

Our findings suggest that the capital market rewards MNCs for engaging in ATRs with the tax authorities in Luxembourg. Thus, our results are in line with hypothesis 1. The potentially negative effects of reputational losses are outweighted by the positive effects. The latter can be attributed either to a capital market reward for a commitment to engaging in tax avoidance or to the particularly positive feature of additional tax certainty provided by an ATR. It is, however, a challenging empirical task to disentangle the two mechanisms. As described in Section 2, the

effectiveness of the two mechanisms depends on the level of tax avoidance that was already disclosed to the capital market *before* the news about LuxLeaks was released. We therefore distinguish between different levels of tax avoidance already disclosed by the LuxLeaks firms.

More precisely, we analyze the capital market reaction to LuxLeaks for different levels of ETRs. We consider a firm's CASH ETR (taxes paid divided by pretax income) and GAAP ETR (total income taxes divided by pretax income)[43]. As we aim to approximate the level of tax avoidance that was disclosed before LuxLeaks, we consider financial statement data from 2013. Due to missing financial data, we are left with a somewhat smaller sample. In Panel A of Table 5, we therefore repeat the inital test for the ETR subsample. The mean CAR (0.0064) is again positive and significant at the 5% level. Our result again suggests that firms revealed by the ICIJ faced a positive capital market reaction.

In Panel B of Table 5, we divide our sample into four subsamples, one for each quartile of the ETR distribution. We find positive and significant CARs only for firms with extraordinarily low CASH ETRs and for firms with extraordinarily high CASH ETRs. Firms with moderate levels of tax avoidance show CARs that are small and statistically insignificant. Thus, our results suggest that the level of tax avoidance perceived before the LuxLeaks event affects the capital market reaction around the LuxLeaks announcements. Moreover, our results suggest that the positive responses can be attributed to two different mechanisms.

The positive capital market reaction for MNCs with particularly high ETRs is in line with the view that information about firms' engagements in tax avoidance positively surprises shareholders. Until the revelation by the ICIJ, the LuxLeaks firms with high ETRs cannot be identified as being particularly engaged in tax avoidance. Our results suggest that the news about

[43] For an overview on measures of tax avoidance see Hanlon and Heitzman (2010). Following Hanlon and Slemrod (2009), we only consider ETRs between 0 and 0.5 to limit the influence of extraordinary tax payments.

a firm's commitment to tax avoidance is rewarded by the capital market. Regarding low-ETR firms, the capital market could already assume a strong engagement in tax planning strategies. For those firms, LuxLeaks does not provide important new information about tax avoidance behavior as the firms are already publishing low ETRs. Our results, showing a particularly positive response to news about a certain tax avoidance strategy for firms that had not already disclosed small ETRs, are in line with hypothesis 1b.

The positive capital market reaction for MNCs with extraordinarily low ETRs can be attributed to the additional tax certainty associated with an ATR. Because extensive tax avoidance is associated with serious uncertainty about back taxes and penalties in future years, share prices should reflect some level of discount if a firm discloses an extraordinarily low ETR. The LuxLeaks announcement provides news about legal certainty for part of the firm's tax avoidance. Consequently, the information is especially positive. One might argue that LuxLeaks also provides information about tax certainty for all involved firms. If disclosed ETRs were moderate or even high, the capital market might not even expect significant tax risks before the LuxLeaks announcements. Consequently, a significant positive market reaction to LuxLeaks for low-ETR firms is in line with our hypothesis 1a that information about tax certainty is helpful if firms have already disclosed a high level of tax avoidance.

For firms with CASH ETRs in the interquartile range, we find no significant capital market response. Only if CARs are computed using the market adjusted model, we also find a positive market response in the interquartile range. Our results suggest that potential negative effects due to reputational losses are at least outweighed by positive effects due to new information about an engagement in an additional and secure type of tax avoidance. Firms that reported a moderate CASH ETR prior to the LuxLeaks event might be perceived as already committed to some tax avoidance that is not too risky.

In Panel C of Table 5, we consider GAAP ETR as an alternative measure to disclose tax avoidance.[44] Again, we analyze the response to LuxLeaks for different levels of ETRs disclosed in 2013, the financial year before LuxLeaks arises. Our results only suggest a positive effect of news about involvement in tax planning for firms that disclosed high GAAP ETRs. The results are consistent with H1b, i.e., a positive capital market response to new information about involvement in secure tax avoidance. However, we cannot find any support for news merely about tax certainty (H1a). Applying the market adjusted model leads to similar inferences.

The results for different levels of the GAAP ETR may originate in the definition of the GAAP ETR. As total income taxes (nominator) include current as well as deferred taxes, tax avoidance structures such as increased deductions and deferral of income are not reflected by GAAP ETRs (Dyreng, Hanlon, and Maydew, 2008). Thus, investors may perceive GAAP ETR as an imperfect measure of tax avoidance and the associated risk.

Overall, we infer that the effect of a new tax planning signal on the capital market is rather pronounced, whereas the revelation of a less risky tax planning strategy only impacts the capital market reaction of firms that disclosed particularly high levels of tax avoidance in terms of small CASH ETRs.

[44] UTBs (unrecognized tax benefits) disclosed according to FIN48 might be another potential measure for additional analyses, as they provide the capital market with information about tax certainty. However, data on UTBs is only available for U.S. firms and splitting a U.S. subsample (46 MNCs) into yet another four groups leads to insufficient small sample sizes.

Table 5
CARs for Different Levels of Tax Avoidance

Table 5 presents the results of the *t*-tests that are applied to test H1a and H1b. CARs are the mean cumulated abnormal returns over a five-day event window (-2 to +2 where 0 is the event day). Table 5 differentiates between two methods of calculating abnormal returns: the market model and the market adjusted model. The level of tax avoidance is measured by cash effective tax rates. CASH ETR is taxes paid divided by pretax income. Data availability reduces the sample size to 103 firms. Panel A repeats the first analysis of Table 4 to justify the application of a reduced sample. Panel B differentiates between firms with high and low CASH ETRs. Panel C considers a different measure of tax avoidance. GAAP ETR is total taxes divided by pretax income. The latter is adjusted for special items. Due to missing values, the GAAP ETR sample consists of 96 firms. *, **, and *** show significance at the level of 10 %, 5 %, and 1 %, respectively.

Panel A: Initial test		market model		market adjusted model	
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
ETR subsample	103	0.0064**	0.0030	0.0064**	0.0030
Panel B: Tax avoidance measured by CASH ETR					
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
CASH ETR below 25th percentile	26	0.0111*	0.0067	0.0107*	0.0065
CASH ETR above 25th percentile and below median	26	0.0039	0.0045	0.0085*	0.0051
CASH ETR above median and below 75th percentile	26	-0.0024	0.0049	-0.0051	0.0051
CASH ETR above 75th percentile	25	0.0134**	0.0076	0.0116*	0.0070
Panel C: Tax avoidance measured by GAAP ETR					
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
GAAP ETR below 25th percentile	24	0.0025	0.0043	-0.0008	0.0042
GAAP ETR above 25th percentile and below median	24	0.0006	0.0047	0.0040	0.0055
GAAP ETR above median and below 75th percentile	24	0.0080*	0.0055	0.0094**	0.0053
GAAP ETR above 75th percentile	24	0.0155**	0.0090	0.0142*	0.0084

4.2. Additional Tests

Our baseline results suggest a positive response to the LuxLeaks event. Potential reputational effects are dominated by other opposing effects. In additional analyses, we further scrutinize potential reputational effects. Moreover, we analyze the capital market reaction of similar MNCs.

Industry Membership

In Table 6, we exploit how the capital market reacts to MNCs with different characteristics in the context of LuxLeaks. First, we consider industry membership (Panel A of Table 6) because reputational losses might vary across industries. According to Fama and French, we classify five different industries.[45] As far as common belief about reputation goes, negative media coverage, such as the news about LuxLeaks may have a stronger impact on firms that face the end-customer. If consumers respond to news about aggressive tax avoidance with a buying resistance, or if business-to-consumer relationships are important, we would expect particularly negative effects for consumer industries. Surprisingly, we find the opposite. We find a significant positive CAR for consumer industries (0.0262). The CAR of more than 2.5% suggests a particularly positive capital market reaction. However, drawing on a more detailed industry classification and selecting business-to-consumer industries[46] yields significant and positive effects for business-to-business industries, whereas business-to consumer industries fall short of being significant. As we cannot reliably tell in which industry the effect is more pronounced, the results hint at irrelevance of reputational effects.

These counterintuitive results are in line with prior literature studying reputational effects in the context of tax planning. Austin and Wilson (2015) can neither confirm nor reject that firms

[45] We only consider 146 firms in Panel A of Table 6 due to two missing data on industry codes. Dividing our baseline sample into more than five subsamples, we would obtain subsamples with very few observations which are not very suitable for empirical tests.

[46] We consider industries 2, 3, 4, 5, 6, 7, 8, 9, 10, 43, 44 of the 49 Fama and French industry classification as business-to-consumer industries. The remaining industries are classified as business-to-business firms.

with valuable brands engage in more tax avoidance, and Gallemore et al. (2014) find no overall reputational effect of tax sheltering.

Finally, we consider a subsample of financial firms because many LuxLeaks firms can be classified as financial institutions. However, those exhibit no significant capital market reaction.

Market Position

The lack of evidence for reputational effects might be explained by the strong market position of a MNC. If a MNC has strong market position, customers might not respond significantly to news about aggressive tax avoidance. Consequently, MNCs with strong market positions can more easily compensate for reputational losses than firms who already suffer from intense competition. We approximate a firm's market position by profitability (pretax profit divided by total assets) and size (logarithm of total assets). Considering subsamples below and above the median of profitability and size, we expect positive and significant CARs for the highest values of the two measures. Panels B and C of Table 6 depict the results for the capital market response to LuxLeaks.

Interestingly, we find overall significant results in Panel B and a positive capital market reaction for relatively small firms in Panel C. With regard to profitability, the influence of reputational concerns seems to be equally distributed and does not outweigh the benefits. Thus, our results do not support reputational effects. Regarding firm size, Table 6 also does not reveal the expected results, as we would have assumed a higher influence of reputational concerns for small firms. The counterintuitive positive effect for small firms (0.0128) may be due to a stronger perception by the capital market of the news about involvement in tax avoidance. As for large multinationals the capital market receives abundant information whereas smaller firms are rarely mentioned in the media (Brooks et al., 2016).

Table 6
CARs for Different Firm Characteristics

Table 6 presents additional results of cross-sectional *t*-tests to further analyze H2. CARs are the mean cumulated abnormal returns over a five-day event window (-2 to +2 where 0 is the event day) for the examined firms. Table 6 differentiates between two methods of calculating abnormal returns: the market model and the market adjusted model. In Panel A, the baseline sample is divided into five different industry groups according to Fama and French industry classification. It also presents *t*-test for special industries based on a more detailed industry classification. Panel B measures the firm's market position as return on assets. ROA is the firm's pretax profit divided by total assets. Panel C considers Size as logarithm of total assets to further analyze the firm's market position. Results are presented for firms within the quartiles of ROA and Size. *, **, and *** show significance at the level of 10 %, 5 %, and 1 %, respectively.

Panel A: Industry membership		market model		market adjusted model	
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
Industry 1: Consumer	20	0.0262**	0.0140	0.0239*	0.0142
Industry 2: Manufacturing	27	0.0022	0.0074	0.0005	0.0077
Industry 3: High Tech	18	0.01067	0.0095	0.0122*	0.0090
Industry 4: Health	10	-0.0050	0.0073	-0.0047	0.0068
Industry 5: Other	71	0.0012	0.0026	-0.0002	0.0026
Financial institutions	59	0.0019	0.0027	0.0007	0.0028
Business-to-consumer firms	18	0.0156	0.0141	0.0138	0.0144
Business-to-business firms	128	0.0041*	0.0028	0.0031	0.0028
Panel B: Profitability					
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
ROA below (and incl.) median	52	0.0058*	0.0045	0.0062*	0.0042
ROA above median	51	0.0070**	0.0041	0.0066*	0.0044
Panel C: Firm size					
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
Size below (and incl.) median	50	0.0128**	0.0054	0.0109**	0.0051
Size above median	49	0.0019	0.0027	0.0037	0.0031

As even more detailed analyses do not provide evidence for a negative reputational effect, we conclude that possible reputational effects due to tax avoidance seem to be less relevant to the capital market. Instead, the results hint at further support of H1, which states that the positive effects predominate, i.e. outweigh reputational losses resulting from unfavorable media coverage.

Similar Firms

In additional tests, we analyze potential spillover effects of LuxLeaks disclosure on similar

firms. One reason for this influence on other MNCs may be that almost all firms covered by LuxLeaks are clients of PricewaterhouseCoopers (ICIJ, 2014b; Marian, 2016). Thus, one might expect that other multinationals being advised by the remaining Big4 firms were just lucky to not be revealed. This is also in line with one strand of literature that shows the impact of one firm's behavior on the behavior of its peers (e.g., Gleason, Jenkins, and Johnson, 2008; Beatty, Liao, and Yu, 2013). Furthermore, as 32 out of all OECD countries offer ATRs (OECD, 2013), it is likely that Luxembourg is not the only country that engaged in special tax agreements with MNCs.

Moreover, spillover effects are well-known from other events. If one firm of a certain industry issues a profit warning, shareholders anticipate the same will occur with other firms in the same industry. A prominent case, which recently dominated worldwide news and depicts this transfer of information, is the emissions scandal at Volkswagen. The German automobile manufacturer manipulated engines to produce certain emission values during testing. On September 18, 2015, the scandal was revealed.[47] Following the event, share prices of Volkswagen dropped dramatically, but very similar German MNCs such as BMW and Daimler also experienced distinctive market losses. However, MNCs that are perceived to be different, e.g., Toyota as a non-German automaker exhibited a rather stable market performance and seemed to be unaffected by the event. As the Volkswagen emissions scandal reveals, the capital market seems to expect the same behavior only of very similar firms. Considering the spillover effect of the emissions scandal on firms other than Volkswagen itself, LuxLeaks, i.e., news about engagement in ATRs, may have an effect on more than just the firms uncovered by the ICIJ.

[47] On September 18, 2015, the United States Environmental Protection Agency issued the "notice of violation (NOV) of the Clean Air Act (CAA) to Volkswagen". EPA (2015, September 18), available at http://yosemite.epa.gov/opa/admpress.nsf/21b8983ffa5d0e4685257dd4006b85e2/dfc8e33b5ab162b985257ec400578 13b!OpenDocument.

In a first step, we analyze all other firms whose headquarters are located in the same countries as the LuxLeaks firms. We take those firms to be quoted on the same capital market and, therefore, we are able to compare the capital market reaction.[48] Taking into account the CARs of 5,079 firms (Panel A), we find no significant effect (-0.0002). However, this is not surprising as all other firms should roughly resemble the market portfolio to which we compare the returns of LuxLeaks firms in our event study methodology.

Table 7
Spillover Effect on Similar Firms

Table 7 presents the results of the *t*-tests that are applied to test the effect of LuxLeaks on the overall capital market. CARs are the mean cumulated abnormal returns over a five-day event window (-2 to +2 where 0 is the event day). In Panel A, results show CARs for all other available firms that are located in the same countries as the ETR subsample. CARs of similar firms are shown in Panel A as well as in Panel B, which displays results for the market adjusted model. Similar firms are obtained by executing one-to-five nearest neighbor propensity score matching. *, **, and *** show significance at the level of 10 %, 5 %, and 1 %, respectively.

Panel A: Market model			
	# of firms	Mean CAR	Std. err.
Other firms in the same countries	5,079	-0.0002	0.0018
LuxLeaks firms after matching	82	0.0079**	0.0035
Other firms after matching	307	0.0047**	0.0026

Panel B: Market adjusted model			
	# of firms	Mean CAR	Std. err.
LuxLeaks firms after matching	82	0.0067**	0.0033
Other firms after matching	307	0.0031	0.0026

To identify firms similar to the LuxLeaks firms, we apply a one-to-five nearest neighbor propensity score matching procedure according to Rosenbaum and Rubin (1983) and Caliendo and Kopeinig (2008). We calculate the propensity score based on size, profitability and leverage, and we require that the matched firms be located in the same country and operate in the same industry.

[48] Previous studies have found a significant home-bias of investment for shares (French and Poterba, 1991; Mondria and Wu, 2010). Accordingly, we assume that each country's private shareholders account for a large part of investment in their own country.

Furthermore, to reach a reasonable matching quality, we only consider firms with differences in propensity scores of less than 0.025.

We lose 21 firms of our Sample 2 as no matching partners can be found. For the remaining 82 LuxLeaks firms, we find a total of 307 very similar firms. We apply our previously used event study methodology to the 82 LuxLeaks firms as well as to the 307 matched firms. The results of the *t*-tests are shown in Table 7. The CAR of 0.0079, which is significant at the 5 % level, is consistent with prior results for the capital market reaction to LuxLeaks (cf. Table 3). We also find a positive and significant result for very similar firms (0.0047). Panel B replicates the results of Panel A using the market adjusted model. The CAR for very similar firms falls just short of being significant.

We conclude that the capital market anticipates similar firms to also be involved in legally assured tax avoidance through ATRs. An untabulated comparison of LuxLeaks and similar firms by means of a *t*-test underlines our presumption, as we find no statistically significant difference between the two groups. We conclude that positive effects outweigh potential reputational losses not only for LuxLeaks firms but also for the whole capital market as long as the other listed MNCs are perceived as very similar by investors.

4.3. Capital Market Reaction to Potential Removal of Tax Benefits

The positive valuation of LuxLeaks by the capital market can be explained by tax benefits, i.e., tax certainty and reduced tax payments. What happens if those are removed? In the aftermath of LuxLeaks, a public debate about the tax practices of some European countries emerged. In particular, a discussion of possibly illegal state aid was raised. Although ATRs represent legal documents on a national level, they also have to comply with European law. The European Commission started to inspect ATR practices in Luxembourg and all over Europe (European Commission,

2014). Thus, the implications of LuxLeaks enable us to test the effect of a possible removal of tax benefits, i.e., to measure the negative effect of possible back taxes. Almost one year after the ICIJ's publications, on October 21, 2015, the European Commission released a judgment on illegal state aid in the cases of Starbucks and Fiat (European Commission, 2015). The two companies had been granted tax advantages by fiscal authorities of the Netherlands and Luxembourg, respectively.[49] While these two particular MNCs were not included in the LuxLeaks publications, in the following tests, we refer to this second event to analyze – for LuxLeaks firms – a potential additional capital market response to this new view of advance tax rulings.

According to hypothesis 3, namely that the capital market anticipates future, similar judgments for LuxLeaks firms, we use the date of the judgment and analyze the CARs of LuxLeaks firms surrounding October 21, 2015. Mean CARs are presented in Table 8.[50]

Table 8
CARs around European Commission Judgment

Table 8 presents the results of the *t*-tests that are applied to test H3. CARs are the mean cumulated abnormal returns for the baseline sample. Table 8 differentiates between two methods of calculating abnormal returns: the market model and the market adjusted model. The number of firms differs slightly to previous baseline sample due to differing availability of price information. The results are shown for varying window lengths. Due to missing data the sample is reduced by one firm if the window is extended. *, **, and *** show significance at the level of 10 %, 5 %, and 1 %, respectively.

CARs		market model		market adjusted model	
	# of firms	Mean CAR	Std. err.	Mean CAR	Std. err.
Window length: -2/+2	147	-0.0012	0.0030	-0.0076***	0.0032
Window length: -3/+3	147	-0.0021	0.0036	-0.0099***	0.0039
Window length: 0/+3	147	-0.0011	0.0028	-0.0074***	0.0030

We again consider different event windows. If we consider the market model including the detailed correlation of share price with market return, the CARs are close to zero and statistically

[49] Although Fiat was convicted based on a Luxembourg ATR, Fiat is not included in our sample of LuxLeaks firms because it was not one of the firms which were revealed by the ICIJ.
[50] With respect to this event (October 21, 2015), the number of observations hardly differs from the baseline sample. We examine 147 firms instead of 148 due to incomplete price information.

insignificant. That is, we find no support for H3. The capital market seems not to anticipate any back taxes for the LuxLeaks firms. As untabulated tests show, even differentiating among the levels of tax avoidance applied in previous tests does not provide further insight.

To compare our results with the findings of previous studies, such as Hanlon and Slemrod (2009) or Gallemore et al. (2014), we apply the adjusted market model instead. As depicted on the right-hand side of Table 8, we find highly significant negative CARs if the adjusted market method is applied. However, we interpret these results with some caution because only the standard market model considers the specific correlation between the performance of the market and the single share. Consequently, the evidence of negative effects due to potential back taxes is very limited in our case.

Several reasons might affect this result. First, a measurement error may occur as it is not fully clear when the capital market reacts to the judgment with respect to LuxLeaks firms. Judgments and changes in law are often widely anticipated, as they take a long time to develop. Thus, the capital market reaction may be spread over the months prior to the judgment and consequently not be identifiable. Another explanation may be that the capital market does not believe in future, similar judgments, as it is precisely stated that ATRs as such are legal, and they were only incompatible with European state aid rules in the two investigated cases. Last, the reduced certainty due to the possibility of back taxes may simply not be reflected in share prices. This last argument is in line with prior research that had difficulty identifying an overall negative capital market reaction to tax sheltering (e.g., Hanlon and Slemrod, 2009).

5. Conclusion

In this study, we examine the capital market reaction to the LuxLeaks publications on November 5, 2014. This revelation offered new information about firms' involvement in enhanced tax planning, i.e., a reduction of tax payments while gaining tax certainty, to the capital market. Using an event study methodology, we find robust evidence for positive cumulated abnormal returns. The overall positive effect suggests that the positive effects attributed to additional information about tax avoidance and increased tax certainty outweigh the negative impact of potential reputational losses.

In additional tests we find a pronounced positive capital market reaction to LuxLeaks for firms with extraordinarily high ETRs. This finding supports the argument that the capital market rewards new information about a firm's commitment to tax avoidance, particularly if new information about an involvement in secure tax planning is detected that had not already been disclosed by the ETR. We find only limited evidence for the view that the capital market rewards information about tax certainty for those MNCs that are perceived as particularly tax aggressive.

Additional tests also reveal a positive capital market reaction for similar firms. The results imply that potential reputational costs are outweighed by the positive effects of secure tax avoidance not only for LuxLeaks firms but also for other listed MNCs that are perceived as similar.

Considering a second event in 2015 – when the European Commission announced a potential removal of the tax benefits associated with ATRs – we find only limited evidence for a negative capital market response.

Our results contribute to the discussion about the impact of tax avoidance on firm value. Our results cast doubts on significant reputational effects. Instead, we find some evidence that the capital market rewards additional information about a commitment to tax avoidance that is not associated with the risk of back taxes and penalties. Consequently, our results are in line with the

view that increased transparency about tax planning strategies may help MNCs to capitalize the competitive advantages of tax avoidance.

We acknowledge that our results are subject to some limitations. First, we only show a short-term effect of LuxLeaks on share prices, and the effect might be reversed after a while. However, including a longer period as the event window increases the chance of a possible bias due to other influences. Nevertheless, we believe that even a short-term reaction conveys new insight into the interaction of different effects. Second, our results may be questioned because taxes represent only a small fraction of the information that influences share prices, and some investors might simply not care about tax avoidance. Third, our results have to be interpreted with some caution as they only reveal effects of the specific analyzed disclosure, i.e. certain tax avoidance, on equity holders of MNCs. Future research on the effect on credit market participants or customers may complement our results. Additionally, as prior literature shows, public and private firms exhibit different levels of tax avoidance (Badertscher, Katz, and Rego, 2013). Due to the design of our event study, in which we test the capital market reaction, we can only consider public firms. Therefore, future research on the effects of tax avoidance on the firm value of private firms would be quite valuable.

APPENDIX

Table A1
Variable Definitions

CAR	Cumulated abnormal returns, 5 day centered unless otherwise indicated
CASH ETR	*txpd* / *pi*; income taxes paid over pretax income
GAAP ETR	*txt* / (*pi* – *spi*); total income taxes over for special items adjusted pretax income
Size	log (*at*); logarithm of total assets in U.S. dollar
Profitability / Return on Assets	*pi* / *at*; pretax income over total assets
Leverage	*dlc* / *at*; total debt in current liabilities over total assets

Table A2
Sample Firms

LuxLeaks firms included in baseline sample							
Company name	Country	Industry	Sample 2	Company name	Country	Industry	Sample 2
3I GROUP PLC	GBR	Other (Fin.)	x	HUTCHISON	HKG	High Tech	x
ABBOTT LABORATORIES	USA	Health	x	HYPO REAL	DEU	Other (Fin.)	
ABS-CBN	PHL	High Tech	x	ICAP PLC	GBR	Other (Fin.)	
ACCENTURE PLC	IRL	Other	x	INFORMA PLC	GBR	Consumer	
ALLERGAN PLC	USA	Health		INTELSAT	LUX	High Tech	
ALLIANZ SE	DEU	Other (Fin.)	x	INTERPUBLIC GROUP OF COS	USA	Other	x
AMAZON.COM INC	USA	Consumer	x	INTESA SANPAOLO SPA	ITA	Other (Fin.)	
AMERICAN INTERNATIONAL	USA	Other (Fin.)	x	INTL FLAVORS & FRAGRANCES	USA	Manufacturing	x
AMERIPRISE FINANCIAL INC	USA	Other (Fin.)	x	JAZZ PHARM	IRL	Health	x
AMP CAPITA	AUS	Other (Fin.)	x	JONES LANG LASALLE INC	USA	Other (Fin.)	x
AOZORA BANK LTD	JPN	Other (Fin.)	x	JULIUS BAER GRUPPE AG	CHE	Other (Fin.)	x
APOLLO GLOBAL MANAGEMENT	USA	Other (Fin.)	x	LAGARDERE (GROUPE)	FRA	Consumer	x
APPLE INC	USA	High Tech	x	LANDESBANK	DEU	Other (Fin.)	
AVERY DENNISON CORP	USA	Manufacturing	x	LEHMAN BROTHERS HOLDINGS INC	USA	-	
AVIVA PLC	GBR	Other (Fin.)	x	LVMH MOET HENNESSY LOUIS V	FRA	Consumer	x
AXA SA	FRA	Other (Fin.)	x	MACQUARIE GROUP LTD	AUS	Other (Fin.)	
BALL CORP	USA	Manufacturing	x	MCGRAW HILL FINANCIAL	USA	Other	
BALOISE HOLDING	CHE	Other (Fin.)	x	MERCK KGAA	DEU	Health	x
BANCA POPOLARE EMILIA	ITA	Other (Fin.)		METTLER-TOLEDO INTL INC	USA	High Tech	x
BANK OF AMERICA CORP	USA	Other (Fin.)	x	MYLAN NV	GBR	Health	x
BANQUE DEG	BEL	Other (Fin.)	x	NAVISTAR INTERNATIONAL CORP	USA	Consumer	
BARCLAYS PLC	GBR	Other (Fin.)		NEXT PLC	GBR	Consumer	x
BAYTEX ENERGY CORP	CAN	Manufacturing		NIKKO CORD	JPN	-	
BERKSHIRE HATHAWAY	USA	Other	x	NIPPON SHEET GLASS CO LTD	JPN	Manufacturing	
BLACKSTONE GROUP LP	USA	Other (Fin.)	x	NISSHINBO HOLDINGS INC	JPN	Consumer	x
BNP PARIBAS	FRA	Other (Fin.)	x	NORDSON CORP	USA	Manufacturing	x
BRITISH AMER TOBACCO PLC	GBR	Consumer	x	OAKTREE CAPITAL GROUP LLC	USA	Other (Fin.)	x
BROOKFIELD ASSET MANAGEMENT	CAN	Other (Fin.)	x	OFFICE DEPOT INC	USA	Consumer	
BUCHER INDUSTRIES AG	CHE	Manufacturing	x	PROCTER & GAMBLE CO	USA	Manufacturing	x
BURBERRY GROUP PLC	GBR	Consumer	x	PROLOGIS INC	USA	Other (Fin.)	x
CARLYLE GROUP LP	USA	Other (Fin.)	x	PROSPECTOR OFFSHORE DRILLING	LUX	Manufacturing	
CATERPILLAR INC	USA	Manufacturing	x	PRUDENTIAL PLC	GBR	Other (Fin.)	x
CBRE GROUP INC	USA	Other (Fin.)	x	QUILVEST SA	LUX	Other (Fin.)	x
CIRCOR INTL INC	USA	Manufacturing	x	RECKITT BENCKISER GROUP PLC	GBR	Manufacturing	x
CITIGROUP INC	USA	Other (Fin.)	x	ROSEBUD RE	ISR	Other (Fin.)	
CLIFFS NATURAL RESOURCES INC	USA	Other	x	ROTHSCHILD AND CO SCA	FRA	Other (Fin.)	x
CNP ASSURANCES SA	FRA	Other (Fin.)	x	ROWAN COMPANIES PLC	USA	Manufacturing	
COACH INC	USA	Consumer	x	ROYAL BANK OF CANADA	CAN	Other (Fin.)	x
COCA-COLA HBC AG	CHE	Consumer	x	SAN PAOLO	ITA	Other (Fin.)	
COMMERZBANK	DEU	Other (Fin.)		SBERBANK OF RUSSIA OJSC	RUS	Other (Fin.)	x
COMPASS GROUP PLC	GBR	Consumer	x	SCHRODERS PLC	GBR	Other (Fin.)	x
COVIDIEN D	IRL	Health	x	SHIRE PLC	IRL	Health	x
CREDIT SUISSE GROUP	CHE	Other (Fin.)	x	SINOPEC EN	CHN	Manufacturing	x
DEAN FOODS CO	USA	Consumer		SKANDINAVISKA ENSKILDA BANK	SWE	Other (Fin.)	x
DEUTSCHE BANK AG	DEU	Other (Fin.)		SOCFINAL	LUX	Consumer	
DEVELOPER	USA	Other (Fin.)		STABILUS SA	LUX	Consumer	
DEXIA SA	BEL	Other (Fin.)	x	STAPLES INC	USA	Consumer	
DMG MORI AG	DEU	Manufacturing	x	STATE STREET CORP	USA	Other (Fin.)	x
DNB ASA	NOR	Other (Fin.)		SUBSEA 7 SA	GBR	Manufacturing	x
DST SYSTEMS INC	USA	High Tech	x	SYKES ENTERPRISES INC	USA	High Tech	x
DUET GROUP	AUS	Manufacturing	x	TAYLOR WIMPEY PLC	GBR	Other	
E.ON SE	DEU	Other	x	TE CONNECTIVITY LTD	CHE	High Tech	x
EMULEX CORP	USA	High Tech		TELE2 AB	SWE	High Tech	x
EQT CORP	USA	Manufacturing	x	TELENET GROUP HOLDING N.V.	BEL	High Tech	x
EUROHOLD B	BGR	Other (Fin.)		TEMENOS GROUP AG	CHE	High Tech	x
EVRAZ PLC	GBR	Manufacturing		TEVA PHARMACEUTICALS	ISR	Health	x
EXPERIAN PLC	IRL	High Tech	x	TITAN INTERNATIONAL INC	USA	Manufacturing	
FAIRFAX FINANCIAL HOLDINGS	CAN	Other (Fin.)		TYCO INTERNATIONAL PLC	IRL	High Tech	x
FEDEX CORP	USA	Other	x	UBM PLC	GBR	Other	x
FINMECCANICA SPA	ITA	Manufacturing		UBS AG	CHE	Other (Fin.)	x
FONCIERE INEA	FRA	Other (Fin.)		UN HOLDING	IRL	Other (Fin.)	
FOYER DEAD	LUX	Other (Fin.)		UNICREDIT SPA	ITA	Other (Fin.)	
GATE GROUP HLDGS AG	CHE	Consumer	x	UNIONE DI BANCHE ITALIANE	ITA	Other (Fin.)	
GAZPROM PJSC	RUS	Manufacturing	x	UNITED TECHNOLOGIES CORP	USA	Manufacturing	x
GENERAL ELECTRIC CO	USA	Other	x	VERIZON COMMUNICATIONS INC	USA	High Tech	x
GIGAMEDIA	TWN	High Tech		VERMILION ENERGY INC	CAN	Manufacturing	x
GLANBIA PLC	IRL	Health	x	VITEC GROUP PLC	GBR	Manufacturing	x
GLAXOSMITHKLINE PLC	GBR	Health	x	VODAFONE GROUP PLC	GBR	High Tech	
GOODMAN GROUP	AUS	Other (Fin.)	x	VOLKSWAGEN AG	DEU	Consumer	x
GROUPE BRUXELLES LAMBERT	BEL	Other (Fin.)	x	WEATHERFOR	CHE	Manufacturing	
HENDERSON GROUP PLC	GBR	Other (Fin.)	x	WENDEL	FRA	Other	x
HRG GROUP INC	USA	High Tech	x	WGZ BK.GSH	DEU	Other (Fin.)	x
HSBC HLDGS PLC	GBR	Other (Fin.)	x	WOLSELEY PLC	CHE	Consumer	x
HUHTAMAKI OYJ	FIN	Manufacturing	x	YAMANA GOLD INC	CAN	Other	

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