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Sebastian Eichfelder / Mona Lau

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(In)attention and turn-of-the-year returns

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Sebastian Eichfelder, Otto-von-Guericke-Universität Magdeburg[♠]
Mona Lau, Freie Universität Berlin and Ernst & Young Berlin[♣]

Abstract: We argue that the tax capitalization effect is a function of the attention of market participants. Market reactions can therefore be driven not only by the announcement dates of tax events but also by factors influencing the dissemination of tax information, such as deadlines and media reports. Analyzing the introduction date of the earlier-announced German capital gains tax reform of 2009 by triple-difference estimation, we find evidence of a delayed market reaction long after the announcement date. Within the last two (five) trading days before the deadline, we observe a sharp increase in abnormal trading volumes of 151.7% (104.0%). The aggregate abnormal return of the German capital market in the last five trading days in 2008 was 10.6%. Furthermore, we find a significant and positive correlation between trading volumes and measures for awareness of the upcoming tax reform (Google searches and media reports).

Keywords: Capital gains tax, asset pricing, tax awareness, tax arbitrage, turn-of-the-year effect, market efficiency

JEL Classification: G02; G12; H24; M41

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1.   Introduction

The question of how taxes affect stock prices is a central aspect for asset management, firm valuation, and market efficiency (e.g., Ayers, Lefanowicz, and Robinson, 2003; Sialm, 2009). For instance, tax-loss selling is considered an important driver of the turn-of-the-year effect (Starks, Yong, and Zheng, 2006; Sikes, 2014). It is therefore no surprise that research suggests the anticipation of future capital gains taxes in current share prices (Dai, Maydew, Shackelford, and Zhang, 2008). In line with the efficient market hypothesis (EMH; Fama, 1970, 1998), empirical studies concentrate their analysis on the announcement dates of tax reforms and assume an immediate response from investors to new relevant tax information (Lang and Shackelford, 2000; Blouin, Hail, and Yetman, 2009).

However, such an EMH framework does not account for empirical evidence of the delayed incorporation of relevant information into prices (DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009; Pantzalis and Ucar, 2014). If information is costly or information capacity is limited, a rational strategy may be to remain temporarily uninformed (Sims, 2003; Reis, 2006). Thus, empirical research finds stronger tax effects if taxes are salient and decision makers are tax aware (Chetty, Looney, and Kroft, 2009; Alstadsaeter and Jacob, 2013). Recent findings by Hoopes, Reck, and Slemrod (2015) suggest that at least some taxpayers employ attention rationally to react to tax deadlines and tax policy changes.

Combining these strands of literature, we argue that the capitalization of taxes in share prices is driven not only by the "true" tax burden, but also by the attention of market participants. Therefore, market prices should be affected not only by the announcement of upcoming tax reforms, but also by the dissemination of this information in the capital market. In a world with costly information, agents will update their knowledge only if the marginal information benefit exceeds the corresponding cost (Sims, 2003; Reis, 2006). Since issues should become more urgent as they approach their deadlines (Hoopes, Reck, and Slemrod, 2015), we expect

deadlines to play an important role in the dissemination of tax (and, similarly, other) information.

We refer to a recent major capital gains tax reform to address these issues empirically. Before the German capital gains tax reform of 2009 (CGTR 2009), capital gains on the shareholdings of individual investors were fully tax-exempt if the holding period exceeded one year (and were otherwise partially tax-exempt). In 2007, the German parliament implemented a tax reform with a flat tax rate of 26.38% on short-term and long-term capital gains on the shareholdings of individual investors acquired after December 31, 2008. Existing shareholdings of individual and institutional shareholders were not affected by these higher capital gains taxes. This is a benefit for our analysis, since the reform did not increase the tax burden of stock sellers, creating a lock-in effect (Dai, Maydew, Shackelford, and Zhang, 2008). We can therefore focus on the tax capitalization effect for stock buyers.

Our analysis is based on an "early" announcement of the CGTR 2009, since this information disseminated "slowly" to individual investors. The EMH (Fama, 1970) implies a price reaction when new relevant information becomes available (July 2007 in this case). Hence, there should be no volatile "abnormal" pricing reaction on the introduction date (the turn of the year 2008/2009 in this case). However, regarding the CGTR 2009, market research by the Deutsche Bank (2008) and other institutions (GfK, 2008; Hilmes, 2008) suggests that, in the second half of 2008 (about one year after the announcement date), the majority of affected German investors were either unaware of the reform or had not yet adjusted their portfolios.

By the end of 2008, the subject had become a major issue in the media (with the following statements translated from German): *Handelsblatt*'s headline on December 11, 2008, was "Saving taxes at the last minute" and, on December 20, 2008, the *Frankfurter Allgemeine Zeitung* called for a "Final spurt for tax savers." Following previous research (Klibanoff, Lamont, and Wizman, 1998; Peress, 2008), we assume that media coverage generally increases the attention of individual investors with limited information processing capacities

and therefore affects share prices. Furthermore, we expect that the deadline as itself attracted the attention of temporarily unaware individual investors (see also Reis 2006; Hoopes, Reck, and Slemrod, 2015).

Our main target is the identification of market reactions to the CGTR 2009 introduction date at the turn of the year 2008/2009 (TY 2008/2009) using a difference-in-difference-in-differences (triple difference) strategy.[1] The first difference compares the trading volumes, daily returns, and share prices of trading days shortly before and after the reform deadline. The second difference refers to unaffected financial markets as a control group (NYSE Euronext Paris and the London Stock Exchange). The third difference uses untreated pseudo-reform deadlines from control periods (the TY 2007/2008 and the TY 2009/2010). This identification strategy allows us to control for market–year fixed effects and seasonality effects (e.g., turn-of-the-year effects), which might otherwise result in biased or inconsistent regression results. As an alternative identification strategy, we rely on media reports and Google searches as direct measures of the attention of market participants to the upcoming tax reform. We find a significant correlation between our tax awareness measures and the trading volumes of the German capital market.

According to our estimates, the German trading volume in the last two (five) trading days 2008 exceeded the regular volume by 151.7% (104.0%). The aggregate unexpected return within the last five trading days of 2008 can be estimated at 10.6%. We observe negative abnormal trading volumes and daily returns in the five trading days following the TY 2008/2009, which suggests a shifting of share trades from 2009 to 2008 to avoid the taxability of future capital gains. We also find a positive correlation between awareness measures (either Google searches or media reports on the CGTR 2009) and German trading activity.

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[1] We do not consider the announcement effects of the tax reform, which are hard to isolate and are addressed by Voeller and Müller (2011). The CGTR 2009 was part of a broader reform package (the German 2008/2009 Business Tax Reform). Since both reform packages were jointly announced by the German legislature (see Section 2), the announcement effects of the CGTR 2009 are difficult to identify. However, that is not the case for the introduction date, since the other reform measures of the 2008/2009 Business Tax Reform were introduced in January 2008, one year before the new regulations of the CGTR 2009.

We further find evidence of stronger CGTR effects on stocks with typically strong turn-of-the-year effects (small-capitalization stocks and loser stocks; see Starks, Yong and Zheng, 2006 and Sikes, 2014). Therefore, the observed CGTR effects seem to be partially driven by the compensation of opposing turn-of-the-year effects. Hence, tax effects could generally be more relevant for small-capitalization stocks with lower liquidity and higher volatility.

To our knowledge, we are the first to argue and show empirically that the capitalization of taxes in stock prices can be affected by the attention of market participants. An important implication of that outcome is that sole focus on the announcement date of an event might not be sufficient to capture all relevant market reactions resulting from that event. This holds, for example, for the announcement dates of tax reforms, which have been widely used for the identification of tax effects on asset prices. In line with our empirical setting, the attention of investors should be especially important for market reactions if a) investors have limited information processing capacities (e.g. individual investors), b) issues are complicated (e.g. tax policy), and c) the attention is focused on a limited number of trading days.

A second implication is that deadlines may attract the attention of investors and can play an important role in the dissemination of information into prices. This should hold especially if the expiration of a deadline is extensively discussed by the media or other information sources. As a consequence, there might be herd behavior and volatile market reactions if an event attracts the attention of a significant number of investors. Under such conditions, rational (in)attention might be a well-suited framework for the analysis of "abnormal" market reactions such as the turn-of-the-year effect (Poterba and Weisbenner, 2001) and delayed or imperfect pricing reactions (Hirshleifer, Lim, and Teoh, 2009). Note that we find stronger CGTR-2009 effects for stocks with typically high turn-of-the-year effects (small-capitalization stocks and loser stocks). This fits well with the tax-loss-selling hypothesis for the turn-of-the-year effect (Sikes 2014) and the disposition effect for loser stocks (Barberis and Xiong, 2009). Thus, the CGTR 2009 might have distracted the attention of individual

investors from tax-loss selling at the end of the tax year 2008 to the effective "tax exemption" of future capital gains from loser stocks, which had been acquired before the TY 2008/2009.

As a third implication, our findings can be regarded as a challenge for the EMH (Fama, 1970, 1998), which has been controversially discussed in the literature for decades (for a review see Lim and Brooks, 2011). In its weak form, the EMH asserts that asset prices fully reflect all information in the market´s past price history. Therefore, public awareness of previously announced tax reforms should not be able to systematically affect current share prices. Our findings support previous evidence of market underreactions and delayed market responses due to limited attention (DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009). If delayed market reactions can be anticipated, they provide opportunities for better-informed investors to generate arbitrage profits. In the case of the CGTR 2009, an optimal strategy for institutional investors was to sell German shares exactly before the CGTR introduction date and to rebuy those shares about one week later. Note that our regressions imply a steep but temporal average increase in share prices of about 10.6%, while CGTR tax law changes were not relevant to institutional investors.

Our paper proceeds as follows. Section 2 contains a brief overview of the CGTR 2009. Section 3 develops the theory and derives hypotheses for our empirical analysis. Section 4 documents our identification strategy and the data. Section 5 describes our empirical investigation and results. Section 6 concludes the paper. Additional figures and cross-checks are provided by Appendixes A and B.

2.   The German capital gains tax reform of 2009

While the CGTR 2009 was embedded in the more general 2008/2009 Business Tax Reform,[2] we focus on the reform of the taxation of capital earnings and capital gains. The introduction

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[2] This reform introduced major changes in the German taxation of companies, including the reduction of the corporate income tax rate from 26.38% to 15.83% (both including the so-called solidarity tax surcharge), the broadening of the income tax base for businesses (e.g., by a revision of thin capitalization tax rules), and coordinated tax reforms for partnerships, single businesses, and individuals. The main objective of the 2008/2009 Business Tax Reform was to enhance Germany's attractiveness for business investment.

date of this reform (January 2009) differed significantly from the introduction date of the other reform measures of the 2008/2009 Business Tax Reform (January 2008). Therefore, it is possible to isolate tax effects resulting from the CGTR 2009 introduction deadline.

The first media reports on a major German reform of business taxation date back to April 10, 2006. In June 2006, a draft paper published by the German Ministry of Finance suggested imposing a general withholding tax with a flat rate on the capital earnings (including interests and dividends) and capital gains of individual taxpayers. The governmental task force presented the concept in November 2006. In January 2007, the decision was taken to introduce the flat tax on the capital earnings and capital gains of individual taxpayers on January 1, 2009. In addition, it was decided to maintain the "old" capital gains tax rules for shares acquired before that introduction date. The final bill was presented in May 2007 and was approved shortly thereafter (May and July 2007). Figure 1 illustrates the described development process (for a more detailed review, see Voeller and Müller, 2011).

[Figure 1 about here]

For shares acquired before January 2009, the taxation of the capital gains of German individual investors depends on the holding period. If the holding period exceeds one year, investors may sell shares tax free. Otherwise (i.e., the holding period is less than one year), 50% of the capital gains are taxed with the regular progressive personal income tax rate (including the solidarity tax surcharge) ranging from 0% to 47.48%. Hence, the maximum effective capital gains tax rate on shares bought before January 2009 is 23.74%.

By contrast, capital gains realized from shares bought after December 2008 are taxable with the minimum of the regular progressive income tax rate and a flat rate of 26.38% (including the solidarity tax surcharge) on interests, dividends, and capital gains. After 2008, there is no discriminative tax treatment, depending on the length of the holding period. Table 1 illustrates the taxation for shares acquired before and after the CGTR 2009.

[Table 1 about here]

Individual investors face a considerably higher tax burden on capital gains if shares were purchased after January 1, 2009.[3] For a holding period longer than one year, the tax burden (including the solidarity tax surcharge) increases by 26.38% for taxpayers with a personal income tax rate of at least 25% (excluding the solidarity tax surcharge). For a holding period shorter than one year, the additional tax burden increases inversely to the regular personal income tax rate. For example, at a tax rate of 26.38% (including the solidarity tax surcharge), the tax burden doubles from 13.19% for shares purchased before 2009 to 26.38% for shares purchased in 2009 and thereafter (both including the solidarity tax surcharge).

In spite of these tax incentives for individual shareholders and the early announcement date of the reform, a relevant part of the German population was not fully attentive to the upcoming tax law changes. According to GfK (2008), only 30% of the respondents felt well informed about the CGTR 2009 in July 2008, while 30% obtained limited information and 40% were uninformed. About two-thirds (even more for wealthy taxpayers) were planning to obtain better information about CGTR 2009 and about 40% were planning to restructure their portfolios (both to the end of the year 2008). According to a survey of the Deutsche Bank (2008) 100 days before the introduction date, only 11% considered the tax rate change in their trading decisions at that time, while 22% of the survey participants were planning to restructure their portfolios before the end of the year of 2008.

The CGTR 2009 was extensively discussed by the German media in December 2008 (all statements translated from German): *Die Welt* headlined "The stock market crisis as a benefit: Investors may use low share prices and save the new capital gains tax" on December 9 and *Börse Online* "The countdown for the capital gains tax is running" on December 18. Herrmann from *TAZ Online* pointed out on the morning of December 29, "Exactly two days

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[3] That holds also for taxpayers with a regular personal income tax rate below 25%. In these cases the capital gains are not taxed with 26.38%, but with the regular income tax rate plus solidarity tax surcharge. By contrast, either 0% (holding period > one year) or 50% (holding period ≤ one year) of capital gains are taxed with the regular personal income tax rate plus the solidarity tax surcharge when shares were acquired before January 1, 2009.

are left for investors to stock up on shares on the capital markets, for which tax-free selling is possible after one year of holding." Even the *Tagesschau,* the most important daily news show on German television, reported about the CGTR 2009 on December 30.

Table 2 provides a monthly overview of the reports of the largest German daily newspapers in 2008 about the CGTR 2009. We find a maximum of articles in December, but also high numbers in March/April and October/November. The high number in March/April was pushed by rumors about plans for new capital gains taxation rules for certificates and funds. Nevertheless, the tax bill ultimately remained unchanged. Articles published in October/November typically described the new tax rules, while articles in December 2008 were most concrete and recommended buying shares or undertaking a complete restructuring of portfolios before the end of the year of 2008. Table 2 documents the constant stream of information as well as the increasing number of articles close to the year-end.

[Table 2 about here]

3.   Theory and hypotheses

According to Lang and Shackelford (2000), the fair share price P_0 can be modeled as a function of constant free cash flows F, the cash dividend of the following period (with a constant growth rate in future periods) D_1, the constant dividend tax rate τ^d, the constant capital gains tax rate τ^c, and the constant discount rate r:[4]

$$P_0 = \frac{D_1 \cdot \left(1 - \tau^d\right)}{r \cdot \left[\tau^c + \frac{D_1}{F} \cdot \left(1 - \tau^c\right)\right]}.$$

(1)

This model does not account for the attention of market participants. Amending the model by tax awareness parameters θ^c and θ^d for capital gains taxes and dividend taxes results in

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[4] Note that the simplifying assumption of constant payments, interest rates, and tax rates can be justified by the imperfect foresight of the market participants taking current values as expectations for future values. Similar implications follow if free cash flows are assumed to grow over time (Lang and Shackelford, 2000).

$$P_0 = \frac{D_1 \cdot \left(1 - \tau^d \cdot \theta^d\right)}{r \cdot \left[\tau^c \cdot \theta^c + \dfrac{D_1}{F} \cdot \left(1 - \tau^c \cdot \theta^c\right)\right]} , \tag{2}$$

θ^c and θ^d can take values between zero (investor is tax unaware) and one (investor is fully tax aware). Following Lang and Shackelford (2000), the marginal effect of capital gains taxes on share prices can then be described by

$$\frac{\partial P_0}{\partial \tau^c} = -P_0 \cdot \theta^c \cdot \frac{F - D_1}{\tau^c \cdot \theta^c \cdot \left(F - D_1\right) + D_1} . \tag{3}$$

In general, free cash flows F are higher than dividends D_1, and shareholders realize positive capital gains. Thus, the derivative (3) is negative and higher expected capital gains taxes reduce the share price. However, this relation holds only for tax-aware investors. If θ^c approaches zero, we generally obtain

$$\lim_{\delta\theta^c \to 0} \frac{\partial P_0}{\partial \tau^c} = 0 . \tag{4}$$

According to (4), tax-unaware investors will not react to capital gains taxation. Since an investor may obtain information from the daily news, tax awareness is not fixed. Sims (2003) and Reis (2006) provide a theoretical background that rational agents may be temporarily inattentive. Due to limited information capacity (Sims, 2003) and information costs (Reis, 2006), infrequently updating information can be a utility-maximizing strategy. In case of a deadline, an inattentive decision maker then has an incentive to update information shortly before the date a final decision will be required. Analyzing data on taxpayer information search, Hoopes, Reck, and Slemrod (2015) find that taxpayers seek information in systematic ways, considering policy changes and news reports. The authors show that information search activities are focused on tax-relevant deadlines (so-called tax notches).

Abstracting from lock-in effects[5] and interpreting equation (2) as a representation of the equilibrium price from a buyer perspective, higher capital gains taxes will shift the demand curve and reduce average demand. Our model reflects this well-known tax capitalization effect by accounting for tax awareness. If the number of tax-aware investors is high, capital gains taxes will be capitalized in the equilibrium price (Klein, 1998; Dai, Maydew, Shackelford, and Zhang, 2008). However, if a significant fraction of market participants is tax unaware, the capital gains tax will be considered only partially. Financial markets might therefore have a delayed reaction to tax and other events, as suggested by findings in the finance literature (DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009; Pantzalis and Ucar, 2014).

In the case of the CGTR 2009, a rational strategy for avoiding capital gains taxes was to acquire shares before January 1, 2009. Shares acquired before that date were regarded as tax-exempt after a minimum holding period of one year. While volatile market reactions of well-informed investors should have been focused on the period when tax reform information became available (Voeller and Müller, 2011), we also expect an abnormal market reaction at the TY 2008/2009 resulting from a higher attention of temporarily uninformed investors. Hence, we hypothesize that the deadline (Hoopes, Reck, and Slemrod, 2015) as well as the media reports in December 2008 attracted and concentrated the attention of individual investors with high information costs on the TY 2008/2009. As mentioned before, market research in 2008 by order of the Deutsche Bank, Dresdner Bank, and JP Morgan (Deutsche Bank, 2008; GfK, 2008; Hilmes, 2008) suggests that a significant fraction of individual taxpayers was either unaware of the CGTR 2009 or had plans to adjust portfolios by the end of the year.

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[5] The lock-in effect is valid if the seller demands a higher selling price to be compensated for unexpectedly high capital gains taxes. In our setting, capital gains taxes were only increased for shares purchased by individual investors after January 1, 2009. Thus, sellers of shares in the relevant period (December 2008 to January 2009) were not affected by unexpectedly high capital gains taxes. For that reason, we take the reservation price of the sellers as fixed and assume, for simplicity, that the supply curve will not be affected by the CGTR 2009.

According to statistics of the Deutsches Aktieninstitut (DAI, 2014; the German Institute for Shares), 11.23% of the shares on the German capital market in 2008 were directly held by German private households, while 4.35% were held by mutual funds. The aggregate fraction of stocks directly or indirectly held by individual investors was therefore about 15.58%. Hence, the shareholdings of individual investors were relevant enough to substantially affect the German capital market.[6] Note that German tax law generally regards mutual funds as "transparent". As a result, the CGTR 2009 tax incentives of individual investors were the virtually the same for retail share trades and investments in mutual funds. We derive the following hypotheses for our empirical analysis.

H1a: *Due to an increase in tax awareness by the end of 2008, trading volumes were abnormally high shortly before the introduction of the CGTR 2009.*

A higher demand for shares implies higher share prices if it is not related to a corresponding increase in supply. In addition, the CGTR 2009 should have increased the willingness to pay for "tax-free" shares if these shares were compared to taxable shares bought in 2009.

H1b: *Due to an increase in tax awareness by the end of 2008 and tax capitalization effects, daily returns were abnormally high shortly before the introduction of the CGTR 2009.*

H1c: *Due to an increase in tax awareness by the end of 2008 and tax capitalization effects, share prices were abnormally high shortly before the introduction of the CGTR 2009.*

While the CGTR 2009 should have resulted in a short-run increase in share demand by the end of 2008, we expect a reversal at the beginning of 2009. The argument for this hypothesis is a demand-side bring-forward effect. As the tax reform increased the relative attractiveness of shares bought in 2008, we expect a shifting of trades from 2009 to 2008. In addition, higher capital gains taxes reduced the attractiveness of share trades in 2009.

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[6] When individual investors invest in mutual funds, they exert an indirect influence on the resources and the investment behavior of these funds. After receiving additional financial resources from the individual shareholder, the fund will invest corresponding to its policy. In the case of exchange-traded funds, the individual's investment in the mutual fund is, in fact, equivalent to an investment in the underlying assets of that fund (e.g., the stocks of the German DAX 30 index).

H2a: *Due to the abnormally high demand for shares at the end of 2008 induced by tax awareness, trading volumes were abnormally low shortly after the introduction of the CGTR 2009.*

After the CGTR 2009, theory implies a decreasing demand for shares and a decreasing willingness of individual investors to pay for shares. We expect abnormally low returns up to the point that stock prices reached their normal level. This suggests abnormally high share prices and negative abnormal returns in the period shortly after the introduction date.

H2b: *Due to the tax-induced willingness of individual investors to pay higher prices for shares at the end of 2008, daily returns were abnormally low shortly after the introduction of the CGTR 2009.*

H2c: *Due to the tax-induced willingness of individual investors to pay higher prices for shares at the end of 2008, share prices were still abnormally high shortly after the introduction of the CGTR 2009.*

H1a to H1c suggest a market reaction close to the introduction date of the reform. In addition, Pantzalis and Ucar (2014) provide evidence that the attention of market participants to earnings news can be preoccupied by religious holidays. On Christmas as well as on weekends and New Year's Eve, the German financial market was closed. As a result, there were only two trading days left between Christmas 2008 and New Year's Eve 2008. Therefore, since Christmas celebrations should have absorbed the attention of market participants, we expect an especially strong market reaction in the last two trading days in 2008 (December 29 and December 30).

H3a: *The tax awareness level of individual investors was especially high in the last two trading days in 2008, resulting in higher trading volumes.*

H3b: *The tax awareness level of individual investors was especially high in the last two trading days in 2008, resulting in higher daily returns.*

H3c: *The tax awareness level of individual investors was especially high in the last two trading days in 2008, resulting in higher share prices.*

While we are able to empirically test H1a to H3c, one might argue that corresponding market reactions are driven by strategic and tax-aware investors (e.g., institutional investors). Since data on share ownership are not available on a daily or even monthly basis, we are not able to directly observe the trading behavior of individual investors. However, using daily tick data and direct measures on tax awareness, we are able to derive a number of testable hypotheses on the relation between tax awareness and trading behavior.

We assume that individual investors with a low degree of tax awareness have a smaller average trading volume per transaction. This can be justified by economies of scale in the information technology. If market information is costly (Reis, 2006) and the information cost is the same for all shares and investors, it is more valuable for investors with large transaction volumes to invest in share market information. The reason is that the information cost does not depend on the number of purchased shares in a given transaction. Under these conditions, institutional investors and wealthy individual investors with high trading volumes per transaction are better informed about capital markets and market-related tax issues.

H4: *The demand of individual investors was especially high shortly before the introduction of the CGTR 2009, resulting in a lower average trading volume per transaction.*

In addition, we analyze the connection between awareness measures regarding the CGTR 2009 (newspaper articles, Google searches) and trading behavior in the year 2008. A higher awareness of the CGTR 2009 should 'alarm' individual investors and prompt them to purchase shares throughout 2008. Therefore, we expect a positive correlation between trading volume and tax awareness. Since additional trading should be driven by individual investors with a low trading volume per transaction, we further hypothesize a negative correlation between the average trading volume per transaction and tax awareness measures.

H5a: *Tax awareness of the CGTR 2009 is positively correlated with German trading volume in 2008.*

H5b: *Tax awareness of the CGTR 2009 is negatively correlated with German average trading volume per transaction in 2008.*

4.   Identification strategy and data

4.1.   Identification strategy

An important strategy of the literature to identify the pricing effects of capital gains taxes relies on a hypothesized differential impact of capital gains taxes on dividend-paying stocks and non–dividend-paying stocks (Amoako-Adu, Rashid, and Stebbins, 1992; Lang and Shackelford, 2000; Dai, Maydew, Shackelford, and Zhang, 2008). This approach is based on the fact that returns from non–dividend-paying stocks only result from capital gains, while returns from dividend-paying stocks also result from dividends. If investors capitalize taxes rationally, capital gains taxes will have a stronger impact on non–dividend-paying stocks. A major assumption of this approach is that assets are priced rationally by investors who are well informed about tax issues. For that reason, this identification strategy does not seem to be feasible for our analysis of partially or temporarily tax-unaware individual investors.[7] In cross checks, we were not able to provide evidence for a differential impact of the CGTR 2009 on dividend-paying stocks and non–dividend-paying stocks (Table A6 in Appendix B).

We use an alternative identification strategy that relies on comparisons between treated and non-treated stocks. In our baseline model, we interpret the introduction of the CGTR 2009 as a natural experiment, which can be analyzed by a comparison between the treatment group and the control group. Considering the home bias of individual investors (Ahearne, Griever, and Warnock, 2004; Van Nieuwerburgh and Veldkamp, 2009), we expect that tax law changes in Germany will have a stronger impact on shares of the German stock market. Jochem and Volz (2011) show that German investors hold slightly more than 50% of their shares on the German stock market. In the case of individual investors, this fraction should be

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[7] Taking into account the complexity of the correlation between share prices, capital gains taxes, and dividends, this argument holds even in the case of a temporary increase in tax awareness by the end of 2008. A careful analysis of the German investor news of that period does not reveal any evidence that individual investors were advised to buy non–dividend-paying stocks in response to the CGTR 2009.

even higher. Therefore, shares of other European stock markets should be an appropriate control group for our analysis.

A potential problem of our analysis is that the turn-of-the-year effect (Sias and Starks, 1997; Reese, 1998) of the German stock market might be structurally different from that of other stock markets. To control for structural differences in turn-of-the-year effects between the German market (treatment group) and other markets (control group), we consider not only observations from the period 2008–2009, but also observations of the preceding and following turn-of-the-year periods. Hence, we account for the last 30 trading days of the German stock market before and after the TY 2008/2009 (treatment period), as well as for corresponding trading data for the TY 2007/2008 and the TY 2009/2010 (control periods).

Using a control group as well as control periods, our estimation strategy may be denoted as triple-difference estimation. This approach has a number of advantages. By considering a control group, we account for general market trends over time. By including control periods, we consider Germany-specific effects that do not vary significantly between periods. We further include a comprehensive set of control variables, e.g., stock fixed effects, industry–year fixed effects, and structural variables, such as market value, and book value.

4.2. Data

Taking into account that the German stock market[8] is one of the biggest in Europe, we select the major Western European stock markets as the control group, namely, those of the United Kingdom (the London Stock Exchange) and France (the Paris Stock Exchange, part of NYSE Euronext). This can be justified as follows: 1) London and Paris are geographically close to the German trade center Frankfurt. 2) France and the United Kingdom are culturally and politically closely related to Germany. 3) The United Kingdom, France, and Germany are similar countries in terms of population size, land area, and economic development. 4) The London Stock Exchange can be interpreted as a leading trading place affecting other

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[8] The main stock exchange in Germany is the Frankfurt Stock Exchange. We also consider data from stocks listed at other German stock exchanges, such as in Berlin, Munich, and Stuttgart.

European stock markets. 5) There were no major tax reforms implemented in the United Kingdom or France during the treatment period or the control periods.

We rely on stock market and financial statement information using the Datastream database from Thomson Reuters. While information on share prices and trading volumes for each stock is available for each trading day, financial statement data are based on annual business reports. We use information on all officially listed stocks in Germany, France, and the United Kingdom for 30 trading days before the turn of the year and after the turn of the year for each period, plus observations for Christmas and New Year's Eve, which are only relevant for France and the United Kingdom.[9] This leaves us with 267,582 stock–day observations.

These raw data are adjusted in two ways. 1) We exclude all observations with missing information on share prices, trading volumes, or control variables. 2) We do not consider observations with negative EBITDA or a negative book value.[10] Our final data are an unbalanced panel with 184,120 stock–day observations for the treatment period and two control periods: 52,573 observations from the German market, 70,806 observations from the French market (NYSE Euronext Paris), and 60,471 observations from the UK market (London Stock Exchange).

Descriptive statistics for our major variables of interest (share price, daily return, trading volume) and our most relevant control variables (market value, book value, EBITDA) are documented in Table 3. Share price is the average daily stock price as provided by Datastream. The daily return is the relative change of the actual share price compared to the share price of the last trading day in percentage points. The trading volume shows the number of shares traded per day (in 1,000's). The book value is calculated as the share price divided

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[9] While stock markets in Germany are closed on Christmas and New Year's Eve, trading on these days is possible in France and the United Kingdom. Therefore, we consider 62 trading days in our control group and 60 trading days in our treatment group. Note that this effect is not only relevant for the period 2008–2009, but also for the preceding and following control periods. Thus, it should not bias our regression results. As a cross-check, we tested alternative regressions excluding observations of these additional trading days, with almost identical results, which are documented in Table A3 in Appendix B.

[10] We exclude these observations, since the securities of loss firms and especially bankrupt firms could be affected by specific capital market reactions. Nevertheless, we tested a cross-check including observations with negative EBITDA. As documented by Table A4 in Appendix B, the results remain unchanged.

by the price-to-book ratio and multiplied by the number of shares. EBITDA are yearly earnings before interests, taxes, depreciation, and amortization. We use the realized EBITDA of the coming period (e.g., EBITDA 2009 for the period 2008–2009) as a proxy for expected success. Share prices, market values, book values, and EBITDA are reported in local currency (in euros for Germany and France and in British pounds for the United Kingdom).

[Table 3 about here]

Table 3 reveals that average stock prices are lower in the German capital market, which should be driven by the division of stocks into shares. The mean daily returns in all three stock markets are very small and statistically not different from zero. Trading volume is higher in the United Kingdom and somewhat lower in France, while average EBITDA, market volume, and book value are very similar in all three markets. In conclusion, the market indicators of Table 3 reveal considerable similarities between the capital markets analyzed. Nevertheless, we consider stock fixed effects and stock market–year fixed effects in our regressions to account for differences between the three stock markets.

5. Empirical analysis

5.1. Graphical evidence

Hoopes, Reck, and Slemrod (2015) provide evidence that the Google search behavior of taxpayers for capital gains taxes is closely related to tax-specific events and deadlines. Therefore, we report as a first step the frequency of Google searches for *Abgeltungsteuer* or *Abgeltungssteuer* (German words for the new flat tax on capital gains) within 2007, 2008, and 2009. Figure 2 documents the weekly index values for Google Trends.

[Figure 2 about here]

We find a much higher average search index in 2008 compared to the previous and following periods. Furthermore, there is a considerable increase in the search index in the second half of 2008, which fits well with our hypothesis of higher tax awareness shortly before the reform deadline. This can be taken as a first indicator for the hypothesized delayed dissemination of

tax information into the share market. We now turn to the impact of the introduction date of the CGTR 2009 on the German share market. We use the following regression to derive estimates for abnormal trading volumes, abnormal share prices, and abnormal daily returns:

$$Y_{it} = \alpha + \delta \cdot C_{it} + \vartheta_{it} + \psi_{it} + \upsilon_i + u_{it}.$$ (5)

For the dependent variable Y_{it}, we use the logarithm of trading volume (measured in thousands of traded shares per day), the relative change of share prices for each trading day (daily return), and the logarithm of the share price in local currency (euros or British pounds). Regarding trading volume and share price, we choose a logarithmic specification to obtain estimates for relative changes (in percent) and to ensure linearity in variables.

Our vector of controls C_{it} accounts for the logarithm of market value, the logarithm of book value, and the logarithm of EBITDA for each stock (all measured in millions in the local currency). Regarding the market value, we do not account for changes within a given observation period (30 trading days before and after the end of a given year plus Christmas and New Year's Eve). Thus, we exclusively use the corresponding value of the first observation for each turn-of-the-year period. This is to avoid endogeneity, since the market value could be driven by the share price and not vice versa.

We consider the panel nature of our data by stock fixed effects υ_i. We also include stock market–year fixed effects ϑ_{it} (a set of dummy variables for each stock market–year combination) and industry–year fixed effects ψ_{it} (a set of dummy variables for each industry–year combination) to account for trends and exogenous shocks. Abnormal daily returns, share prices, and trading volumes for each stock–day observation are measured by the regression residual u_{it}. A graphical analysis for pseudo-reform years as well as an analysis of unconditional mean values (instead of regression residuals) is provided in Appendix A.

In Figures 3 to 5, we report average residuals for the treatment period (30 trading days before and after the TY 2008/2009 plus Christmas and New Year's Eve) regarding the treatment

group (Germany) and the control group (France and the United Kingdom). The figures reveal that the regression residuals of the treatment group and the control group are closely correlated over the whole treatment period. This holds especially for share prices and daily returns and confirms the common trend assumption, which is a necessary requirement for difference-in-differences estimation. Therefore, our control group should provide us with an appropriate reference point for identifying the impact of the CGTR 2009.

[Figure 3 about here]

At the beginning of the observation period, abnormal trading volumes, as shown in Figure 3, are almost identical in the treatment group and the control group. However, beginning about five trading days before the TY 2008/2009, there is a strong deviation in abnormal trading volumes, with a maximum difference compared to those of France and the United Kingdom by the last trading day in 2008. Thereafter, we find a strong decline in German abnormal trading volumes, while the abnormal trading volumes of the control group are consistently higher. Considering estimates for our control group and for pseudo-reform periods (see Figure A1 in Appendix A), our graphical evidence fits well with the interpretation that German investors abnormally increased their trades by the end of 2008 and shifted trades from 2009 to 2008 to avoid the flat tax on capital gains for shares bought after January 1, 2009.

[Figure 4 about here]

In line with our expectations, the abnormal daily returns (Figure 4) of the treatment group are higher before and lower after the introduction date. We also observe a temporary increase in share prices shortly before and after the TY 2008/2009 (Figure 5). Both observations can be taken as evidence that the CGTR 2009 introduction date resulted in a temporary increase in share prices until prices returned to their normal levels in the second trading week of 2009.

[Figure 5 about here]

5.2. Reform deadline effects on trading volumes and share prices

As described in Section 4.1, we interpret stock–day observations of the German stock market as the treatment group and corresponding observations in France and the United Kingdom as the control group. In addition, we use observations of the control periods 2007–2008 and 2009–2010 to control for structural differences in stock markets and turn-of-the-year effects. Hence, we use the regression model of equation (6) with the logarithm of trading volume (measured in thousands of trades per day), the daily return in percentage points, and the logarithm of share price in the local currency as the dependent variables Y_{it}

$$
\begin{aligned}
Y_{it} = \alpha &+ \beta_1 \cdot Before_{it} + \beta_2 \cdot Before\ Germany_{it} + \beta_3 \cdot Before\ 0809_{it} + \beta_4 \cdot Before\ DDD_{it} \\
&+ \gamma_1 \cdot After_{it} + \gamma_2 \cdot After\ Germany_{it} + \gamma_3 \cdot After\ 0809_{it} + \gamma_4 \cdot After\ DDD_{it} \\
&+ \delta \cdot C_{it} + \vartheta_{it} + \psi_{it} + \upsilon_i + u_{it}.
\end{aligned}
\tag{6}
$$

Before is a dummy variable with a value of one in a certain reference period before the turn of the year and zero otherwise. As our hypotheses H3a to H3c and our graphical evidence suggest stronger tax effects shortly before the reform deadline, we choose two trading days as our standard reference period (Table 4). We also performed regressions for an alternative reference period of five trading days (Table 6 and Table A5 in Appendix B).

The variables *Before Germany* and *Before 0809* are dummies controlling for structural differences of turn-of-the-year effects in the German stock exchange and in 2008–2009. They are calculated as an interaction term of *Before* and a dummy variable for Germany (for the period 2008–2009). The effect of the CGTR 2009 is captured by the triple-difference parameter *Before DDD*, which is an interaction term of *Before*, a dummy variable for Germany, and the dummy for 2008–2009. We expect that *Before DDD* is positively correlated with share prices, daily returns, and trading volumes.

Similar to *Before*, *After* is a dummy variable with a value of one in a reference period after the turn of a given year. We generally use the same time window for *After* and *Before* (two trading days in the baseline case). The terms *After Germany, After 0809,* and *After DDD* are

calculated in the same way as the corresponding interaction terms of our *Before* dummy. We expect a positive correlation of *After DDD* with the share price and a negative correlation of *After DDD* with daily returns and trading volumes. The control variables conform to the regression model for our graphical analysis in equation (5). We estimate a simplified model including a limited set of controls (stock market–year fixed effects and stock fixed effects) and an extended model further including industry–year fixed effects as well as *Market value*, *Book value,* and *EBITDA*.

The estimation is executed by ordinary least squares (OLS). We use robust standard errors clustered for each stock to account for heteroscedasticity and the autocorrelation of standard errors. As documented by Petersen (2009), these clustered (Rogers) standard errors produce correct estimates and correctly sized confidence intervals in the presence of cross-sectional (firm effects) and time-series (time effects) correlations of standard errors and are more accurate than Fama–MacBeth estimates in the presence of firm effects. Therefore, Rogers standard errors should be best suited for our analysis. We report two measures for *R*-squared. While the "regular" *R*-squared describes the fraction of the overall variation explained by the whole model including stock fixed effects, within *R*-squared focuses on the variation over time excluding stock fixed effects. Thus, within *R*-squared describes which part of the within variation is explained by the variables changing over time.

The regression results for our baseline model with a reference period of two trading days are displayed in Table 4. In the models for daily returns, the regression coefficients of the dummy can be interpreted as a change in the daily return in percentage points. In the logarithmic models for share prices or trading volumes, our results can be interpreted as semi-elasticities. In this case, the estimated dummy-variable coefficients have to be recalculated to determine the relative effect on the dependent variable. As shown by Kennedy (1981), the relative change can be approximated by $\exp\left(\hat{\beta}_i - \frac{1}{2} \cdot Var\left(\hat{\beta}_i\right)\right) - 1$ with the estimated regression

coefficient $\hat{\beta}_i$ and the variance $Var\left(\hat{\beta}_i\right)$, which is defined as the squared estimated standard

error of $\hat{\beta}_i$.

[Table 4 about here]

The regression results for our primary variables of interest (*Before DDD* and *After DDD*) confirm our expectations. We focus on the extended models with a higher number of control variables. Confirming H1a, the average daily trading volume of the German stock market in the period 2008–2009 unexpectedly increased by about 142.9% before the introduction of the capital gains tax (*Before DDD*). While Table 4 does not provide significant evidence of lower trading volume after the reform (*After DDD*), our hypothesis on a shifting of trading volumes (H2a) is supported for a longer reference period of five trading days (Table 5). We further find a strong effect of *Before DDD* and *After DDD* on daily returns and share prices. In line with H1b and H2b, the daily return is 2.4 percentage points higher before the turn of the year and 1.7 percentage points lower thereafter. Regarding H1c and H2c, we can state a share price level about 5.7% (4.4%) higher before (after) the reform. All in all, Table 4 suggests an unexpected trading volume for shares at the TY 2008/2009, resulting in a strong but temporary increase in abnormal share prices and a return to their normal levels thereafter.

We tested a number of cross-checks, including an extended number of control periods, an extended control group, the exclusion of observations on Christmas and New Year's Eve, the inclusion of observations with negative EBITDA, and a longer reference period, with almost identical results (Tables A1 to A5 in Appendix B).

To test H3a to H3c, we re-estimate the model including variables for two different reference periods (two days and five days). Within these regressions, the variables *Before DDD (5D)* and *After DDD (5D)* measure the average effects for a reference period of five days and *Before DDD (2D)* and *After DDD (2D)* measure the additional effects for the shorter reference period of two days. Hence, the total effects for two days can be calculated as the

sum of the effects for five days and the additional effects for two days. The results are provided in Table 5. We abstain from reporting the results for regression controls, which are almost identical to those in Table 4. That holds also for the following regressions.

[Table 5 about here]

Confirming H3a to H3c, we find that share prices, daily returns, and trading volumes are significantly higher in the last two days (compared to the average of the last five days) *before* the TY 2008/2009. This result holds especially for the aggregate effect on share prices, which is not significant in the five-day reference period. The results of Table 5 provide us with a more accurate estimate of market reactions. Combining the results on all relevant variables and focusing on the models with a higher number of controls, the average abnormal increase in trading volumes is 104.0% within the first three days of the last trading week of 2008 and 151.7% in the last two trading days. The aggregate abnormal return for the last five trading days of 2008 can be calculated by grossing up the abnormal daily returns over the whole period (1.8 percentage points in the first three days; 2.4 percentage points in the last two days). Compared to the control group, share prices of the German market therefore increased by about 10.6% within the last five trading days of 2008. Thus, late investors paid a high mark-up to avoid future capital gains tax payments. Considering that the observed temporary increase in share prices was restricted to a very short period before the reform (especially the last two days),[11] this mark-up could easily have been avoided by tax-aware investors.

5.3. *Reform deadline effects and the turn-of-the-year effect*

In this section, we address the heterogeneity of tax reform effects between small-capitalization stocks and large-capitalization stocks, as well as between winner and loser stocks. In doing so, we test for connections between the analyzed impact of the CGTR 2009 and the turn-of-the-year effect. The turn-of-the-year effect can be defined as an abnormally

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[11] We conducted a number of unreported cross-checks for alternative longer reference periods with weak and insignificant tax effects on the price level. Hence, according to our evidence, tax effects on daily returns and share prices are focused on the last five trading days of the German stock market in 2008.

high average return in early January, which is especially relevant for small-capitalization stocks (negative correlation of market capitalization and turn-of-the-year effect).

Window dressing of institutional investors and tax-loss selling are regarded as the most relevant drivers of the turn-of-the-year effect (Sias and Starks, 1997; Reese, 1998; Poterba and Weisbenner, 2001; Starks, Yong, and Zheng, 2006). The tax-loss selling hypothesis argues that individual and institutional investors sell loser stocks in the last quarter of a given year to realize tax losses, which in return reduces share prices and provides opportunities for increasing share prices at the beginning of the following year. This argument is underlined by empirical evidence of a positive correlation between loser stocks and turn-of-the-year effects (Sias and Starks, 1997; Sikes, 2014).

We measure the heterogeneity effect for a certain stock property (market capitalization, loser stock) by an interaction term of our *DDD* variables and the corresponding property variable *P* (*Before DDD×P* and *After DDD×P*). We generally refer to our basic reference period of two trading days, as in Table 4. However, we also tested regressions for a reference period of five trading days with similar results (not reported). Including further interaction terms as control variables, we can write a generalized form of the regression model as

$$
\begin{aligned}
Y_{it} = {} & \alpha + \beta_1 \cdot Before_{it} + \beta_2 \cdot Before\ Germany_{it} + \beta_3 \cdot Before\ 0809_{it} + \beta_4 \cdot Before\ DDD_{it} \\
& + \beta_5 \cdot Before \times P_{it} + \beta_6 \cdot Before\ Germany \times P_{it} + \beta_7 \cdot Before\ 0809 \times P_{it} + \beta_8 \cdot Before\ DDD \times P_{it} \\
& + \gamma_1 \cdot After_{it} + \gamma_2 \cdot After\ Germany_{it} + \gamma_3 \cdot After\ 0809_{it} + \gamma_4 \cdot After\ DDD_{it} \\
& + \gamma_5 \cdot After \times P_{it} + \gamma_6 \cdot After\ Germany \times P_{it} + \gamma_7 \cdot After\ 0809 \times P_{it} + \gamma_8 \cdot After\ DDD \times P_{it} \\
& + \delta \cdot C_{it} + \vartheta_{it} + \psi_{it} + \upsilon_i + u_{it},
\end{aligned}
\tag{7}
$$

with the vector C_{it} including P_{it}. The results for including interaction terms for market capitalization are documented in Table 6 (*Before DDD×Market value*, *After DDD×Market value*, etc.). The coefficients of *Before DDD×Market value* and *After DDD×Market value* generally have the opposite sign as the coefficients of our identification variables *Before DDD* and *After DDD* and are significant, with one exception (*After DDD×Market value* for trading

volumes). This outcome suggests that the trading volumes and share prices of stocks with a larger market capitalization reacted to a smaller degree to the CGTR 2009 deadline.

[Table 6 about here]

In addition, we consider interaction terms for loser stocks. The variable *Loser* is a dummy with a value of one in the case of a reduction in the share price during the last year. The change in the share price is defined as the average share price in the second to last week of the current year minus the average share price in the second to last week of the previous year.[12] The results are documented in Table 7. We find that the daily returns of loser stocks were more strongly affected by the CGTR 2009. Note that almost the whole effect on daily returns before the reform is captured by *Before DDD×Loser*, while our baseline interaction term *Before DDD* is not significant. However, we do not find significant effects for share prices and trading volumes.

[Table 7 about here]

Our results in Tables 6 and 7 suggest that stocks typically subject to turn-of-the-year effects and tax-loss selling were more strongly affected by the CGTR 2009. Note that both effects work in opposite directions. While tax-loss selling implies a temporary reduction of share prices in December and an increase in January (turn-of-the-year effect), the introduction of the CGTR 2009 resulted in a temporary increase in share prices (see Figure 5). It seems to be the case that the CGTR-2009 effect is partially driven by a compensation of the "opposed" turn-of-the-year effect. Therefore, because of the tax reform, some individual investors may have renounced the tax-loss selling of shares. This interpretation suggests that tax effects (including the turn-of-the-year effect or the effect of the CGTR 2009) may be generally stronger for small-capitalization stocks, presumably due to the lower market liquidity and the higher volatility of these stocks (Sikes, 2014).

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[12] To calculate the average price, we consider observations of the second to last trading week (i.e., last six to 10 trading days) of a given year. We do not account for the last five trading days, as this week is strongly affected by the pricing effects of the CGTR 2009 at the TY 2008/2009, which could bias our results.

However, this is not the only possible story. An alternative explanation might be that the additional demand of individual investors at the end of 2008 had a stronger impact on the pricing of loser stocks, since the original shareholders of these stocks were not willing to realize their losses. Such an explanation fits well with evidence that individual shareholders are more reluctant to realize capital losses than to realize capital gains (the disposition effect; see, e.g., Barberis and Xiong, 2009).

5.4.   Tests on tax awareness and trading volumes

To provide stronger empirical evidence of the connection between the observed tax reform effects and tax awareness of individual investors, we perform additional tests on trading volumes (see H4, H5a, and H5b). First, we refer to H4, claiming a significantly smaller average trading volume per transaction in the German stock market shortly before the TY 2008/2009. This hypothesis is based on the assumption that the higher trading volumes in the last trading days in December 2008 were driven by individual shareholders with low trading volumes per transaction.

Since the Datastream database does not contain information on the average trading volume per market transaction, we gathered additional information on the daily number of market transactions[13] for each stock of the main stock indexes in Germany (DAX 30), France (CAC 40), and the United Kingdom (FTSE 100). We consider the composition of these indexes as of December 31, 2008. For that reason, our database is smaller than for our baseline regressions and we do not control for industry–year fixed effects. The market transactions are all sell and buy transactions performed on a trading day for each stock.

As dependent variable, we use the natural logarithm of the daily average trading volume per transaction for each stock. The average daily trading volume per transaction is calculated as the daily transaction volume in the local currency (number of shares traded multiplied with the daily average share price) divided by the daily number of market transactions for the

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[13] We are thankful to Bloomberg for the provision of the additional data.

corresponding stock. Using this information, we perform regressions as described by equation (6) with the dependent variables logarithm of trading volume and logarithm of trading volume per transaction. As in Table 4, we focus on the last two trading days in 2008 (*Before DDD*). We expect that *Before DDD* has a positive and significant effect on trading volume and a negative and significant effect on trading volume per transaction.

[Table 8 about here]

The regression results in Table 8 confirm our expectations. In models (1) to (3), we find that the unexpected trading volume increased by 44.3% in the last two trading days in 2008. This estimate is smaller than in our baseline regressions, which fits well with our observation that the impact of the CGTR 2009 was smaller for stocks with high market capitalization (Table 6). Confirming H4, models (4) to (6) provide evidence of a decrease of about 9% in the average trading volume per transaction. Our results therefore confirm the assumption that the increase in trading volumes and share prices at the end of 2008 was at least partially driven by individual investors with low trading volumes per transaction and a low degree of tax awareness. We repeated the regressions of Table 8 for a longer reference period of five trading days with almost identical results (not reported).

Testing H5a and H5b, we rely on direct measures for tax awareness. As mentioned before, we assume that our tax awareness measures are positively correlated with trading volume and negatively correlated with trading volume per transaction. In contrast to previous regressions, we focus on the whole year 2008 and do not account for observations from previous and following years (control periods). We identify the impact of our awareness measure by an interaction term for the treatment group, *Tax Awareness Germany* (= *Tax Awareness×Germany*), while *Tax Awareness* itself controls for general trends affecting the treatment group and control group. The OLS regression model can be described by

$$Y_{it} = \alpha + \beta_1 \cdot Tax\ Awareness_{it} + \beta_2 \cdot Tax\ Awareness\ Germany_{it} + \delta \cdot C_{it} + \vartheta_{it} + \psi_{it} + \upsilon_i + u_{it} \ . \quad (8)$$

We use the same control variables and specifications as in our previous regressions. In addition, we include *Before* and *Before DD* as variables to control for Germany-specific effects within the last two trading days of the year (as identified by our baseline regressions). Since equation (8) does not account for control periods, *Before DD* is a simple difference-in-differences estimator.

We use two alternative measures for awareness of the CGTR 2009: (1) the weekly number of newspaper articles on the CGTR 2009 (see Table 2) and (2) the weekly average index of Google searches on the new German capital gains tax, as provided by Google Trends (see Figure 2). While the first variable accounts for an increase in investor attention resulting from media coverage (Klibanoff, Lamont, and Wizman, 1998), the second variable accounts for the search interests of potential investors (Hoopes, Reck, and Slemrod, 2015). For both weekly measures, Saturdays and Sundays are regarded as the first two days of the following week. Since capital markets are closed on weekends, an increase in attention on these days could affect trading behavior on the following days (Monday to Friday) but not on the current day.

The regression results in Tables 9 and 10 confirm our expectations. For both measures of tax awareness, we obtain a significant and positive coefficient for the interaction term *Tax Awareness Germany* on trading volume and a negative and significant effect of *Tax Awareness Germany* on trading volume per transaction. The results hold even if we control for the effects of the introduction date of the CGTR 2009 by including *Before DD*. In models (3) and (7) of Tables 9 and 10, we also tested for an exclusion of observations from December, with similar results. Therefore, the observed correlation between trading behavior and tax awareness measures is not only driven by trading in December 2008 but is also valid for the whole year 2008. All in all, the regression results of Tables 8 to 10 provide additional empirical support that the results of our baseline regressions are driven by the attention of market participants.

[Table 9 about here]

6. Conclusion

Our paper addresses the impact of capital gains taxes on trading volumes and share prices. Extending previous research, we argue and show empirically that the impact of capital gains taxation on stock markets depends not only on the tax burden but also on the attention of market participants regarding tax issues. The focus of our empirical analysis is on the introduction date of a major German capital gains tax reform in January 2009 (CGTR 2009), which had been announced about one and a half years before and was extensively discussed by the German media. The reform provided a strong incentive for individual investors to buy shares before 2009, while institutional investors (that means corporations) were not affected. Due to the early announcement date, the introduction deadline of the CGTR 2009 should have been anticipated by the market. This would suggest a smooth adjustment process of share prices at the TY 2008/2009.

However, using triple-difference estimation with NYSE Euronext Paris and London Stock Exchange as the control group and the preceding and following turn-of-the-year cycles as control periods, we find evidence of a strong and temporary increase in abnormal trading volumes, daily returns, and share prices shortly before the introduction date at the TY 2008/2009. Our results suggest that the introduction deadline of the CGTR 2009 as well as media reports on that event focused the attention of less-informed individual investors on the last trading days of the year 2008. Corresponding to our estimates, we find an aggregate abnormal return of about 10.6% in the last five trading days in 2008, as well as a shifting of trades from 2009 to 2008. These short-term pricing and trading effects were more pronounced for the last two trading days before the introduction date. Thus, late individual investors paid a high mark-up by the end of 2008.

The CGTR 2009 effect identified is more pronounced for stocks with small market capitalization and a loss of share prices in the previous year (loser stocks). These are well-

known properties of stocks with high turn-of-the-year effects (Poterba and Weisbenner, 2001; Starks, Yong, and Zheng, 2006). Our results therefore suggest that the CGTR 2009 resulted in a partial compensation of the seasonal turn-of-the-year effect (January effect). Using the weekly number of daily newspaper articles on the CGTR 2009 as well as the number of Google searches on that topic as direct measures of tax awareness, we find a significant and positive correlation between trading volumes and the attention on the CGTR 2009. Furthermore, our findings on average trading volumes per transaction suggest that the tax reform effects identified are driven by individual investors with high information costs and low trading volumes per transaction.

In conclusion, we provide evidence that the introduction deadline of an earlier announced tax event may result in significant market reactions with a strong but temporal increase in share prices. Our analysis confirms empirical evidence on a delayed or imperfect dissemination of relevant information into share prices (DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009; Pantzalis and Ucar, 2014) and fits well with the framework of rational (in)attention (Sims, 2003; Reis, 2006) and corresponding evidence on taxpayer information research (Hoopes, Reck, and Slemrod, 2015). Thus, we argue that individual investors with high information costs may rationally decide to remain temporarily uninformed about a complex and future legal event, while the introduction deadline of that event again attracts their attention on the share market.

An alternative theoretical explanation for our findings could be procrastination. Psychological and economic research suggests that individuals tend to procrastinate in their actions and especially their savings behavior (Akerlof, 1991; Bernartzi and Thaler, 2004). Ariely and Wertenbroch (2002) show that deadlines may be effective instruments for overcoming procrastination. Since theoretical connections between procrastination in financial investment, rational (in)attention, and capital market reactions are not well understood so far, they might provide promising questions for further research.

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Appendix A

We calculate residual plots in the same way as in Figures 3 to 5 for our control periods 2007–2008 and 2009–2010, which can be considered as pseudo-reform years. The results are documented in Figure A1. We observe that the common trend assumption is also satisfied in the control periods. However, we do not find a similar dynamic for trading volumes, daily returns, and share prices as in the treatment period. This holds especially for the daily returns, which are almost identical for the treatment group and the control group in both control periods.

[Figure A1 about here]

While our graphical evidence seems compelling, it might nevertheless be driven by our calculation approach. Therefore, we construct similar plots for unconditional daily mean values of trading volumes (in logs), daily returns, and share prices (in logs) for the treatment and control groups. To account for the fact that average trading volumes and share prices differ between groups and periods, we normalize both dependent variables with their average value of the corresponding group and period (e.g., the mean share price of German shares in 2007–2008). We find that these unconditional plots in Figure A2 are very similar to our residual plots for abnormal trading volumes, daily returns, and share prices in Figures 3 to 5. Hence, graphical results do not seem to be driven by our regression approach. We calculate similar unconditional mean plots for pseudo-reform periods. Since the corresponding figures are almost identical to the residual plots in Figure A1, we abstain from reporting these results.

[Figure A2 about here]

Appendix B

We calculate a number of cross-checks for our baseline regressions in Section 5.2. First, we control for the robustness of our control group and our control periods. Hence, we increase the number of control periods from two (2007–2008 and 2009–2010) to four (2006–2007, 2007–2008, 2009–2010, 2010–2011) and we expand our control group (French and UK capital market) by all listed stocks from the Spanish capital market (Madrid Stock Exchange). The results are provided in Tables A1 and A2 and correspond to our baseline regressions.

[Table A1 about here]

[Table A2 about here]

Second, in Table A3 we exclude observations from stock trading on Christmas and New Year's Eve, which are available for our control group but not for our treatment group. Third, we conduct additional regressions, including observations with negative EBITDA. Within these regressions in Table A4, the control variable *EBITDA* is defined as the ratio of EBITDA to market capitalization instead of the logarithm of EBITDA. Both robustness checks fit our baseline results well.

[Table A3 about here]

[Table A4 about here]

To analyze the durability of the observed effects, we calculate a basic regression model for a longer reference period of five trading days instead of two days in Table A5. Hence, *Before DDD* and *After DDD* describe triple-difference estimators for five trading days before (after) the TY 2008/2009. The results confirm H1a to H2c. We again obtain evidence for a temporary increase in trading volumes and share prices. The negative effect of *After DDD* on trading volume suggests that stock trading was shifted from 2009 to 2008.

[Table A5 about here]

We also conducted untabulated regressions for our basic model considering only one major European capital market as the control group, a longer observation period (60 trading days

instead of 30 trading days), and a longer reference period (10 or 15 trading days). All these regressions confirm our hypotheses and regression results.

As described in Section 4.1, the existing literature (e.g., Lang and Shackelford, 2000; Dai, Maydew, Shackelford, and Zhang, 2008) provides evidence that dividend-paying stocks react to a smaller extent to capital gains taxation. The reason is that profits paid out as cash dividends are subject to dividend taxes and not to capital gains taxes. However, it seems questionable whether such a differential impact can be substantiated in the current setting. Note that the tax awareness and tax knowledge of typical individual investors should be limited. Nevertheless, in Table A6 we perform a cross-check comparing the CGTR 2009 effect between dividend-paying and non–dividend-paying stocks. The regression model conforms to equation (7), with a dummy variable for dividend-paying stocks (*Dividend*) as the relevant stock property variable *P*. The terms *Before DDD×Dividend* and *After DDD×Dividend* are the interaction terms of *Dividend* and our identification variables from Section 5.2.

While research would imply a smaller tax effect for dividend-paying stocks, the relevant interaction terms are generally not significant. Only for *After DDD×Dividend* do we find a significant and positive coefficient that partially outweighs the coefficient of *After DDD*. Hence, there is almost no significant evidence for a different market reaction between dividend-paying and non–dividend-paying stocks in our setting.

[Table A6 about here]

Tables and Figures

TABLE 1: Capital gains tax reform of 2009

	Acquisition before 1 January 2009		Acquisition after 1 January 2009
Holding period	≤ 1 year	> 1 year	not relevant
Fraction of taxable capital gains	50%	0%	100%
Effective tax rate	$0.5 \cdot \tau^{i} \cdot \left(1 + \tau^{s}\right)$	tax-exempt	$\tau^{c} \cdot \left(1 + \tau^{s}\right)$
Effective tax rate on capital gains for different income tax rates (25%, 35%, 45%)			
25%	13.19%	0%	26.38%
35%	18.46%	0%	26.38%
45%	23.74%	0%	26.38%

In this table, τ^{i} is the progressive personal income tax rate, varying from 0% to 45%; τ^{c} is the general capital gains tax rate, 25%; and τ^{s} is the solidarity tax surcharge rate, 5.5%. Our analysis is based on the following assumptions: The taxpayer is a resident of Germany and liable to unlimited taxation in Germany, shares are qualified as personal property, the participation quota never exceeded 1% over the last five years, and we do not consider personal exemptions or lump-sum deductions, which are of minor relevance in our analysis.

TABLE 2: Newspaper articles published in Germany in 2008 describing the new German capital gains tax of 2009

Daily Newspapers		Print run	Total number of articles	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bild	*, ***	4,114,651	15	0	1	2	0	0	0	6	0	1	2	0	3
Süddeutsche Zeitung	*	537,857	128	9	8	9	16	7	8	9	5	12	17	8	20
Frankfurter Allgemeine Zeitung (FAZ)	*	467,405	218	9	10	28	20	18	15	16	13	14	31	19	25
Kölner Stadtanzeiger/Kölnische Rundschau	**	386,751	65	2	6	4	2	2	11	1	2	7	4	18	6
Ostthüringer Zeitung/Thüringer Allgemeine/Thüringer Landeszeitung	**	361,204	39	0	5	9	2	4	4	5	2	1	2	1	4
Die Welt/Die Welt Kompakt	**	358,298	184	11	11	31	15	10	24	11	9	13	11	15	23
Stuttgarter Zeitung	*	246,955	9	2	2	0	1	0	0	0	0	2	1	1	0
Frankfurter Rundschau	*	194,525	37	3	5	3	3	0	2	3	2	1	3	11	1
Handelsblatt		183,170	188	5	12	21	34	16	10	6	4	13	38	7	22
Der Tagesspiegel		169,025	18	1	0	1	1	2	0	1	0	4	0	3	5
Berliner Kurier		161,833	4	0	1	2	0	0	0	0	0	0	0	0	1
Berliner Morgenpost		157,332	22	2	0	2	1	1	4	1	1	1	2	0	7
Westdeutsche Zeitung		143,952	5	0	0	0	0	0	0	0	0	0	0	3	2
Tageszeitung (TAZ)		76,400	7	1	1	0	0	0	1	0	1	0	0	0	3
Total		**7,559,358**	**939**	**45**	**62**	**112**	**95**	**60**	**79**	**59**	**39**	**69**	**111**	**86**	**122**

This table reports Germany´s largest daily newspapers in terms of average print runs in 2008. Information regarding the print runs of German newspapers was provided by the German Association for the Determination of the Dissemination of Advertising Media *(Informationsgemeinschaft zur Feststellung der Verbreitung von Werbeträgern e.V. (IVW))*. The table shows the monthly number of newspaper articles published in Germany in 2008 that describe the new German capital gains tax of 2009. The sample was mainly obtained by research in the database WISO-net.de, which contains articles of most German transregional and regional newspapers. In addition, we analyzed the online archives of important newspapers that are not included in WISO (e.g., *Süddeutsche Zeitung*). We generally used the following search term: (*Abgeltungsteuer** OR *Abgeltungssteuer**) AND (**aktie** OR *finanzinstrument**). Hence, we searched for articles connecting information on the new flat capital gains tax, shares (*Aktie*) or financial instruments (*Finanzinstrument*). Note that *Abgeltungsteuer/Abgeltungssteuer* is the generally accepted term for the new German flat tax on capital gains, dividends, and interest.

* The articles of these newspapers were collected manually from the respective online archives and selected by the term *Abgeltungsteuer* OR *Abgeltungssteuer* (new capital gains tax) in combination with *Aktie* (share) OR *Finanzinstrument* (financial instrument).
** Some newspapers that cooperate closely and have the same regional catchment areas (e.g., *Kölner Stadtanzeiger* and *Kölnische Rundschau*) are displayed jointly.
*** The readership of the daily newspaper *Bild* is less well educated and, on average, among the lowest income earners in Germany. This explains the low number of articles on the CGTR 2009.

TABLE 3: Descriptive statistics

	German stock exchange			French stock exchange			UK stock exchange		
Observations	52,573			70,806			60,471		
Variable	Mean	Median	Standard deviation	Mean	Median	Standard deviation	Mean	Median	Standard deviation
Share price	30.59	12.05	79.32	51.61	19.99	230.73	456.02	274.29	629.24
Daily return (%)	0.02	0.00	3.81	-0.15	0.00	3.19	-0.02	0.00	3.54
Trading volume (1,000s)	725.44	23.30	3,824.34	492.86	5.60	1,996.89	4,043.89	708.50	16,122.09
Market value (millions)	3,019.32	186.11	9,640.09	3,406.20	197.04	11,428.41	3,978.08	608.75	11,886.89
Book value (millions)	1,895.34	144.67	5,953.80	2,323.13	179.25	7,496.54	2,278.37	291.29	8,168.29
EBITDA (millions)	811.81	44.86	2,466.76	712.63	45.07	2,452.11	806.41	97.90	2,705.14

Average daily share prices, market values, book values, and EBITDA are reported in local currency (euros or British pounds). Trading volume is reported in thousands of share trades per day. Daily return is the relative change in the share price compared to the share price of the preceding trading day.

TABLE 4: Basic analysis: Two trading days

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	0.0213***	0.0209***	0.00648***	0.00648***	-0.897***	-0.897***
	(0.00151)	(0.00139)	(0.000344)	(0.000344)	(0.0231)	(0.0231)
Before Germany	0.00626*	0.00826***	-0.00286***	-0.00288***	0.540***	0.540***
	(0.00373)	(0.00304)	(0.000816)	(0.000815)	(0.0415)	(0.0415)
Before 0809	-0.0207***	-0.0205***	0.00321***	0.00320***	0.155***	0.155***
	(0.00416)	(0.00405)	(0.000942)	(0.000942)	(0.0321)	(0.0321)
Before DDD	**0.0685***	**0.0558***	**0.0236***	**0.0236***	**0.889***	**0.889***
	(0.00878)	**(0.00764)**	**(0.00232)**	**(0.00232)**	**(0.0565)**	**(0.0565)**
After	0.0311***	0.0312***	0.00474***	0.00474***	-0.198***	-0.198***
	(0.00147)	(0.00131)	(0.000475)	(0.000475)	(0.0182)	(0.0182)
After Germany	0.00768**	0.00619**	0.00188*	0.00188*	-0.0175	-0.0172
	(0.00367)	(0.00292)	(0.00105)	(0.00105)	(0.0297)	(0.0297)
After 0809	0.00650	0.00836**	0.0188***	0.0188***	-0.171***	-0.170***
	(0.00407)	(0.00412)	(0.00136)	(0.00136)	(0.0342)	(0.0342)
After DDD	**0.0498***	**0.0428***	**-0.0175***	**-0.0174***	**-0.0304**	**-0.0352**
	(0.00856)	**(0.00798)**	**(0.00261)**	**(0.00261)**	**(0.0586)**	**(0.0587)**
EBITDA		0.0314***		0.000703***		0.0254
		(0.00964)		(0.000188)		(0.0252)
Market value		0.849***		-0.00404***		0.149***
		(0.0267)		(0.000378)		(0.0510)
Book value		-0.0714**		0.00112***		0.0995**
		(0.0347)		(0.000362)		(0.0440)
Constant	3.916***	-1.607***	-0.00269***	0.00435	4.192***	2.133***
	(0.00853)	(0.343)	(8.11e-05)	(0.00395)	(0.0125)	(0.607)
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Number of observations	184,120	184,120	184,120	184,120	184,120	184,120
Number of stocks	1,267	1,267	1,267	1,267	1,267	1,267
R–squared	0.982	0.992	0.0149	0.0157	0.912	0.913
Within R–squared	0.475	0.783	0.00913	0.00993	0.0693	0.0741

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009; *EBITDA* is the logarithm of EBITDA of the next period (2009 for 2008–2009); and *Market value* (*book value*) is the logarithm of the market value (book value) at the beginning of the observation period.

TABLE 5: Basic analysis: Two trading days (2D) and five trading days (5D)

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before (2D)	0.0119***	0.0117***	0.00173***	0.00173***	-0.480***	-0.480***
	(0.000937)	(0.000826)	(0.000508)	(0.000507)	(0.0211)	(0.0211)
Before Germany (2D)	-0.00686**	-0.00602***	-0.00177	-0.00179*	0.386***	0.386***
	(0.00344)	(0.00232)	(0.00108)	(0.00108)	(0.0398)	(0.0398)
Before 0809 (2D)	0.00751***	0.00725***	0.0105***	0.0105***	-0.00279	-0.00248
	(0.00254)	(0.00227)	(0.00130)	(0.00130)	(0.0340)	(0.0340)
Before DDD (2D)	**0.0511***	**0.0498***	**0.00640**	**0.00641**	**0.212***	**0.212***
	(0.00641)	**(0.00535)**	**(0.00306)**	**(0.00306)**	**(0.0600)**	**(0.0600)**
After (2D)	0.00983***	0.0101***	0.00578***	0.00578***	-0.207***	-0.207***
	(0.00109)	(0.000945)	(0.000581)	(0.000581)	(0.0209)	(0.0209)
After Germany (2D)	-0.00504	-0.00566***	0.000848	0.000846	0.0749**	0.0743**
	(0.00316)	(0.00208)	(0.00134)	(0.00134)	(0.0357)	(0.0358)
After 0809 (2D)	-0.0314***	-0.0292***	0.0123***	0.0123***	-0.231***	-0.230***
	(0.00273)	(0.00251)	(0.00179)	(0.00179)	(0.0389)	(0.0389)
After DDD (2D)	**0.0335***	**0.0201***	**-0.00683**	**-0.00676**	**0.182***	**0.179***
	(0.00743)	**(0.00579)**	**(0.00334)**	**(0.00334)**	**(0.0681)**	**(0.0683)**
Before (5D)	0.0114***	0.0111***	0.00504***	0.00505***	-0.448***	-0.448***
	(0.00160)	(0.00148)	(0.000347)	(0.000347)	(0.0234)	(0.0234)
Before Germany (5D)	0.0145***	0.0157***	-0.00116	-0.00117*	0.163***	0.163***
	(0.00330)	(0.00286)	(0.000705)	(0.000706)	(0.0339)	(0.0339)
Before 0809 (5D)	-0.0281***	-0.0276***	-0.00747***	-0.00747***	0.172***	0.172***
	(0.00454)	(0.00437)	(0.000790)	(0.000790)	(0.0281)	(0.0281)
Before DDD (5D)	**0.0196**	**0.00767**	**0.0179***	**0.0180***	**0.714***	**0.714***
	(0.00813)	**(0.00723)**	**(0.00230)**	**(0.00230)**	**(0.0508)**	**(0.0508)**
After (5D)	0.0232***	0.0231***	-0.000748*	-0.000745*	-0.0222	-0.0222
	(0.00155)	(0.00144)	(0.000384)	(0.000384)	(0.0165)	(0.0165)
After Germany (5D)	0.0141***	0.0133***	0.000957	0.000959	-0.0829***	-0.0820***
	(0.00354)	(0.00312)	(0.000806)	(0.000806)	(0.0301)	(0.0302)
After 0809 (5D)	0.0380***	0.0377***	0.00633***	0.00633***	0.0739**	0.0739**
	(0.00407)	(0.00406)	(0.00112)	(0.00112)	(0.0327)	(0.0327)
After DDD (5D)	**0.0185**	**0.0244***	**-0.00993***	**-0.00995***	**-0.177***	**-0.179***
	(0.00848)	**(0.00809)**	**(0.00212)**	**(0.00212)**	**(0.0552)**	**(0.0552)**
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Number of observations	184,120	184,120	184,120	184,120	184,120	184,120
Number of stocks	1,267	1,267	1,267	1,267	1,267	1,267
R–squared	0.982	0.992	0.0168	0.0176	0.913	0.913
Within R–squared	0.476	0.784	0.0110	0.0119	0.0784	0.0832

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before (After) (2D/5D)* is a dummy for the last two/five trading days before (after) the turn of a year; *Before DDD (After DDD)* is an interaction term of *Before (After)*, a dummy for the treatment group, and a dummy for 2008–2009 for either a five-day reference period (*5D*) or a two-day reference period (*2D*). The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

TABLE 6: Heterogeneity analysis: Market capitalization

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	-0.0516***	-0.00388	0.0143***	0.0141***	0.187***	0.186***
	(0.0131)	(0.00774)	(0.00149)	(0.00149)	(0.0686)	(0.0686)
Before Germany	-0.00499	0.00420	-0.0107***	-0.0107***	0.578***	0.583***
	(0.0248)	(0.0152)	(0.00263)	(0.00262)	(0.105)	(0.106)
Before 0809	-0.164***	-0.116***	-0.00667*	-0.00708**	-0.383***	-0.328***
	(0.0385)	(0.0254)	(0.00351)	(0.00352)	(0.112)	(0.110)
Before DDD	**0.206***	**0.158***	**0.0426***	**0.0426***	**1.333***	**1.324***
	(0.0627)	**(0.0390)**	**(0.00645)**	**(0.00642)**	**(0.168)**	**(0.168)**
Before × Market value	0.0116***	0.00394***	-0.00124***	-0.00121***	-0.173***	-0.172***
	(0.00206)	(0.00119)	(0.000200)	(0.000199)	(0.00906)	(0.00911)
Before Germany × Market value	0.00331	0.00117	0.00125***	0.00125***	-0.0265*	-0.0273*
	(0.00415)	(0.00244)	(0.000355)	(0.000355)	(0.0152)	(0.0153)
Before 0809 × Market value	0.0249***	0.0164***	0.00159***	0.00166***	0.0802***	0.0710***
	(0.00620)	(0.00405)	(0.000484)	(0.000485)	(0.0153)	(0.0150)
Before DDD × Market value	**-0.0223**	**-0.0172***	**-0.00336***	**-0.00335***	**-0.0809***	**-0.0806***
	(0.0106)	**(0.00654)**	**(0.000927)**	**(0.000918)**	**(0.0243)**	**(0.0243)**
After	-0.0295**	0.0210***	0.00842***	0.00825***	0.174**	0.173**
	(0.0136)	(0.00812)	(0.00189)	(0.00190)	(0.0675)	(0.0671)
After Germany	0.000357	-0.00219	0.00317	0.00321	-0.149	-0.144
	(0.0256)	(0.0160)	(0.00359)	(0.00360)	(0.0983)	(0.0984)
After 0809	-0.180***	-0.126***	0.0121**	0.0117**	-0.647***	-0.592***
	(0.0372)	(0.0258)	(0.00531)	(0.00530)	(0.133)	(0.132)
After DDD	**0.174***	**0.143***	**-0.0370***	**-0.0370***	**-0.176**	**-0.197**
	(0.0664)	**(0.0402)**	**(0.00837)**	**(0.00834)**	**(0.208)**	**(0.207)**
After × Market value	0.00965***	0.00163	-0.000586**	-0.000559**	-0.0593***	-0.0591***
	(0.00214)	(0.00124)	(0.000269)	(0.000270)	(0.00871)	(0.00865)
After Germany × Market value	0.00232	0.00165	-0.000290	-0.000294	0.0169	0.0161
	(0.00427)	(0.00256)	(0.000517)	(0.000518)	(0.0135)	(0.0136)
After 0809 × Market value	0.0319***	0.0227***	0.00109	0.00117	0.0768***	0.0676***
	(0.00598)	(0.00410)	(0.000737)	(0.000736)	(0.0181)	(0.0180)
After DDD × Market value	**-0.0205***	**-0.0165**	**0.00363***	**0.00364***	**0.0347**	**0.0368**
	(0.0111)	**(0.00656)**	**(0.00122)**	**(0.00121)**	**(0.0298)**	**(0.0298)**
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Number of observations	184,120	184,120	184,120	184,120	184,120	184,120
Number of stocks	1,267	1,267	1,267	1,267	1,267	1,267
R–squared	0.982	0.992	0.0153	0.0161	0.913	0.913
Within R–squared	0.477	0.783	0.00950	0.0103	0.0745	0.0793

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

TABLE 7: Heterogeneity analysis: Winner versus loser stocks

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	0.0406***	0.0175***	0.00589***	0.00581***	-0.946***	-0.934***
	(0.00512)	(0.00217)	(0.000413)	(0.000416)	(0.0274)	(0.0268)
Before Germany	0.00487	0.00329	-0.00224**	-0.00227**	0.547***	0.545***
	(0.00982)	(0.00545)	(0.000913)	(0.000912)	(0.0486)	(0.0488)
Before 0809	0.247***	0.0316	-0.00163	-0.00136	0.0414	0.0389
	(0.0297)	(0.0209)	(0.00268)	(0.00268)	(0.101)	(0.103)
Before DDD	**0.0773**	**0.00728**	**0.00228**	**0.00275**	**0.793*** **	**0.792*** **
	(0.0576)	**(0.0318)**	**(0.00502)**	**(0.00500)**	**(0.211)**	**(0.214)**
Before × Loser	-0.0587***	0.0107**	0.00177**	0.00205***	0.149***	0.110**
	(0.0150)	(0.00519)	(0.000714)	(0.000726)	(0.0461)	(0.0437)
Before Germany × Loser	-0.00189	0.0185	-0.00189	-0.00183	-0.00950	-0.00307
	(0.0288)	(0.0135)	(0.00185)	(0.00184)	(0.0842)	(0.0846)
Before 0809 × Loser	-0.246***	-0.0626***	0.00398	0.00350	0.0236	0.0526
	(0.0352)	(0.0238)	(0.00288)	(0.00289)	(0.116)	(0.117)
Before DDD × Loser	**-0.00504**	**0.0382**	**0.0238*** **	**0.0233*** **	**0.103**	**0.100**
	(0.0666)	**(0.0360)**	**(0.00585)**	**(0.00583)**	**(0.235)**	**(0.238)**
After	0.0541***	0.0320***	0.00711***	0.00701***	-0.159***	-0.147***
	(0.00508)	(0.00208)	(0.000594)	(0.000595)	(0.0223)	(0.0217)
After Germany	0.00632	-0.00104	0.000182	0.000189	-0.0187	-0.0222
	(0.00966)	(0.00533)	(0.00120)	(0.00120)	(0.0360)	(0.0360)
After 0809	0.243***	0.0399**	0.00175	0.00201	-0.143*	-0.146*
	(0.0286)	(0.0200)	(0.00321)	(0.00320)	(0.0840)	(0.0855)
After DDD	**0.118** **	**0.0132**	**-0.00704**	**-0.00641**	**-0.149**	**-0.166**
	(0.0561)	**(0.0284)**	**(0.00789)**	**(0.00790)**	**(0.316)**	**(0.314)**
After × Loser	-0.0708***	-0.00259	-0.00729***	-0.00699***	-0.120***	-0.159***
	(0.0148)	(0.00502)	(0.00103)	(0.00104)	(0.0448)	(0.0425)
After Germany × Loser	-0.00391	0.0265*	0.00497**	0.00499**	-0.0104	-0.00345
	(0.0292)	(0.0139)	(0.00244)	(0.00244)	(0.0774)	(0.0776)
After 0809 × Loser	-0.205***	-0.0315	0.0228***	0.0224***	0.0487	0.0775
	(0.0340)	(0.0230)	(0.00363)	(0.00361)	(0.101)	(0.102)
After DDD × Loser	**-0.0637**	**0.0127**	**-0.0143***	**-0.0149***	**0.137**	**0.147**
	(0.0645)	**(0.0333)**	**(0.00850)**	**(0.00850)**	**(0.329)**	**(0.325)**
Loser		-0.109***		-0.000621***		0.0722**
		(0.00974)		(0.000188)		(0.0300)
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Number of observations	184,120	184,120	184,120	184,120	184,120	184,120
Number of stocks	1,267	1,267	1,267	1,267	1,267	1,267
R–squared	0.982	0.993	0.0153	0.0161	0.912	0.913
Within *R*–squared	0.477	0.791	0.00951	0.0103	0.0696	0.0747

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. The variable *Loser* is a dummy for loser stocks with a capital loss in the last year. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

TABLE 8: Analysis of trading volume: Relative trading volume

Model	1	2	3	4	5	6
Dependent variable	Trading volume	Trading volume	Trading volume	Volume per transaction	Volume per transaction	Volume per transaction
Before	-1.107***	-1.106***	-1.115***	-0.135***	-0.136***	-0.139***
	(0.0336)	(0.0337)	(0.0338)	(0.0130)	(0.0129)	(0.0129)
Before Germany	0.0695	0.0687	0.0696	0.0148	0.0157	0.0158
	(0.0447)	(0.0447)	(0.0451)	(0.0199)	(0.0198)	(0.0199)
Before 0809	0.0968***	0.0954***	0.0907***	0.0499***	0.0506***	0.0538***
	(0.0294)	(0.0293)	(0.0297)	(0.0178)	(0.0177)	(0.0179)
Before DDD	**0.366***	**0.367***	**0.367***	**-0.0909***	**-0.0915***	**-0.0910***
	(0.0650)	**(0.0649)**	**(0.0655)**	**(0.0330)**	**(0.0329)**	**(0.0327)**
After			-0.260***			-0.0929***
			(0.0221)			(0.00982)
After Germany			0.0252			0.000853
			(0.0423)			(0.0191)
After 0809			-0.164***			0.0908***
			(0.0321)			(0.0170)
After DDD			0.0320			0.0153
			(0.0689)			(0.0353)
Controls	NO	YES	YES	NO	YES	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Number of observations	27,530	27,530	27,530	27,530	27,530	27,530
Number of stocks	164	164	164	164	164	164
R–squared	0.835	0.835	0.837	0.930	0.938	0.938
Within R–squared	0.256	0.258	0.267	0.121	0.215	0.217

The dependent variables are the logarithm of the trading volume and the logarithm of the trading volume per transaction. Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. Controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

TABLE 9: Analysis of trading volume: Articles as an awareness measure

Model	1	2	3	4	5	6	7	8
Dependent variable	Trading volume	Trading volume	Trading volume	Trading volume	Volume per transaction	Volume per transaction	Volume per transaction	Volume per transaction
Articles	0.00183***	0.000337	0.00446***	0.00344***	-0.000443	-0.000443	-0.000185	-0.00104***
	(0.000530)	(0.000549)	(0.000546)	(0.000558)	(0.000330)	(0.000330)	(0.000293)	(0.000293)
Articles Germany	**0.00404***	**0.00362***	**0.00272**	**0.00203**	**-0.00202**	**-0.00202**	**-0.00172***	**-0.00209***
	(0.00105)	**(0.000989)**	**(0.00109)**	**(0.000974)**	**(0.000865)**	**(0.000865)**	**(0.000616)**	**(0.000722)**
Before				-1.259***				-0.171***
				(0.0345)				(0.0165)
Before DD				0.300***				-0.157***
				(0.0735)				(0.0309)
Controls	NO	YES	YES	YES	NO	YES	YES	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	39,458	39,458	36,260	39,458	39,458	39,458	36,260	39,458
Number of stocks	161	161	161	161	161	161	161	161
R–squared	0.843	0.845	0.865	0.855	0.945	0.947	0.950	0.947
Within R–squared	0.00275	0.0162	0.0523	0.0807	0.00173	0.00173	0.0333	0.0371

The dependent variables are the logarithm of the trading volume and the logarithm of the trading volume per transaction. Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Articles* is the number of weekly newspaper articles on financial instruments and the CGTR 2009; *Articles Germany* is an interaction term of *Articles* and a dummy for the treatment group; *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DD* is an interaction term of *Before* (*After*) and a dummy for the treatment group. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period). Models 3 and 7 do not consider observations from December 2008.

TABLE 10: Analysis of trading volume: Google searches as an awareness measure

Model	1	2	3	4	5	6	7	8
Dependent variable	Trading volume	Trading volume	Trading volume	Trading volume	Volume per transaction	Volume per transaction	Volume per transaction	Volume per transaction
Google index	0.00634***	0.00551***	0.00758***	0.00777***	-0.000842	-0.00319***	-0.00271***	-0.00295***
	(0.000809)	(0.000917)	(0.000965)	(0.000940)	(0.000512)	(0.000497)	(0.000504)	(0.000499)
Google index Germany	**0.00429***	**0.00409***	**0.00306**	**0.00305**	**-0.00296**	**-0.00332***	**-0.00298***	**-0.00324***
	(0.00153)	**(0.00151)**	**(0.00141)**	**(0.00151)**	**(0.00143)**	**(0.00113)**	**(0.00102)**	**(0.00113)**
Before				-1.327***				-0.142***
				(0.0352)				(0.0155)
Before DD				0.280***				-0.127***
				(0.0705)				(0.0281)
Controls	NO	YES	YES	YES	NO	YES	YES	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	39,458	39,458	36,260	39,458	39,458	39,458	36,260	39,458
Number of stocks	161	161	161	161	161	161	161	161
R–squared	0.848	0.848	0.869	0.859	0.946	0.948	0.951	0.948
Within R–squared	0.0311	0.0333	0.0776	0.106	0.00799	0.0559	0.0576	0.0611

The dependent variables are the logarithm of the trading volume and the logarithm of the trading volume per transaction. Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Google index* is the weekly index of Google Trends on searches for financial instruments and the CGTR 2009; *Google index Germany* is an interaction term of *Google index* and a dummy for the treatment group; *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DD* is an interaction term of *Before* (*After*) and a dummy for the treatment group. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period). Models 3 and 7 do not consider observations from December 2008.

TABLE A1: Cross-checks: Extended number of control periods (2006–2007 to 2010–2011)

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	-0.000460	0.00977***	0.00408***	0.00415***	-0.864***	-0.853***
	(0.00185)	(0.00126)	(0.000238)	(0.000239)	(0.0188)	(0.0188)
Before Germany	0.0116***	0.00177	-0.00246***	-0.00252***	0.493***	0.480***
	(0.00337)	(0.00242)	(0.000571)	(0.000572)	(0.0337)	(0.0336)
Before 0809	0.00215	-0.00866**	0.00562***	0.00554***	0.122***	0.111***
	(0.00414)	(0.00386)	(0.000918)	(0.000918)	(0.0301)	(0.0300)
Before DDD	**0.0611***	**0.0599***	**0.0233***	**0.0234***	**0.921***	**0.937***
	(0.00937)	**(0.00762)**	**(0.00221)**	**(0.00222)**	**(0.0539)**	**(0.0540)**
After	0.0250***	0.0231***	0.00551***	0.00559***	-0.118***	-0.133***
	(0.00173)	(0.00127)	(0.000327)	(0.000327)	(0.0135)	(0.0134)
After Germany	-0.00412	0.00129	0.00120*	0.00108	-0.0408*	-0.0245
	(0.00315)	(0.00249)	(0.000706)	(0.000706)	(0.0224)	(0.0224)
After 0809	0.0116***	0.0158***	0.0180***	0.0179***	-0.253***	-0.237***
	(0.00432)	(0.00409)	(0.00133)	(0.00133)	(0.0325)	(0.0323)
After DDD	**0.0633***	**0.0456***	**-0.0168***	**-0.0167***	**-0.0103**	**-0.0334**
	(0.00890)	**(0.00805)**	**(0.00250)**	**(0.00249)**	**(0.0566)**	**(0.0566)**
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Observations	313,076	313,076	313,076	313,076	313,076	313,076
Number of stocks	1,319	1,319	1,319	1,319	1,319	1,319
R–squared	0.968	0.989	0.0111	0.0145	0.899	0.902
Within *R*–squared	0.339	0.771	0.00646	0.00988	0.0433	0.0672

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

TABLE A2: Cross-checks: Extended control sample (United Kingdom, France, Spain)

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	0.0202***	0.0198***	0.00553***	0.00554***	-0.805***	-0.805***
	(0.00145)	(0.00134)	(0.000343)	(0.000343)	(0.0236)	(0.0236)
Before Germany	0.00743**	0.00928***	-0.00192**	-0.00194**	0.447***	0.448***
	(0.00370)	(0.00302)	(0.000815)	(0.000815)	(0.0418)	(0.0418)
Before 0809	-0.0198***	-0.0196***	0.00332***	0.00331***	0.142***	0.143***
	(0.00399)	(0.00387)	(0.000887)	(0.000887)	(0.0307)	(0.0307)
Before DDD	**0.0676***	**0.0549***	**0.0235***	**0.0235***	**0.902***	**0.902***
	(0.00870)	**(0.00754)**	**(0.00230)**	**(0.00230)**	**(0.0557)**	**(0.0557)**
After	0.0302***	0.0304***	0.00536***	0.00536***	-0.177***	-0.177***
	(0.00149)	(0.00136)	(0.000463)	(0.000463)	(0.0172)	(0.0173)
After Germany	0.00857**	0.00702**	0.00126	0.00126	-0.0385	-0.0382
	(0.00368)	(0.00294)	(0.00104)	(0.00104)	(0.0291)	(0.0291)
After 0809	0.00694*	0.00854**	0.0185***	0.0185***	-0.145***	-0.144***
	(0.00372)	(0.00374)	(0.00126)	(0.00126)	(0.0317)	(0.0317)
After DDD	**0.0493***	**0.0427***	**-0.0172***	**-0.0172***	**-0.0568**	**-0.0616**
	(0.00840)	**(0.00781)**	**(0.00256)**	**(0.00256)**	**(0.0571)**	**(0.0573)**
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Observations	200,470	200,470	200,470	200,470	200,470	200,470
Number of stocks	1,380	1,380	1,380	1,380	1,380	1,380
R–squared	0.982	0.993	0.0149	0.0157	0.914	0.914
Within R–squared	0.482	0.784	0.00915	0.00992	0.0719	0.0771

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

TABLE A3: Cross-checks: Exclusion of Christmas and New Year's Eve

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	0.0190***	0.0190***	0.00642***	0.00642***	-0.744***	-0.744***
	(0.00160)	(0.00144)	(0.000406)	(0.000406)	(0.0231)	(0.0230)
Before Germany	0.00859**	0.0101***	-0.00280***	-0.00282***	0.386***	0.386***
	(0.00376)	(0.00307)	(0.000844)	(0.000843)	(0.0415)	(0.0415)
Before 0809	-0.0220***	-0.0224***	0.00544***	0.00543***	0.122***	0.123***
	(0.00437)	(0.00421)	(0.00122)	(0.00122)	(0.0352)	(0.0351)
Before DDD	**0.0699***	**0.0577***	**0.0214***	**0.0214***	**0.922***	**0.922***
	(0.00888)	**(0.00772)**	**(0.00245)**	**(0.00245)**	**(0.0583)**	**(0.0583)**
After	0.0312***	0.0314***	0.00481***	0.00481***	-0.224***	-0.224***
	(0.00149)	(0.00133)	(0.000475)	(0.000475)	(0.0183)	(0.0183)
After Germany	0.00750**	0.00600**	0.00181*	0.00181*	0.00819	0.00846
	(0.00368)	(0.00293)	(0.00105)	(0.00105)	(0.0298)	(0.0298)
After 0809	0.00602	0.00783*	0.0187***	0.0187***	-0.170***	-0.169***
	(0.00411)	(0.00416)	(0.00136)	(0.00136)	(0.0343)	(0.0343)
After DDD	**0.0503***	**0.0433***	**-0.0174***	**-0.0174***	**-0.0316**	**-0.0365**
	(0.00858)	**(0.00801)**	**(0.00261)**	**(0.00261)**	**(0.0587)**	**(0.0588)**
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Observations	179,963	179,963	179,963	179,963	179,963	179,963
Number of stocks	1,267	1,267	1,267	1,267	1,267	1,267
R–squared	0.982	0.992	0.0153	0.0162	0.916	0.917
Within *R*–squared	0.475	0.782	0.00914	0.00999	0.0615	0.0666

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

TABLE A4: Cross-checks: Inclusion of observations with negative EBITDA

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	0.0221***	0.0205***	0.00676***	0.00677***	-0.885***	-0.885***
	(0.00154)	(0.00158)	(0.000339)	(0.000338)	(0.0223)	(0.0223)
Before Germany	0.00705*	0.00880***	-0.00296***	-0.00297***	0.586***	0.587***
	(0.00405)	(0.00313)	(0.000857)	(0.000857)	(0.0398)	(0.0398)
Before 0809	-0.0215***	-0.0201***	0.00204**	0.00204**	0.159***	0.160***
	(0.00408)	(0.00403)	(0.000953)	(0.000953)	(0.0307)	(0.0306)
Before DDD	**0.0705***	**0.0556***	**0.0266***	**0.0267***	**0.886***	**0.887***
	(0.00851)	**(0.00769)**	**(0.00250)**	**(0.00250)**	**(0.0526)**	**(0.0525)**
After	0.0313***	0.0307***	0.00489***	0.00489***	-0.204***	-0.204***
	(0.00151)	(0.00149)	(0.000579)	(0.000579)	(0.0175)	(0.0175)
After Germany	0.00465	0.00487	0.00245**	0.00245**	-0.00693	-0.00675
	(0.00393)	(0.00316)	(0.00111)	(0.00110)	(0.0288)	(0.0288)
After 0809	0.00536	0.00919**	0.0199***	0.0199***	-0.157***	-0.156***
	(0.00390)	(0.00392)	(0.00127)	(0.00127)	(0.0318)	(0.0318)
After DDD	**0.0552***	**0.0495***	**-0.0192***	**-0.0192***	**-0.0211**	**-0.0240**
	(0.00818)	**(0.00800)**	**(0.00257)**	**(0.00257)**	**(0.0547)**	**(0.0547)**
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Observations	208,651	208,651	208,651	208,651	208,651	208,651
Number of stocks	1,315	1,315	1,315	1,315	1,315	1,315
R–squared	0.977	0.990	0.0148	0.0155	0.907	0.908
Within R–squared	0.473	0.779	0.00777	0.00851	0.0646	0.0691

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. The controls include the ratio of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value at the beginning of the current period.

TABLE A5: Cross-checks: Five trading days

| Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	0.0167***	0.0163***	0.00581***	0.00581***	-0.661***	-0.661***
	(0.00155)	(0.00144)	(0.000235)	(0.000234)	(0.0214)	(0.0214)
Before Germany	0.0113***	0.0128***	-0.00194***	-0.00196***	0.339***	0.339***
	(0.00313)	(0.00280)	(0.000529)	(0.000529)	(0.0322)	(0.0322)
Before 0809	-0.0251***	-0.0247***	-0.00300***	-0.00301***	0.178***	0.179***
	(0.00437)	(0.00426)	(0.000564)	(0.000564)	(0.0253)	(0.0253)
Before DDD	**0.0407***	**0.0282***	**0.0204***	**0.0204***	**0.792***	**0.792***
	(0.00806)	**(0.00719)**	**(0.00175)**	**(0.00175)**	**(0.0451)**	**(0.0452)**
After	0.0271***	0.0271***	0.00157***	0.00157***	-0.105***	-0.105***
	(0.00148)	(0.00136)	(0.000315)	(0.000315)	(0.0141)	(0.0141)
After Germany	0.0122***	0.0111***	0.00134**	0.00134**	-0.0538**	-0.0531**
	(0.00334)	(0.00296)	(0.000631)	(0.000631)	(0.0247)	(0.0247)
After 0809	0.0255***	0.0260***	0.0112***	0.0112***	-0.0169	-0.0166
	(0.00401)	(0.00406)	(0.000849)	(0.000848)	(0.0278)	(0.0278)
After DDD	**0.0319***	**0.0323***	**-0.0124***	**-0.0124***	**-0.108**	**-0.112**
	(0.00794)	**(0.00780)**	**(0.00165)**	**(0.00165)**	**(0.0463)**	**(0.0463)**
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Observations	184,120	184,120	184,120	184,120	184,120	184,120
Number of stocks	1,267	1,267	1,267	1,267	1,267	1,267
R–squared	0.982	0.992	0.0138	0.0146	0.912	0.913
Within R–squared	0.476	0.784	0.00802	0.00883	0.0727	0.0775

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (at the beginning of the current period).

**TABLE A6: Cross-checks: Dividend-paying versus non–dividend-paying stocks**

Model	1	2	3	4	5	6
Dependent variable	Share price	Share price	Daily return	Daily return	Trading volume	Trading volume
Before	-0.0129	0.00606	0.00874***	0.00907***	-0.751***	-0.734***
	(0.0199)	(0.0109)	(0.00109)	(0.00112)	(0.0702)	(0.0685)
Before Germany	0.0342	0.0309**	-0.00516***	-0.00538***	0.616***	0.605***
	(0.0232)	(0.0140)	(0.00184)	(0.00184)	(0.0882)	(0.0877)
Before 0809	-0.0797	0.0120	0.00715	0.00660	0.110	0.148
	(0.0544)	(0.0356)	(0.00563)	(0.00566)	(0.183)	(0.183)
Before DD	**0.0703**	**-0.00408**	**0.0216*****	**0.0218*****	**0.983*****	**0.959*****
	(0.0619)	**(0.0417)**	**(0.00701)**	**(0.00702)**	**(0.203)**	**(0.203)**
Before × Dividend	0.0400*	0.0182	-0.00318***	-0.00354***	-0.211***	-0.230***
	(0.0228)	(0.0124)	(0.00113)	(0.00116)	(0.0751)	(0.0732)
Before Germany × Dividend	-0.0295	-0.0295*	0.00324	0.00341*	-0.162	-0.151
	(0.0290)	(0.0176)	(0.00198)	(0.00198)	(0.102)	(0.102)
Before 0809 × Dividend	0.0637	-0.0348	-0.00325	-0.00269	0.0639	0.0224
	(0.0587)	(0.0380)	(0.00571)	(0.00574)	(0.188)	(0.188)
Before DDD × Dividend	**0.0221**	**0.0750**	**0.000365**	**0.000320**	**-0.101**	**-0.0831**
	(0.0721)	**(0.0480)**	**(0.00738)**	**(0.00738)**	**(0.217)**	**(0.216)**
After	-0.0589**	0.00703	0.0132***	0.0133***	0.0180	0.0444
	(0.0251)	(0.0131)	(0.00221)	(0.00223)	(0.0754)	(0.0752)
After Germany	0.0766***	0.0338**	-0.00184	-0.00180	-0.110	-0.121
	(0.0287)	(0.0167)	(0.00300)	(0.00300)	(0.0889)	(0.0887)
After 0809	-0.0923**	0.00424	0.0207***	0.0203***	-0.562***	-0.525***
	(0.0408)	(0.0298)	(0.00568)	(0.00563)	(0.115)	(0.115)
After DD	**0.0822**	**0.0139**	**-0.0269*****	**-0.0268*****	**0.232**	**0.199**
	(0.0525)	**(0.0374)**	**(0.00751)**	**(0.00747)**	**(0.154)**	**(0.152)**
After × Dividend	0.0992***	0.0249*	-0.00989***	-0.00993***	-0.254***	-0.285***
	(0.0277)	(0.0143)	(0.00228)	(0.00230)	(0.0801)	(0.0795)
After Germany × Dividend	-0.0670**	-0.0319	0.00260	0.00251	0.0654	0.0710
	(0.0341)	(0.0200)	(0.00318)	(0.00318)	(0.0998)	(0.0993)
After 0809 × Dividend	0.128***	0.0141	-0.00483	-0.00428	0.432***	0.391***
	(0.0466)	(0.0331)	(0.00582)	(0.00576)	(0.126)	(0.125)
After DDD × Dividend	**-0.0287**	**0.0385**	**0.0163****	**0.0163****	**-0.236**	**-0.203**
	(0.0650)	**(0.0445)**	**(0.00787)**	**(0.00782)**	**(0.176)**	**(0.172)**
Dividend		0.0398**		0.000677*		0.0480
		(0.0156)		(0.000392)		(0.0362)
Controls	NO	YES	NO	YES	NO	YES
Stock fixed effects	YES	YES	YES	YES	YES	YES
Market–year fixed effects	YES	YES	YES	YES	YES	YES
Industry–year fixed effects	NO	YES	NO	YES	NO	YES
Observations	165,287	165,287	165,287	165,287	165,287	165,287
Number of stocks	1,123	1,123	1,123	1,123	1,123	1,123
R–squared	0.981	0.992	0.0152	0.0160	0.912	0.912
Within R–squared	0.479	0.785	0.00942	0.0103	0.0739	0.0786

The dependent variables are the logarithm of share price, the daily return (in percentage points), and the logarithm of the trading volume (in thousands). Estimates are calculated by OLS with stock fixed effects. Heteroscedasticity-robust standard errors are clustered by stock level and documented in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The variable *Before* (*After*) is a dummy for the last two trading days before (after) the turn of a year; *Before DDD* (*After DDD*) is an interaction term of *Before* (*After*), a dummy for the treatment group, and a dummy for 2008–2009; *Dividend* is a dummy for dividend-paying stocks. The controls include the logarithm of EBITDA of the next period (2009 for 2008–2009), the logarithm of the market value, and the logarithm of the book value (both at the beginning of the relevant period).

FIGURE 1: Timing of the 2008/2009 Business Tax Reform

June 26, 2006
1st draft of general tax reform concept

January 22, 2007
Decision to introduce capital gains tax

May 5, 2007
Presentation of tax bill

May 18, 2007
Approval of Federal Council

July 6, 2007
Approval of Federal Parliament

January 1, 2008
Introduction of the 2008/2009 Business Tax Reform

January 1, 2009
Introduction of CGTR 2009
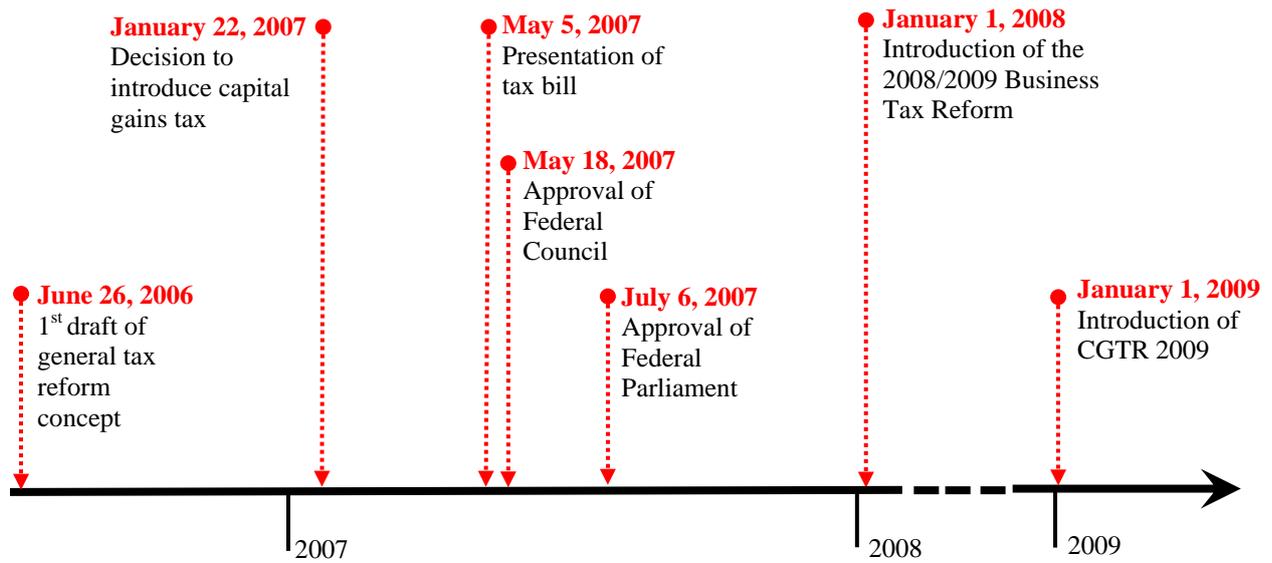
2007   2008   2009

FIGURE 2: Google Trends analyses, 2007 to 2009
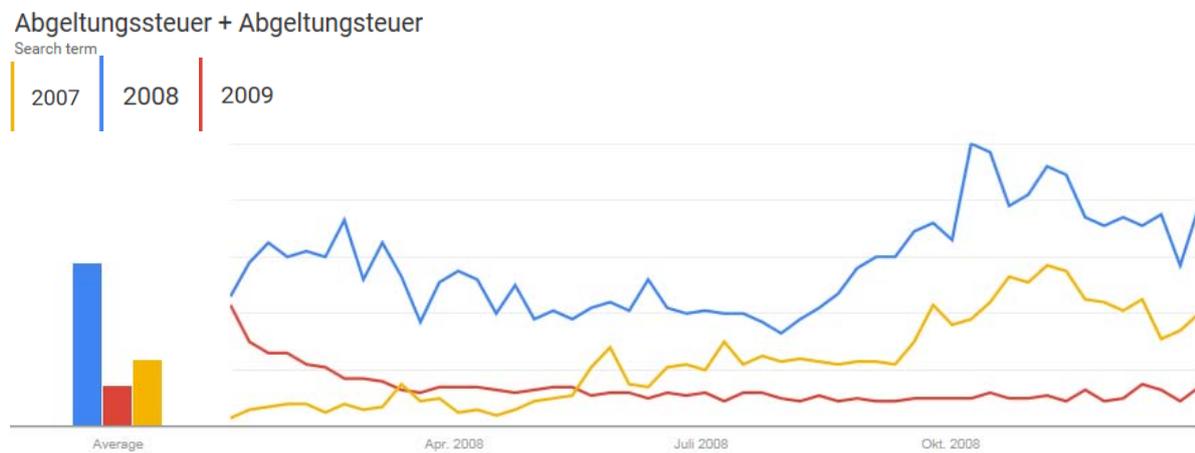
Data Source: Google Trends (www.google.com/trends).

FIGURE 3: Abnormal trading volumes, TY 2008/2009

FIGURE 4: Abnormal daily returns, TY 2008/2009

Abnormal daily returns 2008/2009
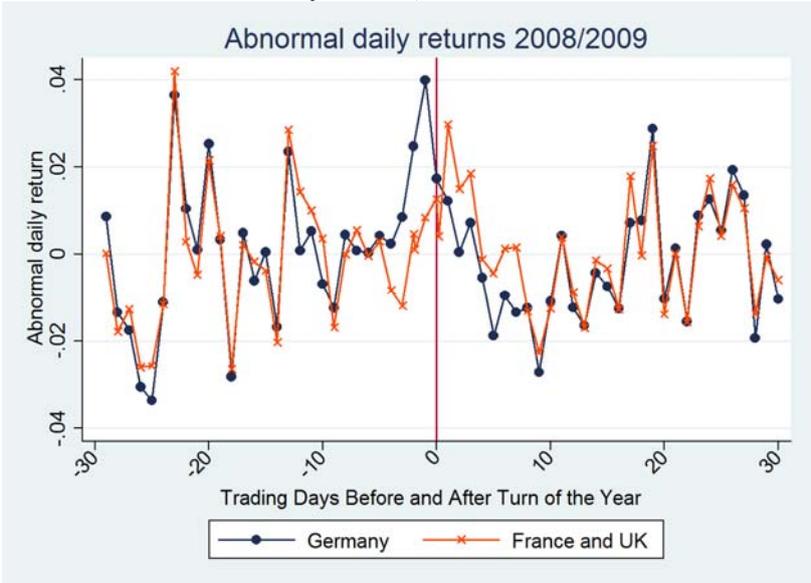
FIGURE 5: Abnormal share prices, TY 2008/2009

Abnormal share prices 2008/2009

FIGURE A1: Abnormal trading volumes, daily returns, and share prices, TY 2007/2008, TY 2009/2010
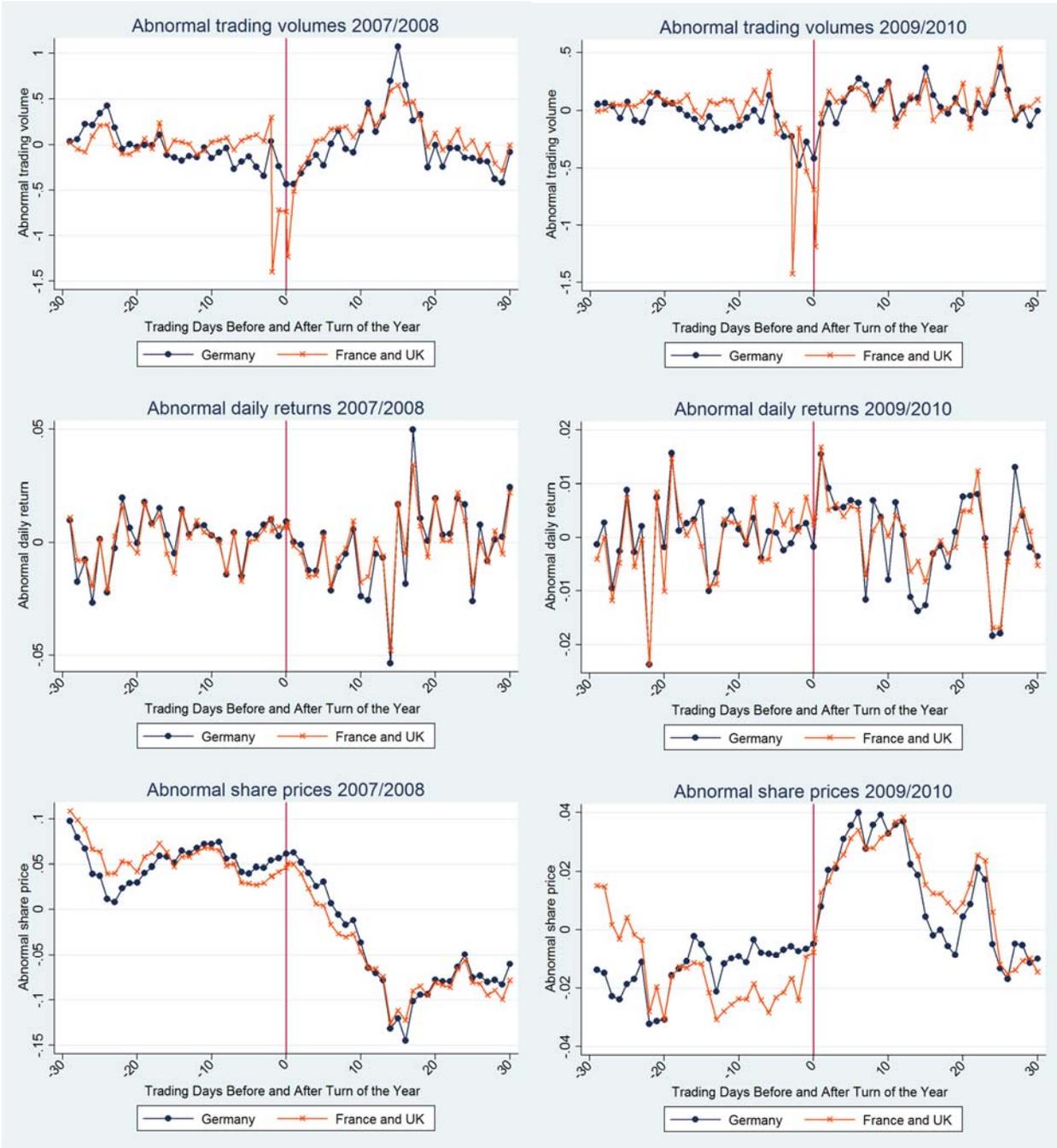
FIGURE A2: Unconditional trading volumes, daily returns, and share prices, TY 2008/2009