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Pre-holiday effect, large trades and small investor behaviour

Vicente Meneu, Angel Pardo*

Department of Financial Economics, University of Valencia, Edificio Departamental Oriental, Avda. de los Naranjos s/n, 46022 Valencia, Spain

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Abstract

This paper investigates the existence of a pre-holiday effect in the most important individual stocks of the Spanish Stock Exchange that are also traded in both the New York Stock Exchange and the Frankfurt Stock Exchange. Our results show high abnormal returns on the trading day prior to holidays that are not related to any calendar anomaly. A thorough study of diverse liquidity-related measures suggests a new explanation for the pre-holiday effect based on the reluctance of small investors to buy on pre-holidays. The results of this paper are important for the practitioners since we show that institutional investors could have economically exploited this anomaly.

JEL classification: G12; G14
Keywords: Liquidity; Order size; Pre-holiday effect; Small investor

1. Introduction

The seasonal behaviour of stock market daily returns on pre-holidays has been widely documented. Specifically, an important number of studies have provided evidence of high abnormal returns on days prior to a holiday in the US stock markets. For example, Lakonishok and Smidt (1988) and Ariel (1990) detect pre-holiday effects in several organised stock markets. Liano et al. (1992) find evidence of a pre-holiday effect in several over-the-counter stock markets. Pettengill (1989) provides some evidence of abnormal returns on pre-holidays in both large and small firms grouped into portfolios, and Kim and

* Corresponding author. Tel.: +34-6-382-83-77; fax: +34-6-382-83-70.
E-mail address: angel.pardo@uv.es (A. Pardo).

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Park (1994) as well as Brockman and Michayluk (1998) observe the same pattern in markets with different trading systems.

The existence of a pre-holiday effect has also been explored in other countries. Barone (1990) finds that the average rate of change in the Italian MIB index on the days preceding the main public holidays is higher than the one for the other days. Cadsby and Ratner (1992) study the holiday effect in 10 stock market indices. They observe a pre-holiday effect in Canada, Japan, Australia and Hong Kong but it is not detected in the European markets. These findings are in contrast to those obtained by Mills and Coutts (1995), Arsad and Coutts (1997) and Meneu and Pardo (2001) who observe a pre-holiday effect in the FT-SE Mid 250 index, FT 30 index, and IBEX indices, respectively[1]. Kim and Park (1994) note a pre-holiday effect in all three major stock markets in the USA (NYSE, AMEX and NASDAQ) as well as those in the UK and Japan. They indicate that the persistence of a pre-holiday effect across countries suggests that it is not driven by institutional arrangements unique to the stock market of a country.

The previous studies summarised above have attempted to account for the holiday effect by focusing their attention on three explanations. The first one is the existence of a relationship between this effect and other calendar anomalies. Lakonishok and Smidt (1988), Ariel (1990) and Liano et al. (1992) were amongst the firsts to attempt to explain the holiday effect by appealing to other calendar anomalies such as the day-of-the-week effect, the monthly effect, and the turn-of-the-year effect. Their results indicate that the high returns observed on pre-holidays are not a manifestation of other calendar anomalies.

Another explanation is based on the existence of a link between the pre-holiday effect and the small firm effect. Pettengill (1989) reports that small firms outperform large ones on both January and non-January pre-holidays. Ariel (1990) and Kim and Park (1994), on the contrary, find that, after controlling for the day-of-the-week effect and the pre-New-Year's-Day effect, a size effect is not present in mean returns on pre-holidays.

The last explanation of the pre-holiday effect is based on a set of different and systematic trading patterns. Keim (1989) suggests that the pre-holiday return may be, in part, due to movements from the bid to the ask price. Ariel (1990, p. 1625) points out that pre-holiday strength can be attributed to short-sellers who desire to close short positions but not long positions in advance of holidays or, simply, to some clientele which preferentially buys (or avoids selling) on pre-holidays.

All of the above studies use aggregate data, either indices or portfolios, to analyse pre-holiday effects. The use of this type of data gives an overall view of the market, but makes it difficult to compute the cost of implementing any potentially profitable trading rule. An alternative approach that mitigates this problem is to investigate the pre-holiday effect on individual stocks. This is precisely the purpose of the present paper.

Additionally, evidence of seasonality in individual stocks will let us take into diverse account liquidity-related measures, as well as transaction costs in order to obtain additional insights on possible causes for the pre-holiday effect. Our research reveals a new explanation to this anomaly. Specifically, our results provide evidence supporting the reluctance of small investors to buy on pre-holidays, which in turn could be the origin of

[1] An English version of Meneu and Pardo's article is available upon request.

the pre-holiday effect. This reluctance to buy produces an increase in the average size of bid orders on pre-holidays. The larger the trade size, the more likely it is to trade with an informed trader. Therefore, the price increase on pre-holidays seems to reflect this increased probability of information-based trading.

The remainder of the paper is organised as follows. Section 2 presents the data set employed and contains an analysis on the performance of stock returns around a holiday. Section 3 checks if the detected effect is a national or international one. Section 4 verifies if the pre-holiday effect is a manifestation of other calendar anomalies. Section 5 studies possible seasonal patterns on liquidity-related measures that could help to explain better the holiday effect. Finally, the last section summarises and gives the main conclusions drawn from the study.

2. Data and preliminary results

The data set used in this study comes from the Sociedad de Bolsas SA, and it consists of daily prices, trading volumes and spreads for the five most traded stocks in the Spanish Stock Exchange, from January 1990 through December 2000. More specifically, the study has been carried out with data on Telefónica, Banco Bilbao Vizcaya Argentaria (BBVA), Banco Santander Central Hispano (SAN), Repsol YPF and Endesa[2]. For comparison purposes, we have also studied the IBEX-35 index returns.

It is noteworthy that the selected stocks collect more than 60% of the average capitalization size of the IBEX-35 during the analysed period. All of them are constituents of the main pan-European indices such as Dow Jones EuroStoxx 50, S&P Euro Plus, FTSE Eurotop 100, amongst others. Moreover, these shares are traded in both the Spanish Stock Exchange and two of the major Stocks Exchanges in the world: New York Stock Exchange and the Frankfurt Stock Exchange.

A stock market holiday has been defined as a public holiday on which the market is closed. We have taken into account the following Spanish holidays: New Year's Day, Epiphany, Maundy Thursday and Good Friday, All Saints Day, Assumption Day, National Day, Labour Day, Constitution Day, Immaculate Conception Day, Christmas Eve and Christmas Day.

First, the trading days in the sample period were divided in three subsets: days before a holiday, days after a holiday and all the other days. Pre-holiday returns were defined as daily close-to-close returns occurring on the day prior to a closing day, post-holiday returns as daily close-to-close returns occurring on the day following to a closing day, and non-holiday returns are all the remaining close-to-close returns. Since no statistical difference was observed between the two last subsets, the total trading days (2756) were finally divided into two subsets: the pre-holidays (90 observations) and the non-holidays (all the other days excluding the pre-holidays).

Panel A of Table 1 reports means and variances for the pre-holidays and non-holidays. Mean returns on pre-holidays fluctuate between 0.308% (Repsol) and 0.553% (BBVA),

[2] The BBVA series incorporate the BBV series up to the merger with Argentaria on 01/31/2000, while the SAN series incorporate the Banco de Santander series up to the merger with Banco Central Hispano on 04/19/1999.

whereas on non-holidays, they range from 0.034% (Repsol) to 0.07% (Telefónica). In conclusion, stocks show high mean returns on pre-holidays, averaging 6–14 times the mean returns for the remaining days of the year.

Despite the higher mean return, in general, the pre-holiday variance is not much larger than the return variance for all the other days. So, means and variances do not increase proportionately. However, in order to determine whether any of these differences between mean values are statistically significant, the following dummy variable regression model has been estimated:

$$r_{it} = c_i + \alpha_{i,\mathrm{PRE}} D_{\mathrm{PRE}} + \varepsilon_{it} \quad (1)$$

where i = Telefónica, BBVA, SAN, Endesa, Repsol and IBEX-35, r_{it} = close-to-close return for stock i and day t, D_{PRE} = dummy variable which equals 1 if the return occurs

Table 1
Pre-holiday versus non-holiday returns

	Telefónica	BBVA	SAN	Endesa	Repsol	IBEX-35
Panel A						
Pre-holiday mean	0.439	0.553	0.479	0.365	0.308	0.464
Standard deviation	2.011	1.870	2.008	1.656	1.508	1.233
Non-holiday mean	0.070	0.049	0.035	0.049	0.034	0.026
Standard deviation	1.827	1.863	1.955	1.627	1.571	1.280
Panel B						
c_i	0.070	0.049	0.035	0.049	0.034	0.026
t Statistic	(1.97)*	(1.36)	(0.92)	(1.56)	(1.13)	(1.04)
$\alpha_{i,\mathrm{PRE}}$	0.3694	0.5038	0.4446	0.3156	0.2733	0.4381
t Statistic	(1.88)	(2.52)*	(2.12)*	(1.81)	(1.63)	(3.20)**
Panel C						
Brown–Forsythe	0.162	0.775	3.526	0.001	0.016	0.149
p Value	(0.687)	(0.379)	(0.061)	(0.970)	(0.899)	(0.700)
F statistic	3.535	6.361*	4.494*	3.274	2.640	10.226**
K–W statistic	4.711*	8.157**	5.224*	4.452*	2.735	12.414**
Panel D						
BHR	39.54	49.76	43.15	32.83	27.69	41.75
TR	225.97	180.73	135.99	163.71	119.37	110.55
BHR/TR	17.50	27.53	31.73	20.05	23.20	37.77
P_{95}	36.28	36.78	35.16	30.49	28.88	23.11

Sample period from January 1990 to December 2000 (2756 observations) amongst which there are 90 pre-holiday returns. The Brown–Forsythe's statistic tests the null hypothesis of equality of variances and its p value appears in parentheses. The F statistic tests the null hypothesis of equality of means. Kruskal–Wallis statistic (K–W test) is the non-parametric equivalent of the F test and is distributed as a χ^2 with one degree of freedom. D_{PRE} is a dummy variable equal to 1 if t is a day prior to a holiday, and 0 otherwise. BHR is the buy-and-hold pre-holiday return. TR is the total buy-and-hold return of the sample. P_{95} denotes the 95th percentile.

* Denotes statistical significance at the 5% level.

** Denotes statistical significance at the 1% level.

on the day before a Spanish holiday and 0 otherwise, and ε_{it} = random disturbance term.

The series are analysed by means of seemingly unrelated regression (SUR) method that estimates the parameters of the system taking into account heteroskedasticity and contemporaneous correlation in the errors across equations. A positive coefficient ($\alpha_{i,\mathrm{PRE}}$) would indicate that the pre-holiday return is higher than the non-holiday return and a significant t-value would provide evidence of a pre-holiday effect in individual stocks.

The results are reported in Panel B of Table 1. Coefficients of the dummy variable ($\alpha_{i,\mathrm{PRE}}$) are positive and significantly different from zero in BBVA and SAN at the usual significance levels.[3]

However, following Chien et al. (2002), the employment of a dummy variable regression model may be inappropriate for investigating the seasonal behaviour of the stock market. The model (1) could be misspecified since the return variances are higher on pre-holidays than on non-holidays. Therefore, before testing the equality in mean returns, the equality of variances should be tested, as the first hypothesis is based on the second one.

The equality of variances has been tested with the Brown–Forsythe's statistic while the equality of means has been tested with both the parametric F test and non-parametric Kruskal–Wallis test. As Panel C of Table 1 reports, the equality of variances cannot be rejected. This fact, as Ariel (1990, p. 1614) points out, serves to emphasise that a possible pre-holiday return is not a reward for bearing extra risk.

Panel C also shows that the null hypothesis of equality between the pre-holiday mean return and the non-holiday mean return is rejected at the usual significance levels in all the stocks except for the case of Repsol.

It is informative to compare the buy-and-hold pre-holiday return (BHR) with the total buy-and-hold return of the sample (TR). Panel D of Table 1 shows that pre-holidays returns constitute a nontrivial fraction of the total return accruing to the stocks. Buy-and-hold pre-holiday return represents between 17.5% (Telefónica) and 31.7% (BBVA) of the total return. Therefore, an important amount of the cumulative returns earned by the stocks during eleven years is accruing on the days preceding holidays, which only account for (90/2756=) 3.26% of the trading days in the sample.

In order to complete these results, we have used a benchmark to evaluate if pre-holiday trading profits are significantly different from profits earned at other times during 1990–2000. Following Johnson (2001), the benchmark has been determined by using Monte Carlo simulation. More specifically, 10 000 sets of generated data have been simulated. Each set of data represents the profit from trading over 90 randomly selected trading days and the profits from the generated series become the benchmark. If the profit from the pre-holiday buy-and-hold trading strategy is higher than the 95th percentile, the strategy will be considered significantly different to that which could be earned by chance. Panel D of Table 1 details the outcomes. The results confirm the previous ones. Pre-holiday size is significantly different from the size available from trading on a set of randomly selected days in all the stocks but Repsol.

[3] The presence of autocorrelation has been detected in some series, however the incorporation of specific autocorrelation schemes does not affect the inferences. Therefore, only the results for the model without autocorrelation correction appear in the paper, the rest of the results can be requested from the authors.

Last columns in each panel show the results in the case of the IBEX-35. The average pre-holiday return is 18 times larger than that on non-holidays and accounts for approximately 38% of IBEX-35 annual returns. These results are in accordance with those obtained by Lakonishok and Smidt (1988), Pettengill (1989) and Ariel (1990) for large US companies, as they respectively obtain pre-holiday returns that are 23, 13.6 and 14 times higher than the mean return on non-holidays.

3. International holiday returns

Finance literature suggests that the markets with the most similar behaviour are those that are geographically and economically closest, and/or share the listing of the largest number of stocks. According to Cadsby and Ratner (1992, p. 499), it is possible that the pre-holiday effects are generated in one market and they are spread throughout the world by investors trading on foreign markets. The international evidence indicates a transmission of information flows from the major stock markets to the others. Given that the Spanish blue-chips are traded in Spain, USA and Germany, and taking into account that some holidays occur at different times in different markets, if anomalies were generated in foreign markets (USA or Germany) and then they were spread to the Spanish market, we would observe a pre-holiday effect on days prior to an US and/or a German holidays. In the opposite case, we should detect abnormal high returns only on Spanish pre-holidays.

In order to determine the magnitude of the local (Spanish), foreign (US and German) and the joint pre-holiday effect, we estimate the following dummy variable regression for each stock i:

$$r_{it} = c_i + \alpha_{i\mathrm{SPA-F}} D_{\mathrm{SPA-F}} + \alpha_{i\mathrm{F-SPA}} D_{\mathrm{F-SPA}} + \alpha_{i\mathrm{SPA+F}} D_{\mathrm{SPA+F}} + \varepsilon_{it} \quad (2)$$

where $D_{\mathrm{SPA-F}}$ = dummy variable equal to 1 if t is a pre-holiday in Spain but is not a pre-holiday in the foreign market (F = USA or Germany), and 0 otherwise, $D_{\mathrm{F-SPA}}$ = dummy variable equal to 1 if t is a pre-holiday in the foreign market but is not a pre-holiday in Spain, and 0 otherwise, $D_{\mathrm{SPA+F}}$ = dummy variable equal to 1 if t is a pre-holiday in both Spain and the foreign market, and 0 otherwise.

The precise US holidays used by different researchers vary. This study includes the following: New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas. With regard to the German market, we have taken into account the following holidays: New Year's Day, Epiphany, Labour Day, Ascension, Whit Monday, Corpus Christi Day, Assumption, All Saint's Day, National Day and Christmas Day. The number of holidays considered is 94 for USA and 86 for Germany.[4]

Panel A of Table 2 reports the results when Spanish and US market calendars are considered. Local (Spanish) pre-holiday returns are significantly higher than non-holiday

[4] The New York Stock Exchange and the Frankfurt Stock Exchange data have been obtained from Bloomberg and they have been checked with the Futures calendar.com made up by the Futures Industry Association.

returns at the usual significance levels for Telefonica, BBVA and IBEX-35. US and joint returns are not significant in any case. Finally, no significant pre-holiday effects are detected in Endesa and Repsol.

Panel B of Table 2 shows the results for the same dummy variable regression when the Spanish and German market calendars are considered. Local (Spanish) pre-holiday returns are significantly higher than non-holiday returns at the usual significance levels for BBVA and IBEX-35. German returns are not significant in any case while both returns are significantly higher than non-holidays only for IBEX-35 at the 1% level.

The magnitude of the dummy that represents the days before holidays which are simultaneously Spanish and foreign holidays lead us to test if the pre-holiday effect is a

Table 2
International pre-holiday effect

$$r_{it} = c_i + \alpha_{i\mathrm{SPA-USA}} D_{\mathrm{SPA-USA}} + \alpha_{i\mathrm{USA-SPA}} D_{\mathrm{USA-SPA}} + \alpha_{i\mathrm{SPA+USA}} D_{\mathrm{SPA+USA}} + \varepsilon_{it} \quad (2a)$$

	Telefónica	BBVA	SAN	Endesa	Repsol	IBEX-35
Panel A						
c_i	0.0674	0.0469	0.0356	0.0492	0.0362	0.0240
t Statistic	(1.88)	(1.28)	(0.93)	(1.54)	(1.18)	(0.96)
$\alpha_{i\mathrm{SPA-USA}}$	0.6544	0.5646	0.3716	0.3298	0.3332	0.4998
t Statistic	(2.71)**	(2.30)*	(1.44)	(1.54)	(1.61)	(2.97)**
$\alpha_{i\mathrm{USA-SPA}}$	0.1085	0.0948	−0.0322	−0.0042	−0.0772	0.0785
t Statistic	(0.46)	(0.40)	(−0.13)	(−0.02)	(−0.39)	(0.48)
$\alpha_{i\mathrm{SPA+USA}}$	−0.1656	0.3944	0.5813	0.2884	0.1540	0.3260
t Statistic	(−0.50)	(1.17)	(1.64)	(0.98)	(0.54)	(1.41)
χ^2	3.9283	0.3092	0.2335	0.0080	0.0647	0.5957
p Value	0.0475	0.5782	0.6290	0.9289	0.7993	0.4402

$$r_{it} = c_i + \alpha_{i\mathrm{SPA-GER}} D_{\mathrm{SPA-GER}} + \alpha_{i\mathrm{GER-SPA}} D_{\mathrm{GER-SPA}} + \alpha_{i\mathrm{SPA+GER}} D_{\mathrm{SPA+GER}} + \varepsilon_{it} \quad (2b)$$

Panel B						
c_i	0.0698	0.0469	0.0452	0.0492	0.0360	0.0246
t Statistic	(1.95)	(1.29)	(1.18)	(1.55)	(1.17)	(0.98)
$\alpha_{i\mathrm{SPA-GER}}$	0.2755	0.5235	0.3789	0.3269	0.3936	0.3531
t Statistic	(1.14)	(2.13)*	(1.47)	(1.53)	(1.91)	(2.10)*
$\alpha_{i\mathrm{GER-SPA}}$	0.0090	0.1081	−0.5022	−0.0050	−0.0791	0.0579
t Statistic	(0.04)	(0.43)	(−1.89)	(−0.02)	(−0.37)	(0.33)
$\alpha_{i\mathrm{SPA+GER}}$	0.5486	0.4727	0.5395	0.2938	0.0396	0.6032
t Statistic	(1.66)	(1.40)	(1.53)	(1.00)	(0.14)	(2.61)**
χ^2	0.3068	0.1073	1.6966	0.0044	0.4534	0.3338
p Value	0.5797	0.7432	0.1927	0.9471	0.5007	0.5634

Sample period from January 1990 to December 2000 (2756 observations) amongst which there are 90 pre-holiday returns in Spain, 94 in the United States and 86 in Germany. $D_{\mathrm{SPA-F}}$ is a dummy variable equal to 1 if t is a pre-holiday in Spain but is not a pre-holiday in the foreign market, and 0 otherwise. $D_{\mathrm{F-SPA}}$ is a dummy variable equal to 1 if t is a pre-holiday in the foreign market but is not a pre-holiday in Spain, and 0 otherwise. $D_{\mathrm{SPA+F}}$ is a dummy variable equal to 1 if t is a pre-holiday in both Spain and the foreign market, and 0 otherwise. χ^2 tests the null H_0: $\alpha_{i\mathrm{SPA-F}}+\alpha_{i\mathrm{F-SPA}}=\alpha_{i\mathrm{SPA+F}}$. t Statistic in parentheses.

* Denotes statistical significance at the 5% level.

** Denotes statistical significance at the 1% level.

simple linear interaction between local and non-local effects. That is to say, we are interested in testing the following null hypothesis:

$$H_0: \ \alpha_{i(\mathrm{SPA+F})} = \alpha_{i\mathrm{SPA-F}} + \alpha_{i\mathrm{F-SPA}}.$$

If true, joint returns would be subject to any impact that arises before a Spanish holiday as well as any impact that arises before a foreign holiday, with the total effect being purely additive (see Cadsby and Ratner, 1992, p. 505).

The results are reported in the last rows of Panels A and B of Table 2. The null hypothesis is marginally rejected at the 5% level only in the case of Telefonica in Panel A, but the null cannot be rejected in the remaining series.

For this reason, we have tested a new dummy variable regression model that incorporates the above linear restriction for all the series:

$$r_{it} = c_i + \alpha_{i\mathrm{SPA}}(D_{\mathrm{SPA-F}} + D_{\mathrm{SPA+F}}) + \alpha_{i\mathrm{F}}(D_{\mathrm{F-SPA}} + D_{\mathrm{SPA+F}}) + \varepsilon_{it} \quad (3)$$

Table 3 reports the results. The dummy variable ($D_{\mathrm{SPA-F}} + D_{\mathrm{SPA+F}}$) represents days before Spanish holidays whether or not these holidays are also celebrated in the foreign

Table 3
International pre-holiday effect with linear restriction

$$r_{it} = c_i + \alpha_{i\mathrm{SPA}}(D_{\mathrm{SPA-USA}} + D_{\mathrm{SPA+USA}}) + \alpha_{i\mathrm{USA}}(D_{\mathrm{USA-SPA}} + D_{\mathrm{SPA+USA}}) + \varepsilon_{it} \quad (3a)$$

	Telefónica	BBVA	SAN	Endesa	Repsol	IBEX-35
Panel A						
c_i	0.0728	0.0485	0.0342	0.0494	0.0368	0.0254
t Statistic	(2.03)*	(1.33)	(0.89)	(1.55)	(1.20)	(1.02)
$\alpha_{i\mathrm{SPA}}$	0.4085	0.4945	0.4356	0.3200	0.3062	0.4330
t Statistic	(1.97)*	(2.35)*	(1.97)*	(1.74)	(1.73)	(3.00)**
$\alpha_{i\mathrm{USA}}$	−0.1221	0.0290	0.0279	−0.0134	−0.1025	0.0158
t Statistic	(−0.60)	(0.14)	(0.13)	(−0.07)	(−0.59)	(0.11)

$$r_{it} = c_i + \alpha_{i\mathrm{SPA}}(D_{\mathrm{SPA-GER}} + D_{\mathrm{SPA+GER}}) + \alpha_{i\mathrm{GER}}(D_{\mathrm{GER-SPA}} + D_{\mathrm{SPA+GER}}) + \varepsilon_{it} \quad (3b)$$

Panel B						
c_i	0.0683	0.0478	0.0415	0.0494	0.0376	0.0235
t Statistic	(1.91)	(1.31)	(1.09)	(1.55)	(1.23)	(0.94)
$\alpha_{i\mathrm{SPA}}$	0.3430	0.4828	0.5484	0.3198	0.3233	0.4023
t Statistic	(1.65)	(2.28)*	(2.47)*	(1.73)	(1.81)	(2.77)**
$\alpha_{i\mathrm{GER}}$	0.0813	0.0646	−0.3206	−0.0127	−0.1544	0.1105
t Statistic	(0.38)	(0.30)	(−1.41)	(−0.07)	(−0.85)	(0.75)

Sample period from January 1990 to December 2000 (2756 observations) amongst which there are 90 pre-holiday returns in Spain, 94 in the United States and 86 in Germany. $D_{\mathrm{SPA-F}}$ is a dummy variable equal to 1 if t is a pre-holiday in Spain but is not a pre-holiday in the foreign market, and 0 otherwise. $D_{\mathrm{F-SPA}}$ is a dummy variable equal to 1 if t is a pre-holiday in the foreign market but is not a pre-holiday in Spain, and 0 otherwise. $D_{\mathrm{SPA+F}}$ is a dummy variable equal to 1 if t is a pre-holiday in both Spain and the foreign market, and 0 otherwise. t Statistic in parentheses.

* Denotes statistical significance at the 5% level.

** Denotes statistical significance at the 1% level.

market. Returns on local pre-holidays are significantly higher than non-holidays at the 5% level for Telefonica, BBVA, SAN and IBEX-35, in Panel A, and for BBVA, SAN and IBEX-35 in Panel B. It is important to note that there are no significant pre-holidays effect on days just prior to foreign holidays in any series of Panel A or B. These results are in accordance with those obtained by Kim and Park (1994) for the FT-30 and Nikkei indices, and Lucey (2002) for the Irish market. They detect that the pre-holiday behaviour seems to have a local as opposed to an international origin.

In summary, none of the stocks in the sample show any significant international pre-holiday effect. Thus, such anomaly is not generated by investors who trade in US or German markets. These results can be justified by the small percentage of Spanish *blue-chips* that are traded in foreign markets. More specifically, during the last decade only 9.39% and 0.40% of the overall traded volume was negotiated in the New York and Frankfurt Stock Exchanges, respectively.[5]

4. Calendar anomalies

Previous studies have provided evidence of different calendar anomalies in the Spanish Stock Exchange. In this section, we will study whether the existence of a holiday effect in the Spanish stock market is related to them. If this were the case, the patterns detected on pre-holidays would only be due to those anomalies being revealed.

The day-of-the-week effect on Spanish Financial Markets has been widely documented in recent years (see Meneu and Pardo, 2001 for a review). Although no unexplained daily seasonality in returns is observed until 1991, recent papers have detected high abnormal daily returns, mainly, on Fridays. The closeness of the weekend might be related to the closeness of a holiday. Since 24 out of 90 Spanish pre-holidays in the sample were on Friday, it is important to adjust the holiday returns for the Friday effect.

To determine if the pre-holiday effect is caused by the Friday effect, the daily return is regressed against the pre-holiday dummy (D_{PRE}) and a dummy variable (D_{FRIDAY}) which equals 1 if the return occurs on Friday and 0 otherwise:

$$r_{it} = c_i + \alpha_{i,\mathrm{PRE}} D_{\mathrm{PRE}} + \alpha_{i,\mathrm{FRIDAY}} D_{\mathrm{FRIDAY}} + \varepsilon_{it} \tag{4a}$$

As Panel A of the Table 4 shows, the additional return earned on pre-holiday is positive and significant in BBVA, SAN and IBEX-35. As a result, adjusting returns for the Friday effect fails to reduce the significance of the pre-holiday effect.[6]

The most recognised and studied monthly seasonality is "the January effect". There are several works that have addressed this effect in the Spanish market. Gultekin and Gultekin (1983), by looking at the period 1959–1979, detected evidence of a decrease in returns at

[5] All the results of Sections 3 and 4 have been confirmed by non-parametric tests. For brevity, these results are not reported in this article, but they are available from the authors upon request.

[6] Following Steeley (2001), we have also checked if a possible systematic daily pattern of specific news arrivals into the Spanish market can provide an explanation for the pre-holiday effect. In order to capture these arrivals, we have considered profit announcements and security analyst recommendations recorded in Baratz Data Base that occurred from August 1992 to December 2000. The results, available from the authors upon request, show that there is no evidence for the firm-specific news announcements to cluster around holidays.

Table 4
Calendar anomalies

$$r_{it} = c_i + \alpha_{i,\mathrm{PRE}} D_{\mathrm{PRE}} + \alpha_{i,\mathrm{FRIDAY}} D_{\mathrm{FRIDAY}} + \varepsilon_{it} \quad (4a)$$

	Telefónica	BBVA	SAN	Endesa	Repsol	IBEX-35
Panel A						
c_i	0.0743	0.0161	0.0090	0.0354	0.0288	0.0027
t Statistic	(1.89)	(0.40)	(0.21)	(1.01)	(0.85)	(0.10)
$\alpha_{i,\mathrm{PRE}}$	0.3710	0.4916	0.4351	0.3106	0.2712	0.4296
t Statistic	(1.89)	(2.46)*	(2.08)*	(1.78)	(1.61)	(3.14)**
$\alpha_{i,\mathrm{FRIDAY}}$	−0.0223	0.1695	0.1324	0.0704	0.0287	0.1183
t Statistic	(−0.25)	(1.90)	(1.41)	(0.90)	(0.38)	(1.93)

$$r_{it} = c_i + \alpha_{i,\mathrm{PRE}} D_{\mathrm{PRE}} + \alpha_{i,\mathrm{JANUARY}} D_{\mathrm{JANUARY}} + \varepsilon_{it} \quad (4b)$$

Panel B						
c_i	0.0555	0.0381	0.0331	0.0345	0.0259	0.0194
t Statistic	(1.50)	(1.01)	(0.84)	(1.05)	(0.82)	(0.75)
$\alpha_{i,\mathrm{PRE}}$	0.3661	0.5013	0.4442	0.3123	0.2714	0.4366
t Statistic	(1.86)	(2.51)*	(2.12)*	(1.79)	(1.61)	(3.19)**
$\alpha_{i,\mathrm{JANUARY}}$	0.1781	0.1351	0.0210	0.1798	0.1042	0.0788
t Statistic	(1.40)	(1.04)	(0.15)	(1.59)	(0.96)	(0.89)

$$r_{it} = c_i + \alpha_{i,\mathrm{PRE}} D_{\mathrm{PRE}} + \alpha_{i,\mathrm{CHANGE}} D_{\mathrm{CHANGE}} + \varepsilon_{it} \quad (4c)$$

Panel C						
c_i	0.0620	0.0487	0.0337	0.0430	0.0291	0.0227
t Statistic	(1.69)	(1.31)	(0.86)	(1.32)	(0.93)	(0.89)
$\alpha_{i,\mathrm{PRE}}$	0.3389	0.5020	0.4403	0.2920	0.2529	0.4259
t Statistic	(1.70)	(2.48)*	(2.07)*	(1.65)	(1.48)	(3.06)**
$\alpha_{i,\mathrm{CHANGE}}$	0.1192	0.0070	0.0169	0.0923	0.0798	0.0476
t Statistic	(0.88)	(0.05)	(0.12)	(0.77)	(0.69)	(0.51)

Sample period from January 1990 to December 2000 (2756 observations) amongst which there are 90 pre-holiday returns. D_{JANUARY} is a dummy variable equal to 1 if t is a January day, and 0 otherwise. D_{CHANGE} equals 1 if t is a day of the second half of December and the first half of January, and 0 otherwise. t Statistic in parentheses.

* Denotes statistical significance at the 5% level.

** Denotes statistical significance at the 1% level.

the end of the year, which increase during the first months of the following year. Santesmases (1986) also detected this seasonality in the period from 1979 to 1983 and he pointed out that the "turn-of-the year effect" still emerges after taking the fiscal effect on the sale of shares into consideration. However, Basarrate and Rubio (1994a), using data from 1976 to 1991, found evidence of a fiscal explanation for the January effect, which is confirmed in Basarrate and Rubio (1994b), where the relationship between volume of trades and taxation on capital gains and losses is studied.

Given the available evidence on the January effect, its influence on pre-holiday effect is examined by estimating the following dummy variable regression:

$$r_{it} = c_i + \alpha_{i,\mathrm{PRE}} D_{\mathrm{PRE}} + \alpha_{i,\mathrm{JANUARY}} D_{\mathrm{JANUARY}} + \varepsilon_{it} \quad (4b)$$

where D_{JANUARY} equals 1 if t is January and 0 otherwise. The results are shown in Panel B of Table 4. The coefficients of the dummy pre-holiday variable are significantly positive,

at usual probability levels, in the BBVA, SAN and IBEX-35 series. The magnitude of the pre-holiday dummy coefficients indicates that a strong pre-holiday effect exists after controlling for the returns on January pre-holidays.

It is worth noting that finance literature usually focuses on the January effect during the last few days in December and the first few days in January, which may realistically be a "turn-of-the-year" effect. In the Spanish stock market calendar, Christmas Eve, Christmas Day, New Year's Day and Epiphany holidays all fall during this time period. Therefore, we have also tested the impact of the turn-of-the-year effect on the pre-holiday effect. We have considered a new dummy variable, D_{CHANGE} that equals 1 if t is placed within the two last trading weeks in December or the two first trading weeks in January, and 0 otherwise. The new model is as follows:

$$r_{it} = c_i + \alpha_{i,\mathrm{PRE}} D_{\mathrm{PRE}} + \alpha_{i,\mathrm{CHANGE}} D_{\mathrm{CHANGE}} + \varepsilon_{it} \tag{4c}$$

The magnitude of $\alpha_{i,\mathrm{PRE}}$ in this model measures the additional return earned on pre-holidays after adjusting for the mean returns earned during the last and first trading days of the year. Panel C of Table 4 shows that the coefficients of the pre-holiday dummies are again significantly positive for BBVA, SAN and IBEX-35. Besides, none of the turn-of-the-year dummies coefficients is significant, suggesting that the pre-holiday effect exists after taking into account the turn-of-the-year effect.

In summary, the findings of this section lead to the conclusion that the magnitude and significance of the pre-holiday effect is unaffected by adjustments for either the Friday, the January or the turn-of-the-year effects.

5. Liquidity-related measures and the pre-holiday effect

As far as we know, all the previous studies about holiday effects use aggregate portfolio or index data. This makes it difficult to investigate any possible relationship between the pre-holiday effect and variables related to the liquidity of the stocks that constitute either the portfolios or the indices. Therefore, this section provides additional evidence to the nature of the pre-holiday effect by investigating the behaviour of different liquidity measures on pre-holidays versus non-holidays. More specifically, we study the trading volume, the bid–ask spread and the order size.

5.1. The trading volume

The empirical literature suggests that trading volume is positively correlated with stock returns. Given that the pre-holiday effect is found in periods of positive returns, if there were a relation between volume and stock returns we would expect that the volume on pre-holidays were higher than the volume on the remaining days. In order to detect possible abnormal trading volume in days prior to a holiday, we calculate for each stock a detrended volume index by dividing the daily trading volume by the average trading volume for the whole sample.

Panel A of Table 5 reports the average detrended trading volume for each stock on pre-holidays and the remaining days. If there were no systematic patterns in trading volume on pre-holidays, then we would expect that the two means were not statistically different. The results show that the daily trading volume on pre-holidays is not different from normal. Therefore, Panel A presents evidence against a possible relationship between volume and stock returns that could contribute to the explanation of the pre-holiday effect.

5.2. The bid–ask spread

Next, we study the average relative spread calculated as the difference between the average of the best ask and the best bid prices along the course of the session, divided by the mid-point of both averages. The Kruskal–Wallis non-parametric test has been used to test the null hypothesis of equality between the average relative spread on holidays and non-holidays, against the alternative that they are not equal.

Panel B of Table 5 reports the relative spreads for pre-holidays and non-holidays. In general, the relative spreads on pre-holidays are higher than those on non-holidays, but no significant differences between both days appear in any stock at the usual probability levels.

Since we work with individual stocks, this allows us to determine if investors can take profit from the pre-holiday effect. In order to do that, the relative spread and commissions supported by the Brokering Companies when the stocks are traded must be considered. During the analysed period, the round-trip costs ranged between 0.13% and 0.2%. Therefore, market frictions cannot preclude trading strategies from exploiting the pre-holiday effect in Telefónica, BBVA and SAN (see Tables 1 and 5).

Table 5
Volume and spread

	Telefónica	BBVA	SAN	Endesa	Repsol
Panel A: volume					
Pre-holidays	0.974	1.313	1.217	0.938	1.013
Remaining days	1.001	0.989	0.992	1.002	1.000
K–W statistic	0.787	0.205	0.008	0.013	0.158
Panel B: spread					
Pre-holidays	0.2353	0.1977	0.2251	0.3630	0.2059
Remaining days	0.2305	0.2046	0.2150	0.2348	0.1812
K–W statistic	0.11	0.40	1.58	3.72	1.37

Sample period from January 1990 to December 2000 (2756 observations) amongst which there are 90 pre-holiday returns. The volume has been calculated as the daily trading volume divided by the average trading volume for the whole sample. The spread is calculated for each day as the difference between the daily average of the best ask and bid prices, divided by the midpoint of both averages. The Kruskal–Wallis non-parametric test has been used to test the null hypothesis of equality of the means of the variables between holidays and non-holidays, against the alternative that they are not equal.

5.3. The order size

Since 1997, the Spanish Stock Exchange has been recording all the information related to the order book. The availability of this type of data let us shed more light on the pre-holiday effect by investigating the relationship between order size and security prices. Thus, we have calculated for each stock (1) the number of bid and ask orders placed during the trading session, (2) the total number of shares of the orders and (3) the average order size, calculated as the ratio between (2) and (1).

To normalise the number of bid (ask) orders, we calculate, for each day and for each stock, the quotient between the number of bid (ask) orders divided by the sum of bid and ask orders, expressed in percentage. Since the Kruskal–Wallis non-parametric statistic has been used to test the null hypothesis, when we test the null hypothesis of equality between the bid orders on pre-holidays versus the bid orders on non-holidays, we will also be testing the equality between ask orders on both days.

Before analysing the results shown in Table 6, it is important to highlight that from now onwards, the sample will be restricted to the period January 1997 to December

Table 6
Order size

	Telefónica	BBVA	SAN	Endesa	Repsol
Panel A: number of orders					
Pre-holidays bids	36.74%	40.65%	38.68%	30.89%	25.25%
Non-pre-holidays bids	39.27%	45.08%	43.79%	31.53%	29.55%
K–W statistic	0.70	4.01*	5.13*	0.05	2.84
Pre-holidays asks	63.26%	59.35%	61.32%	69.11%	74.75%
Non-pre-holidays asks	60.73%	54.92%	56.21%	68.47%	70.45%
Panel B: number of shares					
Pre-holidays bids	48.53%	48.34%	49.14%	48.85%	44.87%
Non-pre-holidays bids	48.35%	48.48%	47.42%	48.47%	45.55%
K–W statistic	0.10	0.01	3.22	0.25	0.01
Pre-holidays asks	51.47%	51.66%	50.86%	51.15%	55.13%
Non-pre-holidays asks	51.65%	51.52%	52.58%	51.53%	54.45%
Panel C: order size					
Pre-holidays bids	4029.77	5153.52	4983.85	3708.08	3056.36
Non-pre-holidays bids	3542.18	3738.48	3672.91	3191.92	2848.94
K–W statistic	2.20	6.15*	7.56**	4.76*	0.31
Pre-holidays asks	2385.63	3408.42	2912.27	1338.71	1377.63
Non-pre-holidays asks	2478.67	2858.59	2722.70	1402.42	1392.85
K–W statistic	0.04	2.98	0.70	0.03	0.04
Friday bids	3797.31	4172.68	4011.47	3402.88	2946.15
Non-Friday bids	3498.64	3687.74	3641.64	3160.43	2833.22
K–W statistic	3.73	1.20	1.30	3.48	3.41

Sample period from January 1997 to December 2000 (1000 observations) amongst which there are 32 pre-holidays and 198 Fridays. K–W statistic is the Kruskal–Wallis statistic which is distributed as a χ^2 with one degree of freedom.

* Denotes statistical significance at the 5% level.

** Denotes statistical significance at the 1% level.

2000. The pre-holiday return during these 4 years is higher than that observed in the full sample in Section 2. Specifically, the returns on a day prior to a holiday are 0.91%, 1.37%, 1.36%, 0.39% and 0.31% for Telefonica, BBVA, SAN, Endesa and Repsol, respectively.

The results are shown on Panel A. The magnitude of the percentage of number of bid orders on holidays is lower than that on non-holidays and the difference is significant in BBVA and SAN. As a consequence, the percentage of number of ask orders on pre-holidays in BBVA and SAN is significantly higher than that on non-holidays. At this point, it is important to note that the null is rejected in the two stocks with the largest pre-holiday effect in the sub-sample.

Panel B of Table 6 presents the results when the number of shares related to the bid and ask orders is considered. These variables have been detrended in the same way as the number of orders. The results indicate that there is no difference between the number of shares that want to be traded on both pre-holidays and non-holidays.

Finally, we calculate the average size of the order as the ratio between the number of shares and the number of orders. The upper portion of Panel C shows that the average size of bid orders on pre-holidays is higher than that observed on non-holidays. First, the null hypothesis of equality of the average size between pre and non-holidays is rejected at the 1% level in SAN and at the 5% level in BBVA and Endesa. Second, no significant difference has been observed between the average size of ask orders on pre-holidays and non-holidays.

The high average size of bid orders on pre-holidays, together with the fact that the trading volume is the same in pre and non-holidays, indicates that small investors are reluctant to buy stocks on the day prior to a holiday, but they do not avoid selling them. This could originate the pre-holiday effect in Spain. In fact, it has been observed in different markets that large trades are made at worse prices than small trades. Further, transaction prices are higher after block buys. There are two possible hypotheses that could explain why trade size affects security prices (see Easley and O'Hara, 1987). On the one hand, the ''liquidity'' hypothesis suggests that the inventory imbalance resulting from a large trade forces specialists away from their preferred inventory positions, thus, prices for this transaction must compensate for bearing this inventory risk. On the other hand, the ''information'' hypothesis is based on an adverse selection problem that arises because informed agents prefer to trade larger amounts at any given price. The larger the trade size, the more likely it is to trade with an informed trader. In consequence, the rising of the prices on pre-holidays would reflect this increased probability of information-based trading.

Given the absence of specialists in the Spanish Stock Market, the ''information'' hypothesis could be appointed as the most plausible explanation to the Spanish pre-holiday effect.

The abovementioned results indicate that small investors avoid to buy when there is a near closing day. Therefore, this would also be the expected investor behaviour on any Friday. However, the lower portion of Panel C also shows that we cannot reject the equality between bid orders on Fridays and non-Fridays at the usual levels. So, Spanish small investors avoid buying stocks on pre-holidays, but not on Fridays. One possible explanation of this behaviour could be the fear of facing the

effects of market turmoils on holidays without the possibility of taking positions, since operating in international stock markets is reserved only for institutional investors.

6. Conclusions

This study shows the existence of a pre-holiday effect in the most traded Spanish stocks. Although the stocks of the sample are traded in both the US and German markets, none of them show any significant pre-holiday effect that could be related to the calendar of those markets. Therefore, all stocks exhibiting pre-holiday effects do so with respect to Spanish holidays.

Several tests have proved that the strong evidence for equities to experience abnormal large returns just prior to holidays is not a manifestation of other calendar anomalies such as Friday, January and turn-of-the-year effects, and it is not related to abnormal trading volumes or bid–ask spreads on non-holidays.

We find that the pre-holiday return compensates market frictions in some stocks. These results have practical applications since the Brokering Companies can exploit the pre-holiday effect in the Spanish Stock Exchange by purchasing the stocks before the closing on the day prior to a pre-holiday and cancelling them out at the last moment on the following day. The small investor can also benefit from this effect because as sellers, they can obtain better prices if they decide to trade at the end on days prior to a holiday. Additionally, the pre-holiday effect indicates that the day prior to a holiday is the worst day to buy.

We provide evidence that the pre-holiday effect could be due to the reluctance of small investors to buy on pre-holidays, which produces an increase in the average size of bid orders on pre-holidays. The larger the trade size, the more likely it is to trade with an informed trader. Therefore, the rise in prices on pre-holidays would reflect this increased probability of information-based trading. Given that the reluctance to buy is not detected on Fridays, a possible explanation for the small investors avoidance to buying stocks on a day prior to a national holiday can be found in the fact that they are afraid to be surprised by information flows being released without the possibility of closing or hedging their positions, since operating in international stock markets is reserved only to institutional investors.

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