The Market Impact of Local Bias: Evidence from a Natural Experiment

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March 29, 2010

Abstract

Exploiting regional holidays in Germany as a source of exogenous cross-sectional variation in investor distraction, we provide large-scale evidence that market participants' well-documented local bias is large and pervasive enough to materially affect firm-level turnover. On holidays which are only observed in some regions, stocks of firms headquartered therein are strikingly less traded, both in statistical and economic terms, than very similar stocks of firms in non-holiday regions. This phenomenon holds controlling for market-wide turnover, past firm-specific turnover, stock returns, media and analyst coverage as well as differences in information release. It is robust across time, econometric specifications and calculation methods. We argue that these findings, in their entirety and robustness, are most plausibly explained with locally biased investors staying out of the market due to high opportunity costs. Consistent with this interpretation and the investor recognition hypothesis of Merton (1987), the volume shock is particulary pronounced in stocks, which are small, hard to value or neglected by the nationwide press, and thus less visible to non-local investors. Trading records of about 3,000 retail investors from a German online broker provide additional supportive evidence. Our findings have implications for the literature on local bias, determinants of trading volume and limited attention.

Keywords: Local bias, determinants of trading volume, investor recognition hypothesis, limited attention, investor distraction, holiday effect

JEL Classification Codes: G12, G14

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1 Introduction

By now there is ample evidence that both individual and professional investors have a strong preference for trading stocks of locally-headquartered firms. Heterogeneous findings suggest that both informational and behavioral factors are likely to drive this so-called local bias.[1] But does this individual behavior matter for market outcomes? The potential impact of local bias on economic aggregates is largely unexplored. We take a step in this direction by analyzing how localized trading affects firm-level turnover. Exploiting favorable characteristics of the German holiday system and of the geographic distribution of firms, we identify and analyze situations in which the market impact of local bias is of statistical and economic significance. Our findings do not only indicate that local investors play an important role in the structure of the market in terms of trading activity, but also have implications for the research on limited attention.

In addition to holidays which are celebrated nationwide (such as Christmas), Germany has a few holidays which are only observed in some of its states. While these holidays have a religious origin, they materially influence public life as a whole. Authorized by law, they are characterized by a limit or ban on work and official business (but not exchanges).[2] Extensive casual evidence[3] suggests that, around regional holidays, opportunity costs of

[1]Studies attributing local bias to a preference for investing into the familiar, to the pronounced visibility of local stocks or to incorrectly perceived information advantages include Ackert et al. (2005), Bailey et al. (2008), Grinblatt and Keloharju (2001), Huberman (2001), Seasholes and Zhu (2009), and Zhu (2003). Papers arguing that the preference for local stocks is instead primarily driven by superior locally generated information include Bodnaruk (2009), Coval and Moskowitz (1999), Coval and Moskowitz (2001), Feng and Seasholes (2004), Ivkovic and Weisbenner (2005), and Massa and Simonov (2006). Moreover, recent studies of Brown et al. (2008), Hong et al. (2004), Hong et al. (2005), Ivkovic and Weisbenner (2007) and Shive (2009) show that local social interaction and neighborhood word-of-mouth effects strongly affect investment choices. While local bias has been shown to be robust across countries, investor subgroups and sample periods, there is no study directly focussing on the German market. However, the combined findings in Dorn et al. (2008), Hau (2001) and section 5 suggest that also German investors have a preference for local firms.

[2]For the holidays analyzed here, the Frankfurt stock exchange has been open over the whole sample period, while stock trading at the regional exchanges in Germany started in 2000. This is unlikely to influence our results for three reasons. First, for all sample stocks, the primary exchange from which Thomson Reuters Datastream obtains its default prices turns out to be the Frankfurt stock exchange. Second, inferences remain the same if we restrict our analysis to those stocks which are exclusively traded on the Frankfurt stock exchange. Third, results are robust across time. In particular, they also hold for the subperiod 2000-2009 (see sections 4.2 and 4.3 for details).

[3]Leading newspapers and other media provide a broad range of anecdotal evidence for high opportunity costs of trading around regional holidays. For example, *Die Welt* (27/05/2005), *Financial Times Deutschland* (12/06/2009), *Tagesspiegel* (12/06/2009), *Stuttgarter Zeitung* (08/05/2007, 24/05/2008), *DPA* (25/05/2001) and *Dow Jones* (01/06/2007) report

participating in the stock market are considerably higher than usual for both individual and professional investors in holiday regions, but largely unchanged for investors in the remaining regions.

We use this exogenous variation in investor distraction to analyze whether localized trading is an important driver of firm-level turnover. If investors in aggregate traded the market portfolio, a large and geographically concentrated subset of holiday-distracted investors would be likely to induce lower market-level turnover, but would not have implications for the cross-section of firm-level trading activity: In the case of two-fund separation, share turnover must be identical for all securities (e.g. Lo and Wang (2000)). Local bias, however, would give rise to a pronounced cross-sectional pattern: Stocks of firms located in holiday regions (in the following referred to as holiday firms) should, all else equal, exhibit a more pronounced drop in turnover than stocks of firms located in unaffected regions (in the following referred to as non-holiday firms). An advantage of the German setting is that non-holiday firms are in many ways very similar to holiday-firms, and thus meet the requirements of a suitable control group: Both samples are broadly homogenous with respect to e.g. the number of firms, industry composition, firm and risk-return-characteristics as well as (unconditional) turnover properties.

We indeed find that holiday-firms are strikingly less traded than non-holiday firms. This result is not only statistically robust, but also economically meaningful: The abnormal drop in volume relative to non-holiday firms is, depending on the specification and all else equal, estimated to range from about 10% to slightly over 20%. The findings hold controlling for market-wide turnover, past firm-specific turnover, contemporaneous and past stock returns, and after various changes in methodology. Digging deeper, we test and largely reject the hypothesis that the negative volume shock for holiday firms is driven by cross-sectional differences in information release. Specifically, we analyze the potential link between the degree of news arrival and turnover on regional holidays from four different angles: From a market perspective, we study the distribution of abnormal returns. From

that many investors, both private and professional, stay out of the market on regional holidays and corresponding bridge days. *Frankfurter Rundschau* (30/10/2004) and *Die Welt* (02/11/2004) report that non-holiday states profit from increased holiday tourism. *AHGZ* (12/05/2007), a magazine for the hotel and catering sector, states that retail sales volume is higher around regional holidays. *Spiegel Online* (14/06/2006) and *ddp* (08/06/2009) point to the danger of traffic jams due to the large number of people on a short holiday. *Sueddeutsche Zeitung* (31/10/2000) writes about massive obstructions of traffic near graveyards on All Saints' Day, on which it is custom to honor the deceased.

an investor's viewpoint, we explore the search frequency for firm names in Google. From an analyst perspective, we study changes in the cross-section of stock recommendations. From a media point of view, we analyze changes in press coverage. In the overall picture, these tests provide only minor evidence for differences in information arrival. We thus argue that the explanation most plausibly fitting our findings is that locally biased investors stay out of the market during regional holidays due to high opportunity costs.

In line with this interpretation and the investor recognition hypothesis of Merton (1987), the holiday effect is particularly pronounced for firms with high shadow cost of information, i.e. for firms less visible to non-local investors. Market capitalization, idiosyncratic risk and residual media coverage are used as proxies for visibility. Finally, we study trading patterns of about 3,000 private investors from a German online broker. Again we find evidence supporting our interpretation. Consistent with findings of studies on local bias and retail investor behavior, individual investors seem to disproportionally cause the holiday effect in small firms, in which their localized trading is concentrated.

Our study contributes to the literature in several ways. First, while prior research shows that investors are biased towards the stocks of nearby firms, we identify scenarios in which these individual preferences are strong and pervasive enough to materially influence economic aggregates. Thus, local bias matters for market outcomes.

Second, our natural experiment supports the idea that firm location affects the dynamics of firm-level turnover. In this way, it helps to enhance our understanding of the determinants of trading volume. While it is well known that trading activity exhibits substantial variation both in the cross-section and time-series, empirical evidence on its underlying drivers is scarce (see e.g. the discussions in Lo and Wang (2000), Statman et al. (2006) or Chordia et al. (2007)). However, the prominence of trading volume in theoretical and empirical research on liquidity, return predictability, behavioral finance or information asymmetries clearly requires the exploration of cross-sectional regularities uncovered so far.[4]

Third, a growing body of research builds on the idea of limited attention, whereby in-

[4]For example, Hong and Stein (2007) note that "many of most interesting patterns in prices and returns are tightly linked to movements in volume" (p. 111).

vestors process only a subset of publicly available information due to attention capacity constraints. A challenge for empirical work is the identification of a suitable proxy for investor distraction. For example, Hou et al. (2009) rely on down market periods, while Hirshleifer et al. (2009) employ the number of competing earnings announcements. In a scenario related to ours, DellaVigna and Pollet (2009) analyze the immediate and delayed response to earnings announcements on Fridays, when, as they argue, investor inattention is more likely. They establish a link between investor distraction, abnormal volume and predictable price drifts. Compared to earnings announcements on other weekdays, trading volume on Fridays is 8% lower and return drifts are much stronger. We contribute to this literature by highlighting the role of regional holidays as a promising proxy for limited attention. We identify scenarios which are likely to cause inattention of an important subset of investors, leading to market frictions along a geographical line. Moreover, we explore which firms and investor groups tend to be most affected. This might serve as a promising starting point for future work on the joint dynamics of price and turnover.

The remainder of this paper is organized as follows. Section two discusses related literature and develops our hypotheses. Section three describes our data. Section four contains the event study analysis and explores alternative interpretations of our findings. Section five analyzes cross-sectional determinants of the holiday effect. Section six concludes.

2 Related Literature and Hypotheses

Though there is extensive evidence for local bias on an individual level (see footnote 1), research exploring its implications for market outcomes is still at its beginning and moreover limited to the US market. Pirinsky and Wang (2006) document an excessive comovement of local stock returns, which they attribute to correlated trading patterns of local residents. Building on investors' consumption smoothing motives, Kumar and Korniotis (2008) argue that stock returns contain a predictable local component. The findings of Hong et al. (2008) suggest that the price level of firms is affected via an "only game in town effect": In the presence of only few local firms competing for investors' money, share prices of spatially close firms are driven up by the excess demand of proximate residents.

To the best of our knowledge, only two papers analyze the impact of local bias on firm-level turnover. Loughran and Schultz (2004) show, among other pieces of evidence, that the time zone in which a firm is headquartered triggers intraday trading patterns in its stock. Loughran and Schultz (2005) demonstrate that rural stocks are less liquid than urban stocks, which they attribute to urban stocks being local and thus visible to more potential investors. They conclude that "much remains to be done on geography and asset pricing" (p. 363).

We aim at taking a step in this direction by running a natural experiment, which exploits the existence of regional holidays in conjunction with the favorable geographic distribution of German firms. In our baseline analysis, we focus on All Saints' day as well as on Epiphany. All Saints' day is a Roman Catholic holiday officially celebrated on November 1 in the predominately catholic states of Baden-Württemberg, Bavaria, Northrhine-Westphalia, Rhineland Palatinate, and Saarland. Epiphany, celebrated on January 6, is a governmental holiday only in the states of Baden-Württemberg, Bavaria, and Saxony-Anhalt. There are more regional celebrations in Germany.[5] However, focusing on these two yields the most attractive event study properties: It is a yearly event which splits the whole market in two large disjunct groups with very similar characteristics (see section 3 for details).

We conjecture that investors in holiday regions on average face high opportunity costs and thus refrain, at least partly, from trading on these days. This assumption is in line with the findings of Hong and Yu (2009) and backed up by ample anecdotal evidence as given in footnote 3. To the extent that investors tend to heavily overweight local stocks in their investment decisions, their behavior will disproportionally affect the turnover of firms located in holiday regions. However, the turnover of the control group, i.e. firms in non-holiday regions, should only be affected by a substantially smaller degree. This line of reasoning gives rise to our main hypothesis 1:

Hypothesis 1: Due to local bias, trading activity during regional holidays will be significantly lower for firms in holiday regions.

[5] Corpus Christi takes place 60 days after Easter Sunday. However, stock trading on this day only started in 2000. Due to the limited number of observations, we analyze this holiday as a robustness check in section 4.2. Moreover, there is Reformation Day, which is celebrated only in the Eastern part of Germany. However, less than 5% of our sample firms are located therein.

From the theoretical perspective, this hypothesis is consistent with the trading-volume implications of the habitat-based model of comovement in Barberis et al. (2005). Similarly, in the model of Merton (1987), the so-called investor recognition hypothesis posits that investors are only aware of a subset of all securities in the stock universe. Consequently, the demand for each stock depends on its shadow cost of information. In equilibrium, firms not recognized by all investors, will, all else equal, have fewer shareholders taking relatively large positions in these securities. It seems plausible to assume that investor recognition of a firm is negatively correlated with geographical distance. We thus expect the impact of local investors on firm-level trading volume to be particularly strong for firms which are hardly visible to remote investors:

Hypothesis 2: The holiday effect will be more pronounced for firms that are less recognized by non-local investors.

While this hypothesis focuses on cross-sectional determinants of the holiday effect on the firm level, we also explore whether there are differences across investor types. Empirical findings assess this to be likely. Specifically, retail stock ownership tends to be more exposed to local bias than institutional stock holdings (e.g. Grinblatt and Keloharju (2001)). It is well documented that retail investors tilt their trading actions towards small stocks (e.g. Dorn et al. (2008), Kumar and Lee (2006)). Moreover, their local bias is concentrated in these small, less visible stocks (e.g. Zhu (2003)). These insights imply that the market-level impact of private investors' localized trading should be most clearly seen in small stocks with high retail concentration. With regard to limited attention around holidays, DellaVigna and Pollet (2009) conjecture that, on Fridays, individuals are more likely to be distracted by the upcoming weekend. Hong and Yu (2009) provide evidence that private investors trade less during the summer months due to vacation time. Combined with the observation of Goetzmann and Kumar (2008) that those investors who trade excessively are particularly locally biased, the rich set of findings suggests:

Hypothesis 3: The holiday effect for small firms will be disproportionally caused by individual investors.

3 Data

The data sets used for the analysis are summarized in table 1. The study combines stock market and geographic data with information on analyst as well as media coverage, ad hoc disclosures, internet search frequencies and with trading records of retail investors. In the following, the stock market data are described in more detail. The other data sets are introduced in the subsequent sections.

Please insert table 1 about here

The initial sample consists of the common stocks of all firms headquartered[6] in Germany which have been listed on a German stock exchange at some point between June 13, 1988 and January 15, 2009. The lower bound of the sample period is determined by the availability of the daily number of shares traded. The data is then subjected to a three-stage screening process. First, adjusted and unadjusted daily closing prices, market capitalization, book values, the number of daily shares traded, the number of total shares outstanding, adjustment factors as well as industry membership have to be available via Thompson Reuters Datastream. Second, we carefully cleanse the data relying on the methods suggested by Ince and Porter (2006). After this process, 1,071 stocks remain. Third, to assure that our analysis relying on daily data is not contaminated by the smallest and most illiquid stocks, we exclude micro cap firms.[7] This leaves a final sample of 792 stocks with a total of about 442,200 firm weeks.

Please insert table 2 about here

Table 2 provides descriptive statistics based on stock market data at a weekly frequency. The mean (median) firm is in our sample for 557 (515) weeks, has an average return of 0.09% (0.16%) per week, has an average market capitalization of roughly 1,148 (123) million Euro, and has a weekly turnover of 1.47% (0.98%). There is large cross-sectional

[6]The headquarter address is obtained from Thomson Reuters Datastream and then verified manually by matching the data with information made available by Deutsche Börse AG as well as with firm homepages. We follow the consensus in the literature on local bias and use a firm's headquarter as a proxy for its location.

[7]We delete securities if their mean market capitalization is less than 10 million Euro or if the 5th percentile of their unadjusted prices is less than 1 Euro. The main results do not change if we use the raw sample.

and considerable time-series variation in turnover, which again motivates the exploration of regional holidays as a potential determinant of differences in firm-level trading volume. As it cannot be negative, turnover is naturally skewed, which justifies taking its natural logarithm in the following calculations (e.g. Ajinkya and Jain (1989)).[8]

Please insert table 3 about here

Table 3 shows summary statistics for holiday and non-holiday firms in both of our event study samples. Several findings are noteworthy. First, both the event (holiday) and the control (non-holiday) group contain several hundred stocks, so that our tests are based on large portfolios. Second, the composition of these portfolios is very similar. Firm characteristics, such as market capitalization, stock returns, and portfolio industry diversification, as measured by the Herfindahl Index based on Datastream Level 2 industry classification, are comparable. Third, the time-series properties of local turnover indices show a remarkably similar behavior, even in the tails of the distribution. Moreover, an eyeball analysis of the geographic distribution of sample firms shows that firm location in Germany tends to be less concentrated than in the predominantly used US samples (e.g. Ivkovic and Weisbenner (2005)). Taking together, our German sample does not seem to suffer from the type of cross-sectional geographic selection bias highlighted by Seasholes and Zhu (2009). Instead, the event study portfolios are broadly diversified, homogeneous and thus particularly suitable for the following natural experiment.

4 Event Study

4.1 Methods and Baseline Results

In order to quantify the impact of localized trading, one needs to define a measure of trading activity. We focus on firm turnover as "turnover yields the sharpest empirical implications and is the most natural measure" (Lo and Wang (2000), p. 12).

[8] To handle the problem of zero turnover, we follow the literature in adding a very small constant before taking the logarithm. In one of our robustness checks in section 4.2, however, we also use ordinary, raw turnover. Inferences remain unchanged.

In the regression setting targeted at testing hypothesis 1, the dependent variable is the natural logarithm of the daily turnover $TO_{i,t}$ of firm i on a regional holiday at time t. We consider every year from 1988 to 2009 in which the respective regional holiday falls on a trading day. For All Saints' day, this results in 16 years with a total of 6,485 firm-level turnover observations. For Epiphany, we are able to identify 14 years with a total of 5,657 observations.

During regional holidays, market turnover in general tends to be lower. The average daily turnover of a value-weighted (equally-weighted) turnover index during our whole sample period is 0.42% (0.20%). On Epiphany, the numbers decrease to 0.36% (0.14%), on All Saints' Day to 0.29% (0.13%). However, we are not interested in changes in trading activity per se, but in potential cross-sectional differences between holiday and non-holiday firms.

Thus, the independent variable of interest is the holiday dummy variable Hol_i that equals one if a firm's headquarter is located in a holiday region and zero otherwise. The null hypothesis is that the dummy should not have any significance.[9]

To isolate the holiday effect, it is essential to control for the expected level of the turnover $E[TO_{i,t}]$ of firm i on event day t. To assure robustness, we rely on two different models widely used in the literature on abnormal volume. Model 1 accounts for firm-specific average trading volume in the pre-event period (see e.g. Chae (2005)). In the baseline analysis, the expected turnover for firm i on day t is calculated as the natural logarithm of its average turnover over the trading days from t=-20 to t=-2. Model 2 controls for both market-related and firm-specific volume by adopting a "turnover market model"(see e.g. Ferris et al. (1988), Tkac (1999)). To this end, in the period from t=-60 to t=-2, turnover for each firm is regressed on a market-wide, value-weighted turnover index $TO_{m,t}$. Using the coefficients from these time-series regressions, expected turnover for firm i on the event day t is then given by

(1) $E[TO_{i,t}] = \widehat{\alpha}_i + \widehat{\beta}_i TO_{m,t}.$

[9] To verify that this hypothesis is empirically appropriate, we implement an "out-of-sample" experiment: For each model specification and each holiday sample, we randomly select 500 days (excluding the period from t-1 to t+1, where t denotes the holiday) and run the regression as given in equation 2. We then calculate the respective t-statistic based on these 500 observations. In each case, the holiday dummy is insignificant with an absolute t-value of less than 0.5.

It is well known that current firm-level turnover is related to current stock return (e.g. Chordia et al. (2007)). We thus include two control variables in our regression. $Ret_{+,i,t}$ represents the event day return of an individual stock if positive and zero otherwise.[10] In a similar way, $Ret_{-,i,t}$ is defined as the event day return if negative and zero otherwise. This distinction is motivated by possible asymmetric effects caused by short-selling constraints or the disposition effect, which have been shown to affect localized trading (e.g. Grinblatt and Keloharju (2001)). It has also been documented that firm-level turnover is influenced by lagged stock returns (e.g. Statman et al. (2006)). This effect should be captured at least partly by our measures of expected turnover. To more fully control for recent past returns, we include two analogous variables ($Ret_{+,i,t-1}$ and $Ret_{-,i,t-1}$) for the pre-event day return. The return controls might also be regarded as simple proxies for news or rumors, which could affect turnover. In section 4.3, we test in more detail for potential differences in information release between holiday and non-holiday firms.

In our basic regression setting, we employ a Fama-MacBeth-approach. Specifically, we implement the following cross-sectional model for each year in which the specific holiday takes place on a weekday:

(2) $TO_{i,t} = \beta_{0,t} + \beta_{1,t}E[TO_{i,t}] + \sum_{k=2}^{5} \beta_{k,t}ReturnControl_k + \beta_{6,t}Hol_i + \epsilon_{i,t}$

Relying on the method of West and Newey (1987), we then use the resulting time-series of coefficients to assess their statistical significance.

Table 4 shows the findings for the Epiphany sample and the All Saints' sample, respectively. Displayed are results from three regression specifications, which differ in the dependent variable. The baseline regression uses firm-specific turnover at the day of the holiday ($TO_{i,t}$), the others use the day preceding and following the holiday, respectively.

Please insert table 4 about here

The holiday dummy attains a highly negative coefficient in all specifications. For both the Epiphany and the All Saints' sample, and for both models of expected turnover, the

[10]However, our results do not change if we only include the lagged return or if we do not add return-related control variables at all. Moreover, as shown in section 4.2, inferences are the same if we include interaction terms to allow for a different impact of returns on holiday firm turnover.

coefficient is strongly statistically significant at the one percent level. The upper bounds of the 95 percent confidence intervals of the coefficients are all well below zero. Moreover, from an economic perspective, the effect is quite large: The pure holiday-induced abnormal drop in volume is estimated to range from roughly 10% to slightly over 20%. Additionally, results are robust across time: In the Epiphany sample, the holiday dummy is negative in each year; in the All Saints' sample, it attains a negative coefficient in 13 out of 16 observations. Finally, the holiday effect can, for the most part, only be identified at the day of the holiday itself. On the day before the holiday, there is no abnormal drop in volume; on the day after the holiday, there is some evidence of abnormally low turnover, which, however, is much weaker than on the date of the holiday itself.[11] Taken together, the findings so far strongly confirm hypothesis 1.

4.2 Robustness Checks

The main results from a variety of sensitivity tests are summarized in table 5.

Please insert table 5 about here

There is arguably some element of arbitrariness in the length of the pre-event period in both models of expected turnover. Therefore, we experimented with different intervals ranging from 10 to 100 trading days. Panel A displays some of these results and verifies that inferences remain the same.

It might be possible that the importance of the return controls varies between holiday and non-holiday firms. We thus interact all return variables from the baseline regression with the holiday dummy. It turns out that none of them is significant. Panel B shows that the importance of the holiday dummy remains unaffected.

One might be concerned that the results could partially be driven by a disproportionate number of holiday firms whose stocks are not traded at all at the event day. Our findings might then not reflect a widespread localized trading phenomenon, but rather

[11] As additional findings suggest, the effect on the day after the holiday might at least partly be attributable to the impact of bridge days as well as the end of Christmas holidays, which varies both across time and states, respectively. This seems also consistent with the anecdotal evidence given in footnote 3.

be attributable to a few outliers. We thus repeat the analysis discarding all stocks with zero trading volume. However, as shown in Panel C, this exercise rather strengthens our results.

Panel D verifies that the findings are robust to the use of raw (instead of logarithmized) turnover. In all specifications, the holiday effect is significant at the 1% level. Moreover, it keeps its economic significance. As a rough estimate, for the mean (median) firm, the results indicate a pure regional holiday-induced drop in daily trading volume of roughly 200,000 (more than 20,000) Euro. Given the usual daily firm trading volume, these numbers are substantial.

Petersen (2009) suggests using a single pooled regression with clustered standard errors to control for the possibility that residuals of a given firm are correlated across years. We thus pool all the data for firms with non-zero turnover, add year dummies and cluster standard errors by firm. As shown in Panel E, findings are robust to this alternative econometric specification.

Legally recognized regional holidays are observed on a state level. Thus, our interpretation rests on the idea of states being an appropriate classification of the preferred investment habitats of local investors. While this concept has been proven fruitful in other studies on local bias (e.g. Hong et al. (2008), Kumar and Korniotis (2008)), it is clearly only a noisy proxy. Note, though, that this classification works against finding any holiday effect: If local investors tilt their trading towards stocks of local firms irrespective of state borders, then, all else equal, it would be hard to identify any differences in trading volume between two states. In an attempt to use a classification scheme with a more pronounced socio-economic background, we repeat our analysis building on metropolitan areas as defined by the Conference of Ministers for Spatial Planning.[12] Some metropolitan areas span more than one state, whereas some states contain more than one metropolitan region. We only consider metropolitan areas which clearly belong either to a holiday or a non-holiday region. This procedure leaves us with a total of 4,350 observations for the Epiphany sample and 5,416 observations for the All Saints' Day sample. Panel E verifies that the significance

[12]This classification identifies eleven metropolitan regions in which roughly 70% of the German population live. It is based on agglomerations characterized by a high degree of dynamic economic development and international significance. http://www.eurometrex.org/ defines these areas as "larger centres of economic and social life" containing "core business, cultural and governmental functions". About 84% of the sample firms are located within such a metropolitan region.

of the holiday dummy is not sensitive to this alternative classification scheme. For most specifications, the holiday effect is estimated even marginally more precisely, possibly pointing to the true impact of localized trading being stronger than reported.

As a final way to test the robustness of our main results, we study turnover shocks on Corpus Christi as the third regional legal holiday. It is celebrated in the states of Baden-Wuerttemberg, Bavaria, Hesse, North Rhine-Westphalia, Rhineland-Palatinate and Saarland, in which about 75% of the sample firms are located in. Stock market trading on this day started in 2000, which results in a total of 5,078 firm-level observations distributed over nine yearly observations. If our findings are robust across time and represent a general, widespread localized trading phenomenon, then we should also find a highly negative holiday coefficient in this scenario. Panel F, which shows findings from a pooled regression with year dummies and firm-level clustered standard errors, provides strongly supportive evidence: The holiday-induced shock in volume is highly significant, and estimated to be close to 20%.

4.3 Differences in Information Release?

So far, the pronounced and robust negative volume shock seems suggestive of local investors staying out of the market due to high opportunity costs. However, a key concern to this interpretation is that holiday firms might release less information than similar non-holiday firms. To the extent that this triggers rebalancing trades or leads to increased differences of opinion among investors, one would expect similar cross-sectional patterns.

We explore the possibility of an information effect from four different perspectives. More precisely, we test for information-induced effects with regard to abnormal price movements, shocks in the degree of analyst coverage, unexpected changes in investors' internet search behavior as well as differences in media exposure. In the following, these tests are described in detail. Their main results are presented in tables 6 and 7.

Please insert table 6 and table 7 about here

To the extent that a higher degree of firm-specific news manifests itself in an increased importance of the idiosyncratic component of stock returns on the event date, non-holiday firms should exhibit more pronounced absolute abnormal returns on average. To test for such differences in unexpected price movements, we calculate daily abnormal returns for each firm during the three day period centered around each holiday in each year. By employing both the OLS market model and the Carhart-four-factor model to measure abnormal returns, we follow standard event study methodology; due to very similar findings, only the results obtained from the latter model are reported. For both the holiday and the non-holiday sample, we then rank firms according to their daily absolute abnormal return. Subsequently, for each holiday, we compute the difference between the cross-sectional median[13] of both samples. This procedure aims at providing an estimate of the absolute abnormal return of the typical firm in each sample at the event date. Finally, a bootstrap approach[14] is used to test whether the resulting time series of differences is statistically distinguishable from zero. Panel A of table 6 , which reports results for the Epiphany, All Saints Day as well as Corpus Christi sample, shows that this is hardly the case. The only slightly significant event is on the day of Corpus Christi, where, from an economic perspective, the resulting return difference seems small. For all other holidays, differences are very close to zero and insignificant, implying that in most cases average abnormal returns do not differ much between holiday and non holiday firms. Similar inferences are drawn from unreported tests, in which we focus on positive and negative returns, respectively.

Our second test for differences in news arrival is inspired by Da et al. (2009) and based on cross-sectional shocks in firm names' search frequencies in Google. The application "Google Insights for Search" allows to construct standardized time-series of terms entered in the internet search engine. Data is available from January 2004 on. We argue that an unexpected change in the query frequency of a firm name[15] is a promising way of

[13]We focus on the median to make sure that extreme return events of a few firms do not drive the results. Nevertheless, the results remain largely unchanged when using the mean of the raw or of the winsorized cross-section.

[14]Specifically, from each time series of differences, we randomly draw values with replacement until we have a pseudo time series of the same length as the original sample. Averaging these differences yields one pseudo observation. This entire process is repeated until we have 10,000 pseudo observations of the differences in absolute abnormal returns between both samples. Finally, empirical p-values are calculated from this simulated distribution. For a discussion of simulations in event studies, see e.g. Lyon et al. (1999).

[15]One might be concerned about the use of firm names. They might not be unambiguous and a few of them clearly have multiple meanings. However, this seems unlikely to drive our main results. First, we study differences between two large samples with several hundred firm names. Thus, any potential inaccuracies and inconsistencies are likely to cancel out. Second, we are interested in shocks of search frequencies, i.e. we control for the expected level of queries. Third,"Google Insights for Search" additionally provides a top search list with the terms most closely related to the original search. In an

capturing shocks in the arrival of firm-specific news or rumors. It is likely to be positively correlated with changes in the number of people that, due to some external stimulus, become interested in this firm. Consequently, if there was less news related to holiday-firms on average, a holiday dummy should attain a significantly negative coefficient in a regression with firm-specific search frequency shocks as dependent variable. To this end, we first construct a measure of unexpected search behavior for each firm. It is defined as the difference between the search frequency on the day t of the holiday minus the average frequency over t-10 to t-2, divided by its standard deviation in the pre-event period. We then pool observations, and regress the shock variables on a holiday dummy in addition to controls for years and industries. Panel B of table 6 shows that all holiday dummy coefficients are insignificant, pointing against a strong information effect.

A third analysis focuses on the large effort of analysts in collecting, processing and disseminating information (e.g. Womack (1996)). Specifically, we are interested whether aggregated analyst coverage on regional holidays differs from the coverage in the rest of the year. To this end, we match our sample with the I/B/E/S analyst buy/hold/sell-recommendations database. This results in a total of 51,497 stock recommendations of 196 brokers, which cover more than 80% of the sample firms. We then calculate the proportion of the total number of recommendations for the universe of holiday firms on each day of the year. Relying on the percentiles of this empirical distribution, we are able to detect whether the level of analyst coverage at the event date is exceptionally low. We distinguish between a value-weighted analysis, in which multiple recommendations of the same firm are considered as multiple observations, and an equal-weighted analysis, in which we regard such a scenario as a single observation. The latter method tends to give more weight to small firms, which less often receive several recommendations at the same day. For additional insight, we repeat the analysis now focusing on the review date instead of the recommendation date.[16] Panel C of table 6 shows the fraction of total analyst coverage on the event day. Percentiles are given in parenthesis. In all specifications, coverage does not seem to decrease for firms located in holiday regions. Judging from the

attempt to cleanse the data, we also used that information to manually exclude those firm names that seemed most likely to distort the analysis. Inferences remain unchanged. The alternative of relying on security identification numbers instead of firm names turned out to be unproductive as search frequencies tend to be much lower, resulting in many missing values.

[16]The review date is the most recent date that an estimate is confirmed by an analyst to I/B/E/S as accurate.

percentiles of the distribution of analyst coverage throughout the year, the day of the holiday on average rather seems to be a day like any other.

As a final test, we study the distribution of media coverage in three leading German daily business newspapers, which are published nation-wide. Our newspaper database spans the time period from 1/1/2000 to 15/01/2009 and comprises Financial Times Deutschland, Handelsblatt and Sueddeutsche Zeitung. Searching factiva and genios, we manually collect articles about each of our sample firms for each day and each newspaper.[17] This procedure results in a total number of 126,125 news stories, which cover almost 94% of our sample firms. Panel A of table 7 gives more detailed information about the database.

Panel B shows results from a test similar to the one used for analyst coverage. We analyze whether aggregated media coverage for holiday firms is abnormally low around the holiday. We consider both the event day and the following day, as information becoming public on day t can not be published by newspapers before day t+1. To assess statistical significance, we calculate the proportion of total media coverage attributable to holiday firms for each day of the year.[18] We then analyze the proportion of press coverage around the holiday relative to the whole empirical distribution. Again, we distinguish between a value-weighted and an equal-weighted perspective. The analysis produces mixed results. While around All Saints' Day, media coverage for holiday firms is indeed statistically significant lower, there is no evidence for a similar pattern around the other holidays. In fact, media coverage is sometimes even higher than on average over the rest of the year. To gain more insight, we employ a second test using a more formal regression approach.

We create the dummy variable $News_{i,t}$ that indicates for each firm on each day of the eleven trading days period centered around the regional holiday whether a news article was

[17]To be included in our database, the article needs to mention at least twice the name or security identification number of the firm. Coverage for Financial Times Deutschland starts on 1/1/2001.

[18]We thereby account for the fact that not all newspapers are published at each day of the year: At Corpus Christi, Handelsblatt and Sueddeutsche Zeitung are not distributed. At Epiphany, Suddeutsche Zeitung is not published. This is unlikely to materially influence our analysis. First, for the more important date t+1, all newspapers are available. Findings are similar as on date t. Second, the results from the equal- and from the value-weighted analysis are similar in general. This suggests that relevant information is, for the most part, picked up by each of these leading newspapers so that partly relying on a subset of them does not change the qualitative nature of the results. This line of reasoning is also supported by the significant correlations in firm-level media coverage as shown in Panel A of table 7.

published.[19] This period is largely representative for the media coverage in the whole year. Inferences remain unchanged when using alternative periods. We then pool observations for all the years on which the regional holiday falls on a weekday and run the following probit regression separately for Epiphany, All Saints' Day and Corpus Christi:

$$(3)\ NEWS_{i,t} = \beta_{0,i} + \beta_1 EventDummy + \beta_2 HolidayDummy + \beta_3 InteractionTerm + YearDummies + \epsilon_{i,t}$$

The event dummy indicates the holiday within the eleven day event period. Additionally, we run analogous regressions for the day preceding and the day following the holiday. The variable of interest is the interaction term between the event dummy and the holiday dummy. If the abnormally low volume was a result of systematic cross-sectional differences in news release, then it should consistently attain a significantly negative sign. Panel C of table 7 reports marginal effects from the nine probit regressions. Again, the only (slightly) significant results are found for the All Saints' Day sample. Thus, the findings at best sporadically point to differences in information release picked up by the press.

We finally incorporate additional control variables in our pooled regression approach as outlined in section 4.2. Due to data availability, we focus on the years 2000-2009 and add a media dummy, which equals one if there is a news article about a firm on the day of or the day after the holiday. Moreover, we add a similar dummy for ad hoc disclosures we gather from Deutsche Gesellschaft für Ad-hoc-Publizitaet.[20] Panel D of table 7 reveals that the holiday effect keeps its significance, both from an statistical and an economic point of view.

Taken together, the findings from our four tests provide the following picture: First, there is minor evidence of differences in information release between holiday and non-holiday firms. Their lack of robustness and small magnitude suggest they are unlikely to drive our strong results. Second, controlling for these differences to the extent possible, our main findings remain qualitatively unchanged.

[19] We choose this binary approach to reduce the overcounting of news about the same subject from multiple sources. However, an analysis focussing on the actual number of news produces very similar results.

[20] Companies whose shares are traded officially in Germany are forced to publish new value-relevant information immediately via these disclosures.

5 Determinants of the Holiday Effect

Firm characteristics What factors drive the heterogeneity in negative turnover shocks for holiday firms? To answer this question, we first construct a firm-specific measure of abnormal turnover, defined as actual (logarithmized) turnover at the holiday (date t) minus the average turnover during t-20 to t-2. We then run pooled regressions separately for each of the three holiday samples as well as for two sample periods to test for the robustness of the explaining factors.

Hypothesis 2, inspired by the model of Merton (1987), posits that investor recognition should be an important determinant. If a firm is visible primarily to local investors, who tend to stay out of the market due to regional holidays, then the unexpected drop in volume should be particularly strong. Merton argues that investor recognition is a function of the shadow cost of information, which, in his model, depend on idiosyncratic risk, relative market size and the completeness of the shareholder base.

We thus use the logarithm of a firm's market capitalization, as measured at the end of the preceding year, and a firm's idiosyncratic risk as independent variables. Idiosyncratic risk is defined as the standard deviation of the residual obtained by fitting a four-factor model, calibrated for the German stock market, to the daily return time-series from t-180 to t-6. The four-factor model includes the market, size and value factors as constructed in Fama and French (1993) and the momentum factor as constructed in Carhart (1997). We expect a positive coefficient for firm size and a negative one for idiosyncratic risk: The larger a firm, the lower the shadow cost of information, and thus the weaker the impact of local investors should be. Consequently, a smaller drop in volume is expected. Idiosyncratic risk, on the other hand, increases the shadow cost of information. As outlined in section 4.2, local investors are commonly thought to possess (actual or perceived) locally generated informational advantages. Thus, local investor clienteles should account for a relatively large proportion in the trading of stocks with high idiosyncratic risk, which should go along with a more pronounced negative volume shock.

In addition to these theoretically derived measures of visibility, we employ with residual media coverage a third proxy, which is orthogonal to size and available for the years 2001 to 2009. The residual is obtained from yearly cross-sectional regressions of the number of firm-specific press articles in the previous year on its lagged average market size, turnover and absolute return as well as a on a set of control variables for industry and DAX30 membership. Press articles are taken from the comprehensive media coverage database described in section 4.3. Residual coverage is assumed to proxy for the unexpected high or low weight the media attaches to a certain firm. Given the importance of leading business newspapers in disseminating information to a broad audience, residual media coverage is an intuitive measure of firm visibility. Consequently, we expect a positive coefficient.

In line with previous findings in the literature, our baseline analysis highlighted the importance of current returns for current turnover. We thus include the same two return-based variables in the regression. To control for additional differences induced by medium-term return continuation, we also consider the loading on the momentum factor (UMD), obtained from a time-series regression of stock returns on the Carhart (1997) four factor model. The factor loadings on the market as well as value factor ($MarketBeta$, HML) are considered as proxies for systematic risk that has been shown to matter for expected turnover (e.g. Chordia et al. (2007)). The intercept from this regression (*Alpha*) is included as it has been argued to contain a premium related to liquidity or heterogeneous information (e.g. Lo and Wang (2000)). Moreover, we include a rural dummy for firms whose headquarter is located outside a metropolitan region (see footnote 11). The "only game in town effect" (Hong et al. (2008)) suggests a negative coefficient. Due to the findings of Seasholes and Wu (2007) and Huddart et al. (2009), a 52 week high dummy for stocks whose price has exceeded this bound in the previous week is considered. Finally, we include a set of ten industry dummies.

For each holiday, table 8 displays univariate and multivariate results for the whole sample period. We report coefficients for the subperiod 2001 to 2009 separately. These coefficients additionally include residual media coverage and controls for the availability of press articles as well as ad hoc disclosures around the event date (see also section 4.3).

Please insert table 8 about here

The findings are broadly consistent with our expectations. First, as hypothesized, the proxies for investor recognition seem to be important determinants of abnormal turnover. They all attain the predicted sign in each specification and, with the exception of idiosyncratic risk, are persistently statistically significant. The effect of market capitalization is clearly the strongest, but residual media coverage has an incremental effect. The magnitude of the results is also of economic importance: As a rough estimate, for example, a one standard deviation change in firm size has a similar impact as a one standard deviation change in stock return on the date of the holiday.

The current absolute return is highly significant. There is hardly evidence for differences between positive and negative returns. The dummies for rural firms and the 52 week high attain coefficients as predicted, but their importance is not robust across specifications. The other control variables seem to play only a minor role in explaining the drop in volume on holidays. In sum, hypothesis 2 can broadly be confirmed. The holiday effect is considerably stronger for firms less visible to non-local investors.

Investor characteristics We now turn to hypothesis 3, which posits that the turnover drop in small stocks is disproportionally caused by private investors. We base our analysis on the daily tracking records of roughly 3,000 retail clients of a German online discount broker from January 1997 to April 2001. They account for a total of 316,134 stock transactions. Out of these, 136,125 take place in 965 firms headquartered in Germany. As these transactions represent roughly 50% of all transactions that are traceable via Datastream, investors seem to exhibit, in line with previous literature (e.g. French and Poterba (1991)), a strong home bias.

Please insert table 9 about here

Panels A to C of table 9 provide descriptive statistics, which show that sample investors trade frequently. The mean (median) number of transactions in German firms is 47 (22), leading to a total sample trading volume of more than 750 million Euro. More detailed information about the sample is given in Glaser and Weber (2009) and Glaser (2003). For the analysis of localized trading around regional holidays, the dataset offers two advantages. First, the broker does not offer investment advice. Therefore, trading decisions are not affected by bank recommendations. Second, online broker investor trading on regional holidays is not restricted in any way. Results suggestive of localized trading in this sample might thus be considered conservative in the sense that investors trading via non-online brokers might face higher obstacles, such as finding an open bank office.[21]

A disadvantage of the sample is that investors' location is not provided. Given this limitation, we aggregate the data and conduct tests based on a measure called $Ratio_{t,i}$. For holiday i, it is computed as the overall fraction of daily "holiday firm trading" by online broker investors divided by the overall fraction of daily "holiday firm trading" by the whole market. The rationale is as follows: To detect whether retail investors have a particularly strong tendency for the trading of local firms, the definition of a benchmark is necessary. As the daily trading volume of the investor sample is highly correlated (0.39) with the total market trading volume for these firms, it seems justified to compute the ratio as outlined above.[22]

By focussing on shocks of $Ratio_{t,i}$, one mitigates the problem of lacking information on investors' location, as the expected level of individual investors' trading in a group of stocks is already accounted for. To identify shocks, we control for the autoregressive properties of $Ratio_{t,i}$ by employing an AR(p) process similar to the approach used in Connolly and Stivers (2003). Specifically, shocks are defined as the residual $\epsilon_{t,i}$ from the following time-series regression model:

(4) $Ratio_{t,i} = \beta_{0,i} + \sum_{k=1}^{p} \beta_{k,i} Ratio_{t-k,i} + \epsilon_{t,i}$ where ratio $= \frac{overall\ fraction\ of\ holiday\ firm\ trading\ by\ online\ broker\ investors}{overall\ fraction\ of\ holiday\ firm\ trading\ by\ the\ whole\ market}$

P denotes the maximum lag, up to which each estimated coefficient on each lagged term of $Ratio_{t,i}$ is individually significant, and takes on values between two and five for the specifications described below. $\epsilon_{t,i}$ can thus be interpreted as unexpected daily changes in holiday firm trading of retail investors as compared to the whole market.

To determine whether individual investors indeed drive the holiday effect for small stocks, we compute $Ratio_{t,i}$ separately for the whole sample as well as for small and large stocks, split by the median of the market capitalization at the beginning of the year. We do this for each of the three holidays.

[21] Note again that high opportunity costs of trading in some regions do not have cross-sectional implications for stock turnover unless local investors' trading decisions systematically deviate from remote investors' buys and sells.

[22] To mitigate the effect of extreme outliers that could materially affect daily trading volume data, we wincorize the investor transaction data at the 99.9% level. Inferences remain qualitatively unchanged when using the raw dataset. To sharpen the analysis, we compute the ratio based on the metropolitan area classification scheme as outlined in section 4.2. Results remain qualitatively unchanged when we make use of states instead.

We then determine the most suitable AR(p)-process for each of the nine specifications and run the regression as given in equation (4). This leaves us with nine shock time series.

Finally, we apply these to the seven holiday observations that take place on a trading day during our retail investor sample period: Epiphany is celebrated four times, All Saints' Day twice and Corpus Christi once. Panel D of table 9 reports the percentiles of the respective shock variables for each stock sample (all, large, small). The results for large stocks and for the whole sample appear like random draws from the distribution. In other words, individual investors and the market on average behave similarly when one studies their value-weighted trading activities in holiday firms. However, focussing explicitly on small firms, the picture is different: Online broker investors' trading activity consistently exhibits negative shocks at the day of the holiday when benchmarked against the whole market. The value of the shock variable is well below its median for every single observation. In other words, the results are consistent with hypothesis 3: Individual local investors disproportionally cause the holiday effect in small, less visible firms.

6 Conclusion

We exploit regional holidays as an exogenous source of cross-sectional differences in market participants' distraction to analyze whether their well-documented local bias leaves discernible traces in firm-level turnover. Within this natural experiment, we compare trading volume of a treatment group, i.e. hundreds of firms in holiday regions, with trading volume of a control group, i.e. very similar firms in non-holiday regions. Firms in holiday regions are strikingly less traded. Our findings are not only statistically significant, but also economically meaningful: The pure holiday-induced drop in trading volume is estimated to range from 10% to more than 20%. It is robust to several plausible changes in methodology and survives a number of sensitivity checks. In addition, results do not appear to be driven by differences in news arrival between holiday and non-holiday firms. Instead, consistent with the model of Merton (1987), the holiday effect is particularly strong for firms with high shadow cost of information, i.e. small, hard-to-value and neglected stocks, which are likely to be less recognized by non-local investors. We argue that these findings, in their entirety and robustness, are best explained with local investors refraining from trading due to high opportunity costs. Anecdotal evidence and the analysis of trading records of about 3,000 online broker investors provide additional support for this hypothesis.

Taken together, we believe to have documented an unambiguous scenario of the market-level impact of local bias. Our findings have several implications. First, they suggest that local investor clienteles are strong and pervasive enough to generate frictions segmenting the stock market along a geographical dimension. Second, they contribute to the emerging literature on determinants of trading volume by uncovering new cross-sectional regularities related to firm location and shadow cost of information. Third, by establishing a link between local bias, limited attention and firm-level trading volume, we believe to provide a fruitful starting point for future research on the relationship between investor distraction and price discovery. Recent work shows that shocks in volume due to investor inattention are tightly linked to predictable return patterns. For example, in a scenario similar to ours, DellaVigna and Pollet (2009) identify situations where distracted investors do not immediately incorporate value-relevant information into prices, giving rise to pronounced return drifts. Focussing on the potentially powerful role of local investors might help to gain new insights into such joint dynamics of prices and trading volume.

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Table 1: Overview of Data Sets

Data	Data Source	Description	Sample Period
Daily Stock Market Data	Thomson Reuters Datastream	Adjusted and unadjusted daily closing prices, market capitalization, book values, the number of daily shares traded, the number of total shares outstanding, adjustment factors, the primary exchange as well as industry membership for a final sample of 792 stocks of firms headquartered in Germany	13/06/1988 - 15/01/2009
Daily Trading Records of Retail Clients	German Online Discount Broker	316,134 stock transactions of about 3,000 individual investors; out of these, 136,125 transactions are conducted by 2,901 investors with regard to 965 firms headquartered in Germany	01/01/1997 - 17/04/2001
Analyst Coverage	I/B/E/S	Recommendation and review dates for a total of 51,497 stock buy/hold/sell-recommendations published by 196 brokers, covering about 80% of sample firms	01/01/1993 - 31/12/2008
Media Coverage	Genios, Factiva	126,125 hand collected firm-specific news articles published in three leading German daily business papers (Financial Times Deutschland, Sueddeutsche Zeitung, Handelsblatt), covering about 94% of sample firms	01/01/2000 - 15/01/2009
Ad hoc disclosures	Deutsche Gesellschaft fuer Ad-hoc-Publizitaet (DGAP)	Time-stamped ad hoc disclosures of sample firms	01/01/2000 - 15/01/2009
Internet Search Frequencies for Firms Names	Google	Standardized daily time-series of search frequencies for the names of sample firms, constructed from Google's application "Insights for Search"	01/01/2004 - 15/01/2009
Metropolitan regions	Initiative European Metropolitan Regions in Germany	Detailed information on the borders of the eleven German metropolitan areas as defined by the Conference of Ministers for Spatial Planning	
Firm headquarters	Thomson Reuters Datastream, Deutsche Boerse AG, firm homepages	Address of firm headquarter location	

Table 2: Summary statistics based on weekly data (13/06/1988-15/01/2009)

This table provides various summary statistics for our sample based on 792 German firms in the period from 13/06/1988 to 15/01/2009. Panel A describes cross-sectional differences in time-series averages of firm characteristics. *Firm market capitalization* is the share price multiplied by the number of ordinary shares in issue. *Firm book/market−ratio* is the balance sheet value of the common equity in the company (Worldscope item 03501) divided by the market value of the common equity. *Firm turnover* is the weekly number of shares traded scaled by the number of total shares outstanding. *Firm weeks* is the number of weeks the firm is in our sample. Panel B describes time-series characteristics of weekly cross-sectional (equally or value-weighted) averages. *Number of firms* is the number of active firms in our sample in a given week.

Panel A: Cross-sectional Statistics					
Variable	Mean	Median	SD	5th Percentile	95th Percentile
Firm return	0.09%	0.16%	0.58%	-0.95%	0.67%
Firm return volatility	7.33%	6.37%	5.99%	2.97%	12.94%
Firm market capitalization	1147.92	123.32	4703.50	16.83	4189.97
Firm book/market-ratio	0.52	0.44	1.36	0.09	1.04
Firm turnover	1.42%	0.93%	1.68%	0.01%	4.55%
Firm weeks	556	515	322	95	1075

Panel B: Time-series Statistics					
Variable	Mean	Median	SD	5th Percentile	95th Percentile
Value weighted return index	0.16%	0.31%	2.54%	-4.22%	3.96%
Equally weighted return index	0.21%	0.35%	1.73%	-2.69%	2.48%
Value weighted turnover index	2.04%	1.86%	0.98%	0.80%	3.69%
Equally weighted turnover index	0.98%	0.85%	0.56%	0.33%	2.09%
Number of firms	411	409	151	183	620

Table 3: Descriptive Statistics of Event Study Samples

This table provides various summary statistics of our event study samples for Epiphany (Panel A) and All Saints' Day (Panel B). *Holiday* (*Non−Holiday*) denotes the sample of firms whose headquarter is (not) located in a region where the respective holiday is legally recognized. *Number of firms* shows the distribution of sample firms across holiday and non-holiday regions. *Median macap* and *median daily return* refer to the cross-sectional median of the time series averages of the sample firms' market capitalization (in million Euro) and daily returns, respectively. *Herfindahl industry diversification* denotes the Herfindahl index based on Datastream Level 2 industry classification (10 industry groups).

Panel A: Epiphany Sample				
Region	Number of Firms	Median Macap	Median Daily Return	Herfindahl Industry Diversification
Holiday	301	1,036.88	-0.01%	0.15
Non-Holiday	491	977.36	-0.01%	0.15
	Time-series properties of equally weighted turnover indices based on daily data (correlation between holiday and non-holiday index: 0.86)			
Region	Mean	SD	5th Percentile	95th Percentile
Holiday	0.21%	0.13%	0.06%	0.45%
Non-Holiday	0.20%	0.12%	0.07%	0.43%

Panel B: All Saints' Day Sample				
Region	Number of Firms	Median Macap	Median Daily Return	Herfindahl Industry Diversification
Holiday	509	1,154.74	-0.01%	0.15
Non-Holiday	283	703.56	-0.02%	0.16
	Time-series properties of equally weighted turnover indices based on daily data (correlation between holiday and non-holiday index: 0.83)			
Region	Mean	SD	5th Percentile	95th Percentile
Holiday	0.20%	0.12%	0.06%	0.44%
Non-Holiday	0.21%	0.13%	0.07%	0.46%

Table 4: Firm Turnover Around Epiphany and All Saints' Day: Yearly Fama-MacBeth Regressions

The dependent variable is the natural logarithm of firm turnover on the day of (t), prior to ($t-1$) or following ($t+1$) the holiday. In Panel A and C, *expected turnover* is measured as the average firm turnover over t=-20 to t=-2. In Panel B and D, a market model of turnover calibrated from t=-60 to t=-2 is employed instead. RET+(t) (RET+(t-1)) denote individual stock return at t (t-1) if positive and zero otherwise. RET-(t) (RET-(t-1)) are defined analogously. T-statistics (in parentheses) are calculated with Newey/West (1987)-adjusted standard errors. Statistical significance at the ten, five and one-percent levels is indicated by *, **, and ***, respectively. Adjusted R^2 is calculated as the average adjusted R^2. *Predicted sign* denotes the fraction of a negative holiday dummy coefficient at t.

Panel A: Firm Specific Expected Turnover (N=5,657) Around Epiphany								
Dependent Variable	Constant	Expected Turnover	RET+(t)	RET-(t)	RET+(t-1)	RET-(t-1)	Holiday dummy	R^2
Firm turnover at t-1	-1.49*** (-6.13)	0.94*** (33.99)	11.00*** (8.49)	8.97** (2.71)	3.69 (1.25)	-1.65 (-0.42)	-0.05 (-1.21)	0.71
Firm turnover at t	-1.91*** (-6.77)	0.91*** (26.66)	19.25*** (4.28)	18.90*** (3.24)	4.63* (1.84)	-3.45 (-1.53)	-0.23*** (-5.59)	0.69
Firm turnover at t+1	-1.50*** (-6.32)	0.94*** (37.97)	16.54*** (6.09)	13.86*** (6.01)	5.38* (2.02)	4.70 (1.34)	-0.10** (-2.40)	0.71
Predicted sign							14/14	
95% conf. interval							-0.319 / -0.141	

Panel B: Market Model Expected Turnover (N=5,657) Around Epiphany								
Dependent Variable	Constant	Expected Turnover	RET+(t)	RET-(t)	RET+(t-1)	RET-(t-1)	Holiday dummy	R^2
Firm turnover at t-1	-0.64*** (-4.02)	0.96*** (83.87)	12.46*** (9.07)	11.64*** (3.52)	1.74 (0.82)	1.54 (0.42)	-0.00 (-0.15)	0.79
Firm turnover at t	-0.97*** (-5.60)	0.94*** (70.28)	19.41*** (4.85)	16.77*** (3.14)	5.20** (2.63)	-0.83 (-0.72)	-0.18*** (-9.33)	0.79
Firm turnover at t+1	-0.58*** (-3.82)	0.96*** (86.28)	16.59*** (6.18)	14.46*** (5.78)	5.86*** (3.12)	3.09 (0.97)	-0.05* (-2.11)	0.80
Predicted sign							14/14	
95% conf. interval							-0.218 / -0.136	

Panel C: Firm Specific Expected Volume (N=6,485) Around All Saints' Day								
Dependent Variable	Constant	Expected Turnover	RET+(t)	RET-(t)	RET+(t-1)	RET-(t-1)	Holiday dummy	R^2
Firm turnover at t-1	-1.44*** (-8.84)	0.94*** (49.02)	15.05*** (5.57)	13.13*** (5.01)	2.81 (1.46)	0.90 (0.40)	-0.00 (-0.11)	0.76
Firm turnover at t	-2.64*** (-8.73)	0.85*** (23.76)	22.21*** (5.36)	20.09*** (5.01)	5.63*** (3.85)	-3.87 (-1.64)	-0.13*** (-4.03)	0.70
Firm turnover at t+1	-1.60*** (-8.02)	0.92*** (36.16)	13.74*** (4.88)	15.76*** (4.86)	8.98*** (3.04)	6.41*** (4.46)	-0.06* (-1.80)	0.75
Predicted sign							13/16	
95% conf. interval							-0.1999/ -0.061	

Panel D: Market Model Expected Volume (N=6,485) Around All Saints' Day								
Dependent Variable	Constant	Expected Turnover	RET+(t)	RET-(t)	RET+(t-1)	RET-(t-1)	Holiday dummy	R^2
Firm turnover at t-1	-0.58*** (-4.69)	0.96*** (65.99)	14.20*** 4.33)	15.53*** (4.90)	6.21*** (3.42)	0.87 (0.40)	-0.04 (-0.76)	0.80
Firm turnover at t	-1.72*** (-9.86)	0.88*** (59.10)	22.48*** (6.10)	20.02*** (5.80)	5.11*** (3.89)	-1.11 (-0.62)	-0.16*** (-4.87)	0.77
Firm turnover at t+1	-0.62*** (-5.64)	0.96*** (65.00)	14.19*** (4.01)	14.38*** (5.06)	6.80*** (3.43)	6.41*** (3.82)	-0.10** (-2.64)	0.80
Predicted sign							13/16	
95% conf. interval							-0.228/ -0.089	

Table 5: Robustness Checks

This table displays the coefficient in front of the holiday dummy obtained from a variety of robustness checks. T-statistics are in parentheses. Statistical significance at the ten, five and one-percent levels is indicated by *, **, and ***, respectively.

	Epiphany	All Saint's Day
Panel A: Alternative Pre-event periods		
Firm specific expected turnover in t-10 to t-2	-0.24*** (-5.54)	-0.13*** (-3.45)
Firm specific expected turnover in t-40 to t-2	-0.21*** (-5.02)	-0.14*** (-3.78)
Firm specific expected turnover in t-40 to t-11	-0.20*** (-5.28)	-0.15*** (-4.14)
Market model expected turnover in t-100 to t-2	-0.17*** (-7.20)	-0.17*** (-3.70)
Market model expected turnover in t-40 to t-2	-0.19*** (-9.04)	-0.16*** (-5.41)
Market model expected turnover in t-60 to t-11	-0.17*** (-9.12)	-0.16*** (-4.62)
Panel B: Interacting Return Variables with Holiday Dummies		
Firm specific expected turnover	-0.29*** (-4.29)	-0.17*** (-2.82)
Market model expected turnover	-0.22*** (-5.69)	-0.21*** (-3.54)
Panel C: Omitting Stocks With Zero Trading Volume On Event Day		
Firm specific expected turnover	-0.24*** (-11.48)	-0.15*** (-4.84)
Market model expected turnover	-0.20*** (-15.10)	-0.19*** (-6.23)
Panel D: Using Ordinary Turnover		
Firm specific expected turnover	-0.02%*** (-3.80)	-0.02%*** (-3.10)
Market model expected turnover	-0.02%*** (-3.31)	-0.02%*** (-3.82)
Panel E: Pooled Regression With Year Dummies and Standard Errors Clustered by Firm		
Firm specific expected turnover	-0.23*** (-4.73)	-0.13** (-2.51)
Market model expected turnover	-0.19*** (-4.13)	-0.16*** (-2.86)
Panel F: Analysis based on Metropolitan Areas		
Firm specific expected turnover	-0.22*** (-9.46)	-0.13*** (-4.13)
Market model expected turnover	-0.18*** (-5.90)	-0.17*** (-4.77)
Panel G: Holiday Effects on Corpus Christi (since 2000)		
	Firm specific expected turnover	Market model expected turnover
	-0.20*** (-2.67)	-0.20*** (-3.61)

Table 6: Tests for Cross-Sectional Differences in News Arrival

This table summarizes results from various tests aimed at detecting potential cross-sectional differences in news arrival between holiday and non-holiday firms at the day of the holiday (=t). Panel A reports average differences between the holiday and non-holiday sample with regard to the median of absolute abnormal returns as obtained from a Carhart-Four-Factor-Model. Factor sensitivities are estimated from time-series regressions from t-66 to t-2. Significance is assessed via a bootstrapping approach. Panel B reports the coefficient in front of the holiday dummy, which, along with industry and year dummies, is the independent variable in pooled regressions of daily firm-specific abnormal search volume in Google. Abnormal search volume is computed as the the difference of search volume on t and the average search volume over t-10 and t-2, divided by the standard deviation of search volume in this pre-event period. T-statistics are reported in parentheses. Panel C shows the fraction of total analyst recommendations and reviews attributable to holiday-firms at t. We compute this fraction also for every other day of the year, leading to an empirical distribution of analyst coverage throughout the year. The percentile of this distribution at t is reported in parentheses.Statistical significance at the ten, five and one-percent levels is indicated by *, **, and ***, respectively.

Panel A: Differences in Absolute Alpha			
Dependent Variable	Epiphany	All Saints' Day	Corpus Christi
Abnormal absolute return at event	-0.02%	0.04%	-0.09%*
Panel B: Abnormal Search Frequencies for Firm Names in Google			
Dependent Variable	Epiphany	All Saints' Day	Corpus Christi
Shocks in online search queries	-0.13 (-0.61)	-0.15 (-1.40)	-0.19 (-1.42)
Panel C: Fraction of Holiday Firm Analysts Recommendations			
Dependent Variable	Epiphany	All Saints' Day	Corpus Christi
Value-weighted fraction of recommendations at event	40.34% (67)	68.57% (49)	81.51% (27)
Equal-weighted fraction of recommendations at event	40.37% (66)	69.90% (71)	82.57% (32)
Value-weighted fraction of reviews at event	41.67% (75)	63.64% (12)	87.87% (89)
Equal-weighted fraction of reviews at event	43.08% (84)	63.84% (13)	89.23% (88)

Table 7: Media Coverage and the Holiday Effect

Panel A provides descriptive statistics. Panel B displays the average proportion of news stories for holiday firms on t-1, t (the holiday) and t+1. We compute this fraction also for every other day of the year, leading to an empirical distribution of media coverage throughout the year. The percentiles obtained for t-1, t and t+1 are reported in parentheses. Panel C reports marginal effects for the interaction term holiday dummy*event date, obtained from probit regressions. Panel D shows the coefficients of the holiday dummy, as obtained by the baseline pooled regression approach with clustered standard errors (see section 4.2) plus two dummies for news coverage (at t and t+1) and ad hoc disclosures (at t). Statistical significance at the ten, five and one-percent levels is indicated by *, **, and ***, respectively.

Panel A: Descriptive Statistics (1/1/2000 to 15/1/2009)

Newspaper	Total number of news stories	Coverage	Average Firm-Level Correlation			
Handelsblatt	61,956	90.34%		Handelsblatt	SZ	FTD
SZ	34,497	79.42%	Handelsblatt	1	0.23	0.2
FTD	29,672	73.44%	SZ	0.23	1	0.19
All	126,125	93.77%	FTD	0.2	0.19	1

Panel B: Fraction of News Stories about Holiday Firms Around the Holiday (=t, Percentiles in Parentheses)

Holiday	value-weighted		equal-weighted	
	t	t+1	t	t+1
Epiphany	30.19% (88)	22.91% (14)	32.41% (89)	27.05% (53)
All Saints' Day	55.83% (3)**	55.85% (3)**	59.33% (4)**	59.28% (3)**
Corpus Christi	81.68 (46)	82.63% (39)	81.21 (44)	81.32% (34)

Panel C: Marginal Effects of Probit Regressions Around the Holiday (=t, z-values in Parentheses)

Holiday	t-1	t	t+1
Epiphany	-0.41% (-0.69)	0.70% (1.16)	-0.03% (-0.05)
All Saints' Day	-0.01% (-0.02)	-1.17%** (-2.15)	-1.16%* (-1.86)
Corpus Christi	0.35% (0.71)	-0.33% (-0.60)	-0.80% (-1.35)

Panel D: Pooled Regression (2000-2009) with Controls for Media Coverage and Ad Hoc Disclosures (t-statistics in Parentheses)

	Epiphany	All Saints' Day	Corpus Christi
Firm specific expected turnover	-0.19*** (-3.68)	-0.10** (-1.94)	-0.17** (-2.21)
Market model expected turnover	-0.18*** (-3.49)	-0.13** (-2.27)	-0.18*** (-2.75)

Table 8: Determinants of the Holiday Effect

This table summarizes the main results obtained from pooled regressions of firm-specific abnormal turnover on the date of a regional holiday (=t) on a number of explaining variables. Only firms whose headquarter is located within the region where the holiday is observed are included. The independent variables include return controls (see table 4 for a detailed description); the log of lagged firm market capitalization; idiosyncratic risk; residual media coverage; the loadings on the market, value and momentum factor (Market Beta, HML, UML, respectively); the intercept from that regression (Alpha); a rural dummy; a 52 week high dummy; controls for media coverage and ad hoc disclosures around the event; a set of 10 industry dummies obtained from the Datastream level 2 industry classification; year dummies. Standard errors are clustered by firm. Statistical significance at the ten, five and one-percent levels is indicated by *, **, and ***, respectively.

Panel A: Determinants of the holiday effect: Univariate Results					
	Epiphany (1988-2009)	Epiphany (2001-2009)	All Saints' Day (1988-2009)	All Saints' Day (2001-2009)	Corpus Christi (2001-2009)
Market Capitalization	0.25*** (10.30)	0.30*** (9.96)	0.19*** (10.93)	0.22*** (11.99)	0.26*** (14.29)
Idiosyncratic Risk	-4.23 (-1.29)	-3.59 (-0.86)	-9.74*** (-3.65)	-9.06*** (-3.09)	-12.97*** (-3.79)
Residual Media Coverage		0.13** (2.11)		0.07* (1.85)	0.07* (1.81)

Panel B: Determinants of the holiday effect: Multivariate Results					
	Epiphany (1988-2009)	Epiphany (2001-2009)	All Saints' Day (1988-2009)	All Saints' Day (2001-2009)	Corpus Christi (2001-2009)
Market Capitalization	0.24*** (8.60)	0.30*** (8.88)	0.16*** (8.69)	0.20*** (10.24)	0.23*** (12.92)
Idiosyncratic Risk	-0.71 (-0.20)	-0.56 (-0.54)	-9.06** (-2.33)	-8.62*** (-2.62)	-7.00** (-1.97)
Residual Media Coverage		0.10* (1.88)		0.07* (1.89)	0.05* (1.78)
RET+(t)	15.96*** (7.11)	15.27*** (5.44)	12.13*** (4.15)	14.57*** (8.50)	19.08*** (9.75)
RET-(t)	17.84*** (7.02)	19.04*** (5.87)	16.11*** (8.07)	16.34*** (8.29)	17.05*** (7.34)
Market Beta	0.12* (1.74)	0.16* (1.78)	0.04 (0.92)	0.09 (1.63)	0.13** (2.17)
HML Beta	-0.03 (-0.57)	-0.07 (-1.29)	0.03 (0.62)	0.05 (1.34)	-0.03 (-0.59)
UML Beta	-0.04 (-0.84)	-0.10 (-1.64)	0.03* (1.95)	0.02 (0.38)	-0.04 (-1.17)
Alpha	-0.86 (-0.00)	2.16 (0.09)	-2.89 (-0.25)	-3.80 (-0.27)	17.58 (1.13)
Rural Dummy	-0.16 (-0.95)	0.14 (0.84)	-0.21** (-2.21)	-0.22** (-2.14)	-0.12 (-1.25)
52 Week High Dummy	0.07 (0.62)	0.15 (1.15)	0.20** (2.22)	0.27** (2.32)	0.20** (2.09)
Ad hoc Disclosure (t)		0.28 (0.90)		0.80** (2.47)	0.50* (1.90)
Media Coverage (t+1)		0.32 (1.46)		-0.11 (-1.28)	0.09 (0.88)
Constant	-2.12*** (-8.25)	-3.12*** (-10.31)	-1.58*** (-9.65)	-3.12*** (-10.31)	-3.12*** (-10.31)
Industry and Year Dummies	yes	yes	yes	yes	yes
R^2	0.18	0.26	0.11	0.16	0.17
N	1,997	1,037	3,963	2,422	2,794

Table 9: Online Broker Sample: Descriptive Statistics and Trading Shocks during Regional Holidays

This table presents results from the analysis of retail investor trading based on daily data. The sample period starts on 1/1/1997 and ends on 17/04/2001. Panel A provides aggregated sample characteristics. Panel B gives more detailed information about the cross-section of transactions. Panel C focusses on differences in trading activity across investors. Panel D provides results from the analysis of trading shocks at the day of the holiday as described in detail in section 5.

Panel A: Aggregated Data (1,084 trading days, 2901 investors, 965 stocks)

No. Transactions	Total Transaction Value	No. Sells	Total Value of Sells	No. Buys	Total Value of Buys
136,125	765,300,000	59,770	381,900,000	76,355	383,300,000

Panel B: Cross-sectional Statistics for Individual Transactions

	Mean Value	Median Value	SD	1%	99%
Transactions: All	5,622	2,733	16,044	128	44,407
Transactions: Buys	5,021	2,523	14,676	125	38,059
Transaction: Sells	6,390	3,066	17,607	140	50,832

Panel C: Cross-Sectional Statistics for Individual Investors

	Mean	Median	SD	1%	99%
Number of transactions	47	22	95	1	447
Number of firms traded	15	11	16	1	85
Value of transactions	263,792	65,743	993,767	580	3,288,099

Panel D: Percentiles of Shock Variable (Grouped by Firm Size) at the Event Day

Size Group	Epiphany 1997	Epiphany 1998	Epiphany 1999	Epiphany 2000	All Saints' Day 1999	All Saints' Day 2000	Corpus Christi 2000
Size: All	50	75	46	43	28	72	32
Size: Large	50	72	64	56	16	66	44
Size: Small	34	39	25	16	30	5	11