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Determinants of holiday effects in mainland Chinese and Hong-Kong markets

Fabrizio Casalin*

Abstract

The joint analysis of the Chinese and Hong-Kong markets enables us to investigate whether differences in the attributes of shares, as well as in institutional features of markets can generate different holiday effects. The analysis is carried out by comparing the Shanghai, Shenzhen and Hong-Kong indices of domestic and cross-listed Chinese shares. Our empirical results suggest that holiday effects are positive, significant, time-varying, with no signs of decline over time and strongly dependent on market-specific institutional practices, with a negligible role played by the attributes of shares. We then carry out the same analysis by using an alternative metric based on trading rules profitability and obtain very similar results.

Keywords: Holiday effects, Cross-listed shares

JEL classification: G14, G15

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I Introduction

Over the past three decades, different types of market anomalies such as the holiday effects have been detected over different markets and periods. The holiday effect refers to the idea that stock returns on days adjacent to specific festivities are statistically higher than returns on common trading days. These phenomena challenge the Efficient Market Hypothesis (EMH) as they indicate that investors can capture excess returns by exploiting specific investment strategies (see, e.g., Keef and Roush (2005)).

Scholars have advanced different explanations that account for the presence of holiday effects. Two popular hypotheses are those put forward by Cadsby and Ratner (1992) and Kim and Park (1994). The former argues that the presence of holiday effects in some markets but not in other indicates that such effects may originate from country-specific institutional practices. The latter suggests that the attributes of shares - such as the size - cannot generate holiday effects.

The presence of two separate markets in mainland China, as well as of cross-listed shares in Chinese and Hong-Kong markets, provides an ideal setting to test the above hypotheses. *On the one hand, both the Shanghai and Shenzhen markets present similar institutional features, as they are in similar stages of development, heavily regulated, and with a large preponderance of domestic retail investors.* However, the shares traded on these two markets present different attributes, consisting of mature state-owned companies for the Shanghai and private small- and medium-cap firms for the Shenzhen market. Thus, the comparison between Shanghai and Shenzhen indices makes it possible to test whether shares with different attributes listed on similar markets can generate different asset pricing dynamics. *On the other hand, the Hong-Kong market is far more established, with lower levels of public intervention, a strong presence of international institutional investors, and shares denominated in the local currency.* Equally important, despite the introduction of the QFII and the more recent Stock Connect programmes both the Chinese exchanges have remained substantially closed to foreign investors.[1] Thus, Chinese and Hong-Kong markets

[1] In November 2014 the Chinese authorities have enabled foreign investors to trade on the Shanghai market through the Shanghai/Hong-Kong Stock Connect. A similar programme has been extended to the Shenzhen market in December 2016.

differ in terms of the type of investors and institutional features. It follows that by comparing the price behavior of shares listed on Chinese markets with that of cross-listed shares on the Hong-Kong market we can investigate whether differences in the institutional features of markets can generate different pricing dynamics in shares with similar attributes.

In this paper, we focus on a specific aspect of such dynamics, i.e. the so-called holiday effects. More specifically, we gauge the joint impact of four major festivities such as the New Year, Chinese Lunar New Year (CLNY), Labour and National days on daily returns of the Shanghai (SH), Shenzhen (SZ), Hang-Seng (HS) and Hang-Seng China Enterprises (HSCE) indices. These indices have different compositions, with the SH comprising of large state-owned companies with a prevalence of the financial and industrial sectors, the SZ consisting of smaller, fast-growing firms from the SME and ChiNext boards, the HS encompassing firms with origin of business in Hong-Kong, and the HSCE that tracks the price dynamics of cross-listed shares.[2] *We focus our analysis on the period 2002-2017, in the light of the substantial immaturity of the A-share markets during the 1990s, and the presence of relatively few H-listed companies prior to 2000. We set the initial date to 2002 as that year marked the introduction of a series of reforms - such as the QFII, RQFII, the launch of the SME and ChiNext boards, and both the Shanghai/Hong-Kong and Shenzhen/Hong-Kong Stock Connects - that have gradually re-shaped the Chinese exchanges.*

The above setting enables us to answer the following questions: Do holiday effects occur in the above markets? If they do exist, does Cadsby and Ratner's (1992) hypothesis that country-specific institutional practices generate different holiday effects hold? Do shares with different attributes traded in similar markets (such as the SH and SZ, as well as the HS and HSCE indices) present different holiday effects? By answering this question we tackle from a different angle Kim and Park's (1994) hypothesis, as we consider as an attribute the different nature and location of firms - i.e. state-owned versus private, and China-versus Hong-Kong-based - rather than the size previously consider. Are there differences among the four

[2] *The HSCE encompasses 40 among the largest Chinese cross-listed firms such as ICBC, Ping An, Bank of China, Petro China and China Railway - with 28 constituents which are also part of the Shanghai A-share index, equivalent to 85.33% of the index's capitalization.*

festivities, and does their importance change over time? Are the above effects robust to different metrics such as the profitability of trading rules designed around such festivities? We then investigate whether the above holiday effects depend on pre-holiday strength induced by short-sellers closing their risky positions in advance of holidays (the so-called Ariel's (1990) inventory adjustment explanation). This last analysis, however, is limited to Hong-Kong markets, as for the Chinese markets short sales are prohibited (see, e.g., De Jong et al. (2012)).

We carry out the analysis by considering both close-to-close and open-to-close returns. The comparison of the two types of return specifications is important to understand whether the patterns of holiday effects are dependent on any building US market sentiment occurring during the China and Hong-Kong non-trading period prior to early morning (HKT) market openings. While, in fact, close-to-close returns might impound such sentiment effects, open-to-close returns should remain substantially immune from the same effects.

Our results suggest that the holiday effects are positive, strongly significant and characterized by country-specific dynamics. On the one hand, we find abnormal returns in days immediately adjacent to holidays for both the SH and SZ indices, with the effects occurring in days preceding and following holidays which are of similar magnitude. On the other hand, both the HSCE and HS indices are characterized by higher returns which are confined to days before or after holidays depending on whether close-to-close or open-to-close returns are considered. The stark difference in the price behavior of Shanghai and HSCE indices lends strong support to Cadsby and Rather's (1992) hypothesis that different holiday effects may originate from country-specific institutional practices.

The comparison between the mainland Chinese markets shows that the holiday impacts are symmetrical and similar in magnitude, but slightly different in their dynamics. In fact, for the Shanghai market, the magnitude and significance of days prior to holidays are stronger and longer lasting than those following holidays, whereas for the Shenzhen market the impact of days after holidays is stronger. Such patterns hold for both close-to-close and open-to-close returns. Both the HSCE and HS indices show strong and positive impacts of similar magnitude occurring one day before and one day after festivities for open-to-close and close-to-close returns, respectively. Such impacts are much short-lived as they become insignificant 2 days after holidays. We then construct formal tests which fail to reject the null of equality of holiday effects between the Shanghai and Shenzhen, and between the HSCE and HS markets. These results suggest that the dynamics of returns on days adjacent to holidays are similar for the Chinese, and for and Hong-Kong markets - so that we find strong support for Kim and Park's (1994) hypothesis that the attributes of shares cannot generate different holiday effects. Limitedly to the Hong-Kong market, we do not find any support for Ariel's (1990) explanation.

We find that the above results are not driven by US stock market spill-overs, changing macroeconomic conditions - as proxied by growth rates in national GDP and inter-bank rates - as well as the presence of day-of-the-week (DoW) and turn-of-the-month (ToM) effects. Moreover, the above results hold, even though with slightly different dynamics, for both close-to-close and open-to-close returns - suggesting that US market sentiments occurring during non-trading periods prior to the opening of the Asian exchanges play a negligible role in shaping the previously detected patterns of holiday effects. The above results are fairly general, as the four indices under analysis represent large shares of the total market capitalizations. Moreover, they are not driven by tax-avoidance practices which could generate abnormal returns around NY and CLNY days, as both China and Hong-Kong do not have a separate capital gains tax (see, e.g., Bergsma and Jiang (2016)).

While at aggregate level we find that the holiday effects are consistently positive, when we examine their individual impacts we find that they vary in sign, magnitude and significance, with trends which present no signs of decline over time. The festivities that yield the strongest impacts are the NY, Labour and National days, whereas the CLNY presents weaker - yet positive and significant - effects. We then measure the economic relevance of the four festivities by means of three rules which consist of trading the four market indices on days adjacent to holidays with different timing. Empirical results show that such rules yield positive cumulated returns which are increasing over the last 10 years of the sample, with values which are sizeable shares of the total returns obtained from simple buy-and-hold strategies. Such trends are particularly strong for the rules designed around the NY, Labour and National days, with investors that can reap substantial profits by trading on the Chinese and Hong-Kong indices. We find that the CLNY deploys the weakest holiday effects over time. These last, however, become substantially stronger once the negative impacts induced by the 2008 Subprime Crisis and 2015 stock market turbulence are removed.

Moreover, we find that the streams of cumulated returns generated by the above rules are of similar magnitude and move in lock-step for the two Chinese, as well as the two Hong-Kong indices - whereas the degree of similarity between the Shanghai and HSCE index is much weaker. The same pattern holds for the individual holiday impact previously considered. These last results lend further support to Cadsby and Ratner (1992), and Kim and Parks (1994) hypotheses that holiday effects may originate from country-specific institutional practices, with a little role played by the attributes of shares. *The Chinese and Hong-Kong markets, in fact, present very different institutional features indeed. The former are, in fact, dominated by domestic retail investors, with foreign investors that have limited access to domestic securities via the QFII quotas.*[3] *The latter is instead characterized by a strong presence of institutional investors, with a preponderance of UK, Mainland China and US investment firms.*[4] *Such differences are, in all likelihood, at the basis of the different patterns of holiday effects found in the Shanghai and HSCE indices.*

The results found in this study are also at odds with the existing literature on holiday effects in Western stock markets, which shows that such effects had gradually vanished since the late 1990s (see, e.g., Keef and Roush (2005)). The strong presence of holiday effects in the first and third largest Asian markets poses some serious challenges to both the Chinese and Hong-Kong market authorities. Such holiday effects, in fact, represent seasonal departures from informational efficiency which the results of this study show to be independent from both the institutional features of the market considered and the attributes of shares.

[3] As of 2017, China has approximately 200 million retail investors which generate about 85% of trades on the Mainland markets.

[4] According to the 2016 Cash Market Transaction Survey conducted by the Hong Kong Stock Exchange, over the period 2006-2016 the institutional investors had accounted for as much as 60% of the cash market trading value.

The remainder of the paper is organized as follows: Section II reviews the literature, Section III describes the dataset, Section IV sets out the econometric methods and Section V discusses the empirical results. Finally, Section VI concludes.

II Literature

A large body of literature has investigated the presence of holiday effects in the US markets. Lakonishok and Smidt (1988) consider the DJIA over a period of almost 100 years and find that the average returns on days prior to holidays are about 23 times higher than returns on common trading days. Similarly, Kim and Park (1994) show that holiday returns for the NYSE, NASDAQ, and AMEX indices over the period 1963 - 1986 are between 9 and 27% higher than average returns. Liano and Huang (1992) document for the period 1973 - 1989 the presence of pre-holiday returns using CRSP data. Frieder and Subrahmanyam (2004) find similar results for the S&P500 over the period 1946 - 2000. Pettengill (1989) shows that pre-holiday effects occur for both large and small companies. Recently, Pantzalis and Ucar (2014) find that Easter holidays affect US investor's response to firms' earning announcements.

A parallel strand of research has investigated the presence of holiday effects in international markets, as a result of spill-overs from US markets or local holidays. Ziemba (1991) finds that pre-holiday returns in the Japanese stock market are about 5 times higher than those on normal trading days. Holden et al. (2005) document strong holiday effects on the Thai exchange occurring in the immediate aftermath of the Asian crisis. Casado et al. (2011) find strong local and NYSE holiday effects on five major European markets (see also Gama and Vieira (2013)). Osamah (2014) using data for a number of Muslim countries shows that stock returns are greater in correspondence to Ramadan (see also Bialkowski et al. (2012)).

More recently, a number of scholars have shown that the holiday effects in mature markets are not permanent over time. Keef and Roush (2005) using the S&P500 index find that the pre-holiday effects tend to disappear in the period post-1987. Chong et al. (2005) show that for the period 1973-2003 the same index presents significant pre-holiday effects which die out during the last six years of the sample. Vergin and McGinnis (1999) test for the presence of the holiday effects using S&P and NYSE indices over the period 1987 - 1996 and show that these last fade away for large companies.

The large size of the Chinese and Hong-Kong stock exchanges - as well as the strong geopolitical ties between the two systems - have sparkled a copious literature focussed on the comparative analysis of the two financial sectors. Scholars have shown that the two economies began to be financially interconnected since the late 90s, with a substantial level of co-movement among the stock indices (see, e.g., Girardin and Liu (2007), Huyghebaert and Wang (2010), and Ho and Zhang (2012)). Quite surprisingly, the strand of studies on calendar effects in the Chinese and Hong-Kong markets is still rather sparse. Cao et al. (2007) investigate the separate effects of the New Year, Labour, National and CLNY days on the mainland Chinese markets over the period 1994-2006, and find that only this last festivity has positive and significant impacts. Mitchell and Ong (2006) find similar results for the period 1990-2002. Bergsma and Jiang (2016) find strong CLNY impacts on both the Chinese and Hong-Kong markets, whereas Yuan and Gupta (2014) show that such impacts are limited to the Hong-Kong market only (see also McGuinness (2005)). McGuinness and Harris (2011) is the only study which explicitly compares calendar effects across the Shanghai, Shenzhen and Hong-Kong markets. The authors find strong and positive impacts of the CLNY, whereas the effect of other holidays is insignificant. Despite some mixed results, the overall evidence is in favor of the existence of holiday effects in both mainland Chinese and Hong-Kong markets.

The literature offers a number of explanations as to why abnormal returns around holidays can occur. The idea that the attributes of shares - in the form of size - could be a driver of calendar effects was proposed for the first time by Keim (1983) and Keim and Stambaugh (1984). These authors showed that the January and weekend effects were mainly small-firm effects. Kim and Park (1994) tested the the same hypothesis for the presence of holiday effects. By partitioning the US stock markets into portfolios of different market capitalization, these authors showed that such portfolios presented different patterns of holiday effects which cannot be explained by the differences in size. Cadsby and Ratner (1992) noticed *that different markets presented different patterns of holiday effects which were often independent from US holidays. They therefore advanced the hypothesis that holiday effects can be explained by differences in the institutional practices of markets, such as trading methods, clearing mechanisms, settlement procedures, as well as the type of dominant investors. A number of scholars have shown that the Cadsby and Rather (1992) and Kim and Park's (1994) explanations can account for day-of-the-week and turn-of-the-month effects, whereas similar studies on holiday effects are very limited. For example, Sias and Starks (1995), and Maher and Parikh (2013) find that the above calendar effects are primarily driven by institutional investors trading patterns, whereas Sharma and Narayan (2014) show that - for individual NYSE shares - the turn-of-the-month effects are dependent on both industry and size.*

On top of Cadsby and Ratner (1992) and Kim and Park's (1994) hypotheses, scholars have proposed some alternative explanations for the existence of holiday effects. As already mentioned, Ariel (1990) argues that holiday effects might depend on pre-holiday strength induced by short-sellers closing their risky positions in advance of holidays. Similarly, Ritter (1988), and Harris and Gurel (1986) put forward the idea that there exists some clientele which preferentially buys (or avoids selling) on days prior to holidays. Empirical results support this last hypothesis, whereas Ariel's (1990) hypothesis finds weak evidence when tested on actual data. Pettengill (1989) investigates the possibility that high pre-holiday returns may result from a closing effect. Empirical results from the same author, however, do not support this hypothesis (see also Fabozzi et al. (1994)). Finally, Keim (1989) finds evidence that pre-holiday returns are inflated by systematic patterns in the relative frequencies of bid and ask transaction prices.

III Dataset

We gather daily opening and closing prices for the Shanghai (SH), Shenzen (SZ), Hang-Seng (HS) and Hang-Seng China Enterprises (HSCE) composite indices over the period 01/01/2002 - 30/06/2017.[5] *We set*

[5] All the above stock indices have been obtained from Bloomberg.

the initial date to 2002 as that year marked the introduction of a series of reforms - such as the QFII, RQFII, the launch of the SME and ChiNext boards, and both the Shanghai/Hong-Kong and Shenzhen/Hong-Kong Stock Connects - that have gradually transformed the Chinese exchanges. We choose to focus on this period also because of the relatively small number of H-listed firms prior to 2000.[6] *We consider both close-to-close and open-to-close returns as the two specifications might discount differently any building US market sentiment occurring during the China and Hong-Kong non-trading period prior to early morning (HKT) market openings.* We consider four Chinese holidays such as the New Year (NY), Lunar New Year (CLNY), Labour (LAB) and National (NAT) days. *The total number of festivities is 62 for Mainland China and 55 for Hong-Kong.* The total number of trading days for mainland Chinese and Hong-Kong markets is therefore different, as the former remain close for longer periods and for a larger number of festivities.[7]

Table 1 reports some preliminary statistics for both the close-to-close and open-to-close returns of the four indices, as well as for their partition into returns for one day before and after holidays (denoted by r_{DH1}) and returns on all remaining days ($r_{\overline{DH1}}$). Close-to-close returns are not significantly different from zero across the four indices, whereas open-to-close returns are significantly positive for the Chinese, and negative for the Hong-Kong markets. Focussing on the differences between r_{DH1} and $r_{\overline{DH1}}$, empirical results show that the average means for close-to-close returns adjacent to holidays are statistically greater than zero, whereas the corresponding means for days non-adjacent are not significant. The above gaps are even more pronounced in open-to-close returns for the Hong-Kong markets, whereas they seem to weaken, yet remaining positive, for open-to-close returns in the Chinese markets. Values of the skewness and kurtosis statistically greater than zero suggest fat tails distributions and departures from normality

[6]For instance, prior to 2000 only two firms (China Petroleum and Huaneng Power) of the 40 current constituents of the HSCE index were already H-listed.

[7]*The New Year, Labour and National days fall, respectively, on the 1/1, 1/5 and 1/10 of each year, whereas the CLNY falls between the end of January and mid-February. Chinese holidays have different durations: 1 day for NY, 3 days for Labour, and 7 days for CLNY and National days. Moreover, Labour days were 7-day holidays prior to 2008. Hong-Kong holiday are traditionally shorter, typically 1 day for NY and Labour, 2 days for National and 3 days for the CLNY. Moreover, Hong-Kong markets did not close on the following festivities: 2004 and 2010 Labour Day, 2005, 2011 and 2016 National Day, 2005 and 2011 New Year's Day.*

across the different types of returns.[8] *These figures highlight the existence of a positive gap between returns around holidays and those on all remaining days across the four indices and for both close-to-close and open-to close specifications, suggesting therefore a strong presence holiday effects.*

In Table 2 we directly compare returns for days adjacent to holidays with returns for days non-adjacent to holidays by using 2-sample t, Mann-Whitney (M-W), Barnett-Eisen (B-E) and Kolmogorov-Smirnov (K-S) statistics for the null of equality in mean, median and distributions. We then repeat the analysis by decomposing the holiday impacts into effects occurring on days before and days after holidays. We do so by comparing returns for 1 day before holidays (r_{DBH1}) with those on all remaining days ($r_{\overline{DBH1}}$), as well as returns for 1 day after holidays (r_{DAH1}) with those on all remaining days ($r_{\overline{DAH1}}$). Empirical results indicate that close-to-close returns for 1 day adjacent to holidays (r_{DH1}) are significantly greater than those for days non-adjacent to holidays. Similarly, both the B-E and K-S tests reject the null of equality in distribution for the above samples.[9] *We then disentangle the above effects and find that these last are generated by excess returns occurring on both one day before and after holidays for the SH and SZ markets, whereas the Hong-Kong markets present stronger returns on 1 day after holidays only. Focussing on open-to-close returns, the differences in distribution between days adjacent and days non-adjacent to holidays are far less marked for the SH and SZ markets, whereas the same differences remain very strong for the Hong-Kong markets. These last, unlike the case of close-to-close returns, are mainly generated by extra returns occurring on 1 day before holidays.*[10]

All in all, the above results suggest the presence of strong holiday effects across the four markets for

[8]Both the Jarque-Bera and Kolmogorov–Smirnov tests reject the null of normality at standard significance levels. Moreover, Q-stats and LM-ARCH tests show the presence of strong serial correlation and conditional heteroscedasticity for the four indices. These results are not reported to save space but are available from the author upon request.

[9]The B-E statistics indicate that the differences between the two types of returns are often driven by differences in the location of the empirical distributions. The decomposition of the B-E tests is not reported to save space but it is available from the author upon request.

[10]The analysis reported on Table 1 and 2 is limited to 1 day before and after holidays. However, it can be shown that differences in distribution occur also between returns on 2 days adjacent to holidays and returns on all other days. Such differences, however, become weaker as the time horizon is extended from 1 to 2, and from 2 to 3 days around holidays. These results are not reported to save space, but are available from the author upon request.

close-to-close returns. When open-to-close returns are considered, holiday effects remain strong for the Hong-Kong markets, whereas the same evidence becomes less clear-cut for the Chinese markets. The above figures highlight also a dichotomy in the ways Chinese and Hong-Kong markets move around holidays. In fact, the two Chinese and the two Hong-Kong indices tend to move in lock-step, with their dynamics being quite different for close-to-close and open-to-close returns. This last result can be taken as a prima-facie evidence that differences in the attributes of shares traded on the same markets do not seem to generate any different dynamics around days adjacent to holidays.

Given the relatively small samples of returns adjacent to holidays, the asymptotic inference of the above tests might be not the best approximation for their finite sample properties. We therefore bootstrap the above statistics by re-sampling 1,999 times from the original samples of returns for days adjacent and non-adjacent to holidays. Our empirical exercise shows that the differences between asymptotic and bootstrapped critical values (obtained under the null that the samples of adjacent and non-adjacent returns are drawn from the same population) are negligible. To check whether the empirical results set out in Table 2 are not an artifact of our dataset we re-sample separately 1,999 times from the samples of adjacent and non-adjacent returns, compute the above statistics and count the number of times the null is rejected at the 5% level. For instance, for close-to-close returns on the Shanghai and Shenzhen markets 1 day before and after holidays the 2-sample t tests reject the null 83% and 94% of the repetitions, whereas the same statistics for 1 day before or after holidays reject the null 97% and 33%, and 91% and 62% respectively. Similar results are obtained for the M-W, B-E and K-S statistics.[11] *We report in Figure 1 the empirical distributions of the bootstrapped returns. The diagrams show that the distributions of returns adjacent and non-adjacent to holidays are different in location, with the former taking on average larger values. Such difference in location holds across the four markets for both close-to-close and open-to-close returns.*[12] *All in all, the above results provide convincing evidence that the stochastic properties of the samples of returns*

[11] The empirical results for these bootstrapping exercises are not reported but are available from the author upon request.

[12] For example, the sample mean of the Shanghai empirical distributions (open-to-close returns) is 0.24 for days adjacent, and 0.070 for days non-adjacent to holidays, with the same gap that widens for close-to-close returns.

adjacent and non-adjacent to holidays are different.

We then carry out a final preliminary analysis in order to detect the presence of both DoW and ToM effects in our dataset. In line with previous studies, we find that returns in the Shanghai market are statistically significant on Thursday and December (close-to-close), and Wednesday, Friday and December (open-to-close), whereas for the Shenzhen market the same are significant on Wednesday, Thursday and February (close-to-close), and Tuesday, Wednesday, Friday and May (open-to-close). For the HSCE, returns are significant on Thursday and August (open-to-close), whereas for the HS market returns are significant on April (close-to-close) and Thursday (open-to-close) (see Mookerjee and Yu (1999), and Chen and Singal (2004)).[13] *These last results will be used in the next section where we set out the regression models used in our empirical analysis.*

TABLES 1 AND 2 HERE

FIGURE 1 HERE

IV Methodology

Many previous studies employ single equations to study daily stock returns around holidays. We depart from this approach by making use of systems of equations which enable the testing of cross-equation restrictions such as the equality of holiday effects across markets. We define three sets of dummy variables $DH_{i,t}$, $DBH_{i,t}$ and $DAH_{i,t}$ which take value 1 during days adjacent to holidays as follows:

[13] Results are not displayed to save space but they are available from the author upon request.

$$DH_{i,t} = \begin{cases} 1, & \text{if day } t \text{ is } i \text{ days before and after holiday} \\ 0, & \text{otherwise} \end{cases}$$

$$DBH_{i,t} = \begin{cases} 1, & \text{if day } t \text{ is } i \text{ days before holiday} \\ 0, & \text{otherwise} \end{cases}$$

$$DAH_{i,t} = \begin{cases} 1, & \text{if day } t \text{ is } i \text{ days after holiday} \\ 0, & \text{otherwise} \end{cases}$$

where i=1, 2, 3. *We test for the presence of holiday effects by using the two baseline models as follows:*

$$r_t^j = \alpha_0^j + \alpha_1^j r_{S\&P,t-1} + \alpha_2^j GDP_t + \alpha_3^j i_t + \sum_{i=1}^{3} \alpha_{DHi}^j DH_{i,t} + e_t^j \tag{1}$$

$$r_t^j = \alpha_0^j + \alpha_1^j r_{S\&P,t-1} + \alpha_2^j GDP_t + \alpha_3^j i_t + \sum_{i=1}^{3} \alpha_{DBHi}^j DBH_{i,t} + \sum_{i=1}^{3} \alpha_{DAHi}^j DAH_{i,t} + \varepsilon_t^j \tag{2}$$

*where j=SH/SZ/HSCE/HS. To control for the possible modulating effect of the US markets - which close only a few hours before the Chinese and Hong-Kong markets open - we supplement the above specifications with the lagged values of the daily return on the S&P*500 *index. The same specifications are also supplemented with quarterly growth rates of real GDP as well as interbank rates. GDP represents therefore the growth rates for Mainland China and Hong-Kong (annualized on a year-to-year basis), whereas* i_t *is the daily percentage change in the 3-month Chinese and Hong-Kong interbank rates.*[14] *We then supplement the above specifications with seasonal dummies which capture the DoW and ToM effects previously defined.* Thus, the above specifications are designed to detect calendar effects up to 3 days before and after holidays.

We estimate simultaneously eqs.(1)-(2) as a system of four equations for j=SH/SZ by using Seemingly

[14] These series are retrieved from the National Bureau of Statistics of China, Peoples Bank of China, Census and Statistics Department of Hong-Kong and Hong-Kong Association of Banks.

Unrelated Regressions (SUR) which account for the contemporaneous cross-correlation in the disturbance terms. We then repeat the same empirical exercise by setting j=HSCE/HS. As previously mentioned, the daily returns are affected by serial correlation, conditional heteroscedasticity and departures from normality. Since the disturbance terms in the above equations will inherit such features, standard estimators might lose consistency and deliver potentially unreliable results (see Chien et al. (2002)). Based on these considerations, we supplement our estimation strategy by using alternative methods such as Weighted Least Squares (WLS) and block bootstrapping which can better cope with ill-conditioned data.

We then re-estimate the holiday effects previously specified by means of the following two ARMA-GARCH specifications:

$$r_t^j = \alpha_0^j + \sum_{p=1}^{P} \alpha_p r_{t-p}^j + \sum_{q=1}^{Q} \theta_q e_{t-p}^j + \sum_{i=1}^{3} \alpha_{DHi}^j DH_{i,t} + e_t^j \tag{3}$$

$$\sigma_t^{j2} = \gamma_0^j + \gamma_1^j e_{t-1}^{j2} + \gamma_2^j \sigma_{t-1}^{j2} + \sum_{i=1}^{3} \gamma_{DHi}^j DH_{i,t} \tag{4}$$

$$r_t^j = \alpha_0^j + \sum_{p=1}^{P} r_{t-p}^j + \sum_{q=1}^{Q} \theta_q \varepsilon_{t-p}^j + \sum_{i=1}^{3} \alpha_{DBHi}^j DBH_{i,t} + \sum_{i=1}^{3} \alpha_{DAHi}^j DAH_{i,t} + \varepsilon_t^j \tag{5}$$

$$\sigma_t^{j2} = \gamma_0^j + \gamma_1^j \varepsilon_{t-1}^{j2} + \gamma_2^j \sigma_{t-1}^{j2} + \sum_{i=1}^{3} \gamma_{DBHi}^j DBH_{i,t} + \sum_{i=1}^{3} \gamma_{DAHi}^j DAH_{i,t} \tag{6}$$

Both eqs.(3)-(4) *and* (5)-(6) *are designed to detect calendar effects up to 3 days before and after holidays in both daily returns and their volatility. Such specifications can account for both heteroscedasticity and serial correlation, are robust to departures from normality, and they can detect various forms of ARMA dynamics not previously modelled in eqs.*(1) *and* (2).

Doornik and Oms (2008) have shown that - for joint estimations of mean and GARCH variance equations - the inclusion of dummy variables with structure similar to those previously defined can generate multi-modality in likelihood functions, with an ensuing possibility of achieving local rather then global *maxima. The above issue becomes potentially more and more severe as the number of dummy variables included in the mean equation increases. To circumvent this problem, we conduct empirical estimations of the above GARCH models in a two-stage setting, where we first carry out estimation of eq.*(3) *and then use the residuals so obtained to estimate eq.*(4)*.*[15] *We reckon that this modelling strategy is more suitable to deliver robust estimators with a negligible impact on the asymptotic efficiency of these last, given the large sample of daily returns in use.*[16]

Finally, we investigate the impact of individual holidays by specifying the following dummy variables:

$$DBH_t^p = \{ \begin{array}{ll} 1, & \text{if day } t \text{ is 1 day before holiday } p \\ 0, & \text{otherwise} \end{array}$$

$$DAH_t^q = \{ \begin{array}{ll} 1, & \text{if day } t \text{ is 1 day after holiday } q \\ 0, & \text{otherwise} \end{array}$$

and by estimating the following specifications:

$$r_t^j = \alpha_0^j + \alpha_1^j r_{S\&P,t-1} + \alpha_2^j GDP_t + \alpha_3^j i_t + \sum_{p=2}^{P} \alpha_{DBH^p}^j DBH_t^p + \sum_{q=1}^{Q} \alpha_{DAH^q}^j DAH_t^q + \varepsilon_t^j \tag{7}$$

where j=SH/SZ/HSCE/HS and $\{P,Q\}$ *are equal to* $\{62,63\}$ *and* $\{55,56\}$ *for the Chinese and Hong-Kong markets, respectively.*

The above specifications enable the testing of a number of hypotheses on the patterns of holidays effect over time and across markets. More specifically, we gauge the sign, magnitude, timing and persistency of holiday effects within a specific market through the null H_1, H_5, H_6, H_7, H_{11} and H_{12}. Comparisons across markets are instead carried out through the null H_2, H_3, H_4, H_8, H_9 and H_{10}. These last are used to shed light on Kim and Park's (1994) argument that differences in the attributes of shares cannot explain

[15] The same modelling strategy is adopted for eqs.(5)-(6).

[16] Moreover, Lin et al. (1994) show that, for similar GARCH specifications, the two-step approach is asymptotically equivalent to the joint estimation of the mean and variance equations.

differences in holiday effects. We specify the above null as follows:[17]

- H_1 : Equality between impacts 1 and 2 days before and after holidays for one market ($\alpha^j_{DH1} = \alpha^j_{DH2}$ for j=SH/SH/HSCE/HS)

- H_2 : Equality between impacts 1 day before and after holidays across SH/SZ and HSCE/HS markets ($\alpha^{SH}_{DH1} = \alpha^{SZ}_{DH1}$ and $\alpha^{HSCE}_{DH1} = \alpha^{HS}_{DH1}$)

- H_3 : Equality between impacts 2 day before and after holidays across SH/SZ and HSCE/HS markets ($\alpha^{SH}_{DH2} = \alpha^{SZ}_{DH2}$ and $\alpha^{HSCE}_{DH2} = \alpha^{HS}_{DH2}$)

- H_4 : Equality between impacts 1 and 2 days before and after holidays across SH/SZ and HSCE/HS markets ($\alpha^{SH}_{DH1} = \alpha^{SZ}_{DH1} \cap \alpha^{SH}_{DH2} = \alpha^{SZ}_{DH2}$ and $\alpha^{HSCE}_{DH1} = \alpha^{HS}_{DH1} \cap \alpha^{HSCE}_{DH2} = \alpha^{HS}_{DH2}$)

- H_5 : Impacts 1 and 2 days before and after holidays for one market jointly not statistically significant ($\alpha^j_{DH1} = \alpha^j_{DH2} = 0$ for j=SH/SZ/HSCE/HS)

- H_6 : *Impacts 1 and 2 days before and after holidays on conditional volatility for one market jointly not statistically significant (*$\gamma^j_{DH1} = \gamma^j_{DH2} = 0$ *for j=SH/SZ/HSCE/HS)*

- H_7 : Equality between impacts 1 day before and 1 day after holidays for one market ($\alpha^j_{DBH1} = \alpha^j_{DAH1}$ for j=SH/SZ/HSCE/HS)

- H_8 : Equality between impacts 1 day before holidays across SH/SZ and HSCE/HS markets ($\alpha^{SH}_{DBH1} = \alpha^{SZ}_{DBH1}$ and $\alpha^{HSCE}_{DBH1} = \alpha^{HS}_{DBH1}$)

- H_9 : Equality between impacts 1 day after holidays across SH/SZ and HSCE/HS markets ($\alpha^{SH}_{DAH1} = \alpha^{SZ}_{DAH1}$ and $\alpha^{HSCE}_{DAH1} = \alpha^{HS}_{DAH1}$)

- H_{10} : Equality between impacts 1 day before and after holidays across SH/SZ and HSCE/HS markets ($\alpha^{SH}_{DBH1} = \alpha^{SZ}_{DBH1} \cap \alpha^{SH}_{DAH1} = \alpha^{SZ}_{DAH1}$ and $\alpha^{HSCE}_{DBH1} = \alpha^{HS}_{DBH1} \cap \alpha^{HSCE}_{DAH1} = \alpha^{HS}_{DAH1}$)

- H_{11} : Impacts up to 2 days before and after holidays on returns jointly not significant for j=SH/SZ/HSCE/HS markets ($\alpha^j_{DBH1} = \alpha^j_{DBH2} = \alpha^j_{DAH1} = \alpha^j_{DAH2} = 0$)

[17] Such hypothesis testings are carried out by means of standard Wald statistics with heteroscedasticity-robust covariance matrix of the parameter estimates with two, three and four degrees of freedom.

- H_{12} : *Impacts up to 2 days before and after holidays on conditional volatility for one market jointly not significant* ($\gamma^{j}_{DBH1} = \gamma^{j}_{DBH2} = \gamma^{j}_{DAH1} = \gamma^{j}_{DAH2} = 0$ *for j=SH/SZ/HSCE/HS)*

V Empirical Analysis

V.1 Results

We start the empirical analysis by evaluating whether daily returns occurring 1, 2 and 3 days before and after holidays - as captured by the variables $DH_{i,t}$ - are statistically greater than returns on days non-adjacent to holidays. Empirical estimates for eqs.(1) are reported in Table 3. We find that daily returns on days immediately adjacent to holidays are strongly significant and always positive, with greater magnitude for close-to-close in comparison to open-to-close returns. Such impacts fade away after 1 day except for the SH and SZ open-to-close returns where the effects last up to 2 days adjacent to holidays. For instance, close-to-close returns in the Chinese markets for 1 one day adjacent to holidays are 40 and 47% higher than average returns, whereas open-to-close returns are 30 and 33% higher in the second day adjacent to holidays. Thus, in line with McGuinness and Harris (2011), we find that such effects are short-lived and confined to days immediately adjacent to holidays. The above patterns hold after controlling for possible spill-over effects from the US markets, the business cycle - as proxied by fluctuations in GDP growth and interest rates - as well as the presence of DoW and ToM effects.

We soundly reject the null that the above impacts are not significant (hypothesis H_5) for the four markets under scrutiny. When we test for equality of impacts 1 and 2 days adjacent to holidays (hypothesis H_1) for the two Chinese markets, we fail to reject the null at standard significance levels, whereas the same null is soundly rejected for the Hong-Kong markets close-to-close returns. The tests for equality of such impacts across markets for the day immediately adjacent to holidays (hypotheses H_2) reject the null but only for open-to-close returns. However, when we extend the time horizon to 2 days around holidays (hypotheses H_3 and H_4) we consistently fail to reject the null at standard significance levels. This result highlights the strong pair-wise co-movements between the two Chinese markets, as well as the Hong-Kong markets in periods adjacent to holidays, and provides evidence in favor of Kim and Park's (1994) hypothesis. Such evidence is very strong for close-to-close returns, and somehow less clear-cut for open-to-close returns. The stark difference in the price behavior of Chinese and HSCE indices lends instead support to Cadsby and Rather's (1992) argument that different holiday effects might originate from country-specific institutional practices.

TABLE 3 HERE

The diagnostic statistics reported in the bottom panel of the same table suggest that data in our sample are not well-behaved, with severe heteroscedasticity and serial correlation in the residuals. Thus, we repeat the above analysis by using the GARCH specifications of eqs.(3)-(4) which account for serial correlation, conditional heteroscedasticity and distributions with fat tails. Such specifications allow us to examine whether the above holiday impacts survive once we account for forms of ARMA dynamics not modelled in the previous analysis. In the light of the multi-modality issues raised by Doornik and Oms (2008), we conduct such analysis in a 2-stage setting by adopting the most parsimonious models which include only those dummy variables found significant in the previous estimations of Table 3 and omit the seasonal Dow and ToM effects previously considered.[18]

The empirical estimates set out in Table 4 show that the ARMA dynamics are significant and account for the strong serial correlation in the returns under scrutiny. Similarly, the modelling of conditional volatilities enables drastic reductions of cluster heteroscedasticity. Also in this case, we find strong and positive effects on returns 1 day adjacent to holidays. Such effects are similar those previously reported, even though smaller in magnitude. In fact, we soundly reject the null that the impacts up to 2 days adjacent to holidays are jointly not significant (hypotheses H_5) and fail to reject the null of equality of effects 1 and 2 days adjacent to holidays. We also find that the conditional volatilities of SH and SZ returns tend

[18]We adopt a general-to-specific approach and include in the final GARCH specifications only those holiday dummies that are statistically significant.

to increase during the day immediately adjacent to holidays with a partial correction occurring around the second day around holidays. The same link becomes much weaker for the HSCE market and it fades away for the HS market. Such evidence is supported by formal tests for the null that the impacts of days adjacent to holidays on volatilities are jointly not significant (hypothesis H_6), as we reject the null for the Chinese but not for the Hong-Kong indices.

TABLE 4 HERE

We then decompose the holiday effects into returns occurring either 1, 2 and 3 days before (DBH) or after (DAH) holidays. Empirical estimates set out in Table 5 suggest that such effects are positive and strongly significant for horizons up to 2 days before and 3 days after holidays. Their magnitude is similar to the estimates previously set out. Empirical tests consistently reject the null that returns 1 and 2 days before and after holidays are jointly equal to zero (hypotheses H_{11}) except for open-to-close returns in Chinese markets.[19] Tests for equality between impacts 1 day before and after holidays (hypothesis H_7) consistently fail to reject the null, suggesting the these last are symmetrical limited to days immediately adjacent to holidays.

The holiday impacts are, however, quite different across the four markets, and for close-to-close and open-to-close returns. For both the Chinese markets the impact of holidays is equally spread over 1 and 2 days before and after holidays for close-to-close, and the second and third day around holidays for open-to-close returns. Such pattern is completely reversed for the two Hong-Kong indices. For close-to-close returns, in fact, the holiday effects are mainly concentrated on the day immediately after holidays, whereas for open-to-close returns the main impact is deployed on the day prior to holidays. We find therefore weak evidence in favor of Ariel's (1990) inventory adjustment explanation, as the large post holidays returns - especially for close-to-close returns - suggest that short-selling positions are not re-instated on days immediately after festivities.

[19] However, in this last case, the holiday effects are mainly concentrated on the third day after holiday.

Tests for equality of impacts across markets 1 day before, 1 day after, and jointly 1 day before and after holidays (hypotheses H_8, H_9 and H_{10}) consistently fail to reject the null for both the Chinese and Hong-Kong markets.[20] The above tests show that the two Chinese and Hong-Kong markets tend to move in lock-step during the days immediately adjacent to festivities. Also in this case, the similar pair-wise dynamics of Chinese, and Hong-Kong indices, lend further support to Kim and Park's (1994) hypothesis. Such evidence is particularly strong for close-to-close returns, and slightly weaker for open-to-close. Moreover, the different dynamics between Chinese and HSCE indices corroborates Cadsby and Rather's (1992) hypothesis.

We then repeat the above analysis by using the GARCH specifications of eqs.(5)-(6). Empirical results set out in Table 6 show that, also in this case, holiday effects survive even after controlling for the presence of ARMA processes in the return series - with sign and magnitude similar to the estimates previously set out and overall strength somehow reduced. In fact, the null that the impacts on returns of days before and after holidays are jointly not significant (hypotheses H_{11}) is consistently rejected, with the only exception being the Shanghai close-to-close returns. Moreover, in line with the results previously set out, we find that statistical tests consistently fail to reject the null of equality between the impacts 1 day before and after holidays (hypothesis H_7) at standard significance levels. Focussing now on the conditional volatilities in the four markets, we find that these last tend to peak on days after holidays and decrease on days before holidays, with the overall impact which remains positive. Such pattern of results is particularly strong for the Chinese and weaker for the Hong-Kong indices. In fact, we reject the null H_{12} for the former but not for the latter markets.

We then carry out three different robustness checks. Firstly, we re-estimate eqs.(1)-(2) using Weighted Least Squares.[21] Secondly, we conduct a similar estimation exercise on a restricted dataset in which the residual generated by the above regressions can take values within their mean plus/minus three times the

[20] With the only exception being for the null of equality 1 day after holiday for the Chinese markets with open-to-close returns.

[21] The weights are calculated as the inverse of the residuals originated from eq.(1) and (1) taken in absolute value.

standard deviation.[22] Thirdly, as previous studies have highlighted the significant impact of CLNY days in both Chinese and Hong-Kong markets, we re-estimated the above specifications by considering only the NY, Labour and National holidays (see, e.g., McGuinness and Harris (2011)). In all the above estimation exercises we obtain patterns of results very similar to those previously set out.

All in all, the above results suggest that the holiday effects are positive and significant for days immediately adjacent to holidays. For the Chinese markets, such impacts are balanced between days prior and following holidays. For the Hong-Kong markets such pattern is reversed with calendar effects concentrated on one day before holidays for close-to-close, and on one day after for open-to-close returns. We find evidence that the two Chinese, and the two Hong-Kong markets, move in lock-step during days adjacent to holidays - so that both the Cadsby and Rather (1992), and Kim and Park's (1994) hypotheses hold.

TABLES 5 AND 6 HERE

V.2 Individual impacts

The results set out in the previous section provide a broad brush picture which does not enable us to capture differences in sign, magnitude and significance over time among the four festivities. The period under analysis, however, is characterized by a sequence of bull markets interspersed with the burst of the Dot.com bubble, the Subprime Crisis, and the 2015 turbulence in Chinese markets - so that we would expect substantial time variability in the above impacts. We, therefore, shed light on some features of the time varying impact of individual festivities by carrying out joint estimates of eq.(7). We then compute the returns obtained from three different trading rules designed around the four festivities where an initial portfolio of 100 CNY (or HK$) is invested over the period 2002-2017. The first trading rule (denoted by TR_B) consists of buying a specific index (i.e. the SH, SZ, HSCE or HS) two trading days prior to holidays and sell it back the first trading day following holidays. The second rule (denoted by TR_A)

[22] In these cases, the reduction in the number of observations available is of the order of 70 data points.

consists of buying the same index one trading day before holidays and sell it back the second trading day after holidays. The third (denoted by $TR_{B\&A}$) consists of buying two trading days before holidays and sell back the second trading day after holidays. We compute the above individual impacts and trading rules for both the close-to-close and open-to-close returns. Within each market, the individual impacts on the two types of returns are very similar, with their correlations being all positive and of the order of 0.9 or above.[23] We find that the same degree of similarity holds also for the cumulated returns obtained from the trading rules applied to the two return specifications. These last, in fact, present very similar dynamics over time, with patterns of correlation which replicate those already highlighted for individual impacts. In the light of these similarities, we decide to focus the analysis on close-to-close returns only.[24]

The histograms of Figures from 2 to 5 report the estimated individual holiday effects, where each bar corresponds to the impact of a specific holiday in a given year. Individual impact not significant at the 5% level are simply omitted from the histograms. These figures show that such impacts are almost always significant, and they fluctuate in sign and magnitude. The size of positive impacts is greater than that of negative impacts, especially for Labour and National days - so that the average impacts are guaranteed to be positive for the four markets.

The middle and lower panels of the same figures report the cumulated returns obtained from the above trading rules, whereas the Sharpe ratios computed for the same rules are reported in Table 7. Empirical results show that the such rules yield positive and increasing cumulated profits, with Sharpe ratios which are sizeable shares of those obtained from the buy-and-hold strategies. Trading rules based on both days before and after holidays yield strongly positive risk-adjusted returns which are sizeable shares of the total returns obtained from buy-and-hold rules.[25] The same rules based on days before holiday consistently deliver better risk-return profiles when applied to Chinese indices, whereas the evidence for Hong-Kong

[23]There are only two cases involving DAH effects in the close-to-close HS index where such correlations are close to zero.

[24]Empirical results for individual holiday impacts and trading rules based on open-to-close returns are available from the author upon request.

[25]The only exception is the risk-adjusted returns generated by the HSCE index limitedly to CLNY which are negative.

indices is more mixed - with rules tailored around days after holidays that yield better risk-return profiles but limitedly to the Labour and National days.

The impacts of New Year's days are set out in the upper panel of Fig. 2. On average, they take positive sign for 9 out of 16 years in the Chinese, and for 11 out of 14 years in the Hong-Kong markets, with similar trends occurring for returns preceding and following holidays. All in all, empirical estimates highlight a clear pattern of positive and strong impacts over the last 7 years of the sample especially for the Hong-Kong markets - with two severe negative impacts which occurred in the years 2009 and 2016. The cumulated impact over the entire period for the HSCE and HS markets is fairly strong, of the order of 22.7 and 13.7 basis points, whereas the same impact for the Shanghai and Shenzhen markets is as small as 1.11 and -2.38.[26] The above trends translate into increasing returns generated by the trading rules previously defined, especially for those based on days after holidays (A) applied to HSCE and HS indices. All in all, limitedly to the New Year's day the Hong-Kong indices are by far the most profitable in comparison with the Chinese indices - which are severely affected by two large drops that took place during the 2009 and 2016 New Year days.

The Labor and National days are the festivities which deliver the highest number of positive impacts, with peaks of 12 positive returns out of 16 festivities for the Chinese markets, and 10 out of 12 for the Hong-Kong markets. The two festivities deliver consistently very strong cumulated impacts, as large as 14 and 18 basis points for the Chinese markets, and 13 and 12 for the Hong-Kong markets. The total cumulated returns obtained from the three trading rules are increasing and strongly positive, especially for the last 10 years of the sample. In line with the above results, rules based on trading after holidays deliver similar risk-adjusted profits for the four markets, whereas rules based on days prior to holidays deliver higher profits for the Chinese markets. The trading rules designed around the Labor and National day deliver very large shares of the total returns generated by buy-and-hold strategies. For instance, the

[26] Cumulated impacts are calculated in excess to average returns as the sum of the dummy coefficients minus the constant term of eq.(7).

rule TR_B applied to the Shanghai index deliver a Sharpe ratio almost 3 times as large as that generated by the related buy-and-hold strategy, whereas the TR_A rules applied to the HS index generate Sharpe ratios on average 5 times as large as that of the buy-and-hold rule.

The CLNY presents a number of positive holiday impacts in line with the previous festivities, with an average of 10 and 11 positive returns for the Chinese and Hong-Kong markets, respectively. Despite this similarity, the cumulated effects across the four markets are much weaker than the those for the Labor and National days - as they discount two strong drops coinciding with the 2008 Subprime Crisis and the 2015 stock market turbulence. The above evidence holds especially for the HSCE and HS indices, whereas for the Chinese indices such impacts are less severe - and it can explain the weak aggregate impact found by some studies on Chinese and Hong-Kong markets (see, e.g., Yuan and Gupta (2014)). The cumulated impact is the second lowest for the Shanghai and Shenzhen (3.4 and 3.9 basis points), and the lowest (-2.5 and -2.3) for the HSCE and HS markets. The cumulated returns obtained from the three trading rules show two drastic drops in correspondence with the 2008 and 2015 crashes, with some forms of recovery taking place during the remaining years of the sample - with the exception of the SZ index which achieves peaks as high as 16%. This finding corroborates the results set out in Table 7 which show that the rules based on CLNY - with the only exception of the SZ index - consistently yield the lowest risk-adjusted returns. *The CLNY, however, is also the festivity that seems to be the most sensitives to the 2008 and 2015 sharp drops in stock prices. In fact, when we remove the effects of such episodes we find that the trading rules designed around CLNY days deliver the second highest cumulated profits for the Hong-Kong markets, with a substantial increase in cumulated returns occurring across the four markets.*

We then fatherly dissect the CLNY effects by investigating whether they are dependent on the turn-of-the-month effect. We do so by examining the pre- and post-CLNY returns for years when the holiday periods fall entirely on January, and for years in which the same holiday periods begin in January but end in February, or fall entirely on February. Our results show that such effects are very strong and positive for holiday periods falling on January, whereas the same effects become much weaker when the holiday *periods overlap with February. This pattern of results is strong for both close-to-close and open-to-close returns in the two Chinese markets, whereas the same evidence for the Hong-Kong markets is limited to close-to-close returns.*[27]

Table 8 reports the correlation between individual holiday effects in the two Chinese, the two Hong-Kong, and the Shanghai and HSCE indices. Such figures show that there is strong co-movement between such impacts in the Chinese, as well as the Hong-Kong indices - with correlations spanning from 0.87 to 0.95 for the former, and from 0.58 to 0.93 for the latter. On the contrary, the cross correlations between the Shanghai and HSCE indices are much weaker, especially for returns adjacent to Labour and National days. A similar pattern of results holds for the streams of cumulative returns generated by the three trading rules previously considered. These figures provide further evidence that the Chinese - as well as the Hong-Kong indices - tend to move in lock-step during days adjacent to holidays, whereas the link between the Shanghai and HSCE indices is much weaker. Thus, we obtain further support for both the Kim and Park (1994) and Cadsby and Ratner's (1992) hypotheses.[28]

All in all, the above results suggest that pre- and post-holidays effects are significant and time varying, characterized by trends which are increasing over time and holiday specific. The festivities with stronger impacts are the Labor and National days, whereas the CLNY days deploy the weakest effects. These results are at odds with the evidence on Western markets which shows that the holiday effects have disappeared since the late 1990s (see, e.g., Keef and Roush (2005)). We also find strong pair-wise co-movement between the two Chinese as well as the two Hong-Kong markets in periods adjacent to holidays. The application of simple trading rules designed around the four holidays shows that investors can reap substantial risk-adjusted profits in both the Chinese and Hong-Kong markets, especially for some specific festivities

[27] For instance, the average close-to-close returns for holiday periods falling entirely in January is 0.538 and 1.061 for the Shanghai and Shenzhen indices, as opposed to 0.202 and 0.489 for periods overlapping with February.

[28] *The gap between the closing time of the Chinese (3:30pm) and Hong-Kong markets (4:00pm) introduces an element of non-synchronicity which might potentially explain the different dynamics in holiday effects found in the SH and HSCE indices. However, the figures reported in Table 8 suggest that this hypothesis is quite implausible. In fact, it seems quite unlikely that the very high correlations between HSCE and HS - of the order of 0.9 - are exclusively the by-product of price co-movements occurring within the time slot 330-4pm.*

such as the Labour and National days.

TABLE 7 HERE

FIGURES FROM 2 TO 5 HERE

V.3 Bootstrapping

The reported diagnostic statistics show that the residuals obtained from the estimation of eqs.(1)-(2) and (7) are strongly leptokurtic and serially correlated. Moreover, eq.(7) implies the estimation of as many as 120 parameters, leading to a fast depletion of the degrees of freedom in our sample. Thus, the reliance on asymptotic confidence intervals might lead to incorrect conclusions. We, therefore, investigate the finite sample properties of the above estimators by carrying out bootstrap analyses. More specifically, we generate artificial series of the SH, SZ, HSCE and HS close-to-close and open-to-close returns by re-sampling in blocks of 10 observations the original residuals obtained from eqs.(1)-(2) and (7). We then use the generated series to work out estimates of the same equations. We repeat the above re-sampling scheme 1,999 times so that we can construct the empirical distributions of the above parameters.

A common feature of the empirical distributions so obtained is that they are moderately leptokurtic, suggesting departures of the above estimators from their asymptotic properties. In fact, the K-S statistics reject the null of normality for a relatively large set of parameters in eqs.(1)-(2).[29] Given the above evidence, bootstrapped confidence intervals could be a better tool than asymptotic intervals to carry out statistical inference. We, therefore, use the above empirical distributions to construct Bias-Corrected (BC) intervals at the 5% confidence level (see DiCiccio and Efron (1996)). Such confidence intervals for eqs.(1)-(2) are set out in Tables 3 and 5. For purposes of comparison, we also compute the bootstrap percentile

[29] For example we find departures from normality for the parameters α^{SH}_{DBH1}, α^{SH}_{DBH2}, α^{SH}_{DAH1}, α^{SH}_{DAH2} , α^{SH}_{DAH3}, α^{SZ}_{DBH1}, α^{SZ}_{DBH2}, α^{SZ}_{DBH3}, α^{SZ}_{DAH1}, α^{SZ}_{DAH2}, α^{SZ}_{DAH3} of eqs.(2), as well as for α^{SH}_{DH1}, α^{SH}_{DH2}, α^{SH}_{DH3}, α^{SZ}_{DH1}, α^{SZ}_{DH2}, α^{SZ}_{DH3} of eqs.(1) applied to close-to-close returns.

intervals as well as asymptotic intervals.[30] The BC intervals differ only slightly from the percentile intervals as the average bootstrap coefficients are similar to the corresponding point estimates. This result suggests that there is negligible bias in the estimates of the parameters of the above equations. The BC confidence intervals present also similar size as those of asymptotic intervals, suggesting that the asymptotic standard deviations are only moderately biased. In fact, the bootstrap analysis provides a pattern of results very similar to that obtained by applying asymptotic inference.[31] All in all, the above results suggest that the finite sample properties of the above estimators depart from their asymptotic properties. However, such departures appear negligible, so that inference carried out on the basis of asymptotic and finite sample properties leads to similar conclusions.

VI Conclusions

The Chinese and Hong-Kong markets constitute an ideal setting to investigate whether shares with different attributes listed on similar markets, as well as shares with similar attributes listed on markets with different institutional features, can generate different holiday effects. We study the above hypotheses by gauging the impacts of the New Year, CLNY, Labour and National days on the Shanghai (SH), Shenzhen (SZ), Hang-Seng (HS) and HSCE composite indices, where this last tracks the price behavior of cross-listed Chinese shares. We carry out the analysis by considering both close-to-close and open-to-close daily returns to control for any building US market sentiments occurring during the China non-trading periods prior to early morning (HKT) market openings. While, in fact, the former might impound such sentiment effects, the latter should be largely free from the same.

Our empirical results suggest that the above festivities have positive and strongly significant impacts

[30] The BC, percentile and asymptotic intervals for eq.(7), as well as the percentile and asymptotic intervals for eqs.(1)-(2) are not reported to save space, but are available from the author upon request.

[31] The only differences relate to the parameters α_{INT}^{HSCE} of eq.(1), and α_{DAH3}^{SZ} and α_{DBH1}^{HS} of eqs.(2) which are significant at the 5% levels according to asymptotic t-stats, and that they become not significant when BC confidence intervals at 5% level are considered. We obtain similar evidence for a small set of parameters in eqs.(7).

on both close-to-close and open-to-close returns across the four markets which last up to 2 days adjacent to holidays. While the holiday effects in the Shanghai and Shenzhen markets take place on both days before and after festivities, the HSCE and HS markets show strong impacts confined to one day before or after holidays depending on the type of returns considered. Our results also suggest that the price behavior for days adjacent to holidays on the two Chinese, and the two Hong-Kong markets, present very similar dynamics - whereas the same price behavior characterizing the Shanghai and HSCE indices is different. We find therefore evidence in favour of both the Cadsby and Rather (1992) and Kim and Park's (1994) hypotheses that different holiday effects can be generated by different country-specific institutional practices, with little role played by differences in the attributes. We obtain, instead, weak evidence in favor of Ariel's (1990) inventory adjustment explanation for the Hong-Kong markets. *The above results hold, even though with slightly different dynamics, for both close-to-close and open-to-close returns - suggesting that US market sentiments occurring during non-trading periods prior to the opening of the Asian exchanges play a negligible role in shaping the patterns of holiday effects previously detected.*

While at the aggregate level such holiday effects are consistently positive, when we examine the individual impacts we find that they vary in sign and magnitude, with trends which present no signs of decline over time. The festivities that yield the strongest impacts are the NY, Labour and National days, with the CLNY being the most sensitive to the 2008 and 2015 crashes that affected the Asian markets. The streams of individual impacts move in lock-step in both the two Chinese and the two Hong-Kong markets, whereas we find that the co-movement between the holiday impacts on the Shanghai and HSCE indices is much weaker. We then measure the economic importance of the four festivities by computing three alternative rules which consist of trading the four indices in days adjacent to holidays. Empirical results show that such rules yield positive cumulated returns - especially for the last 10 years of the period - which are sizeable shares of the total risk-adjusted return obtained from buy-and-hold strategies. Also in this case, we find strong co-movement between the cumulated returns generated by the above rules for the two Chinese, and the two Hong-Kong indices, and a weaker link between the same returns in the Shanghai and HSCE indices. *These results provide further support to the hypothesis that different holiday effects can be generated by different market-specific institutional practices. What these market specific features are - and how they differ form market to market - are important questions. In the present context, the stark difference in the institutional features of the Chinese and Hong-Kong markets, for instance in terms of the mix of retail and institutional investors, could be at the basis of the different holiday impacts found in the Shanghai and HSCE indices.*

The result that holiday effects in the Chinese and Hong-Kong markets show no signs of decline is at odds with the existing literature for Western markets - which shows that such effects had gradually vanished since the late 1990s (see, e.g., Keef and Roush (2005)). This poses serious challenges on the market authorities as such holiday effects represent seasonal departures from informational efficiency which regulators should try to remove. This, however, could be a difficult task in the light of the results of this study which show that such effects are independent from the institutional features of the markets considered and the attributes of shares.

Table 1: Preliminary statistics for returns adjacent and non-adjacent to holidays.

	SH				SZ				HSCE				HS			
	Mean	**SD**	**SK**	**KURT**	**Mean**	**SD**	**SK**	**KURT**	**Mean**	**SD**	**SK**	**KURT**	**Mean**	**SD**	**SK**	**KURT**
r	0.018	1.644	-0.415	4.353	0.037	1.828	-0.595	2.996	0.046	1.910	-0.008	6.957	0.021	1.450	0.018	9.514
	(0.658)		(0.000)	(0.000)	(1.235)		(0.000)	(0.000)	(1.503)		(0.843)	(0.000)	(0.910)		(0.641)	(0.000)
r_{DH1}	0.381	1.696	-0.569	3.276	0.480	1.756	-0.979	5.020	0.512	2.077	-0.149	2.215	0.393	1.632	-0.200	2.374
	(2.510)		(0.010)	(0.000)	(3.054)		(0.000)	(0.000)	(2.597)		(0.528)	(0.000)	(2.538)		(0.395)	(0.000)
$r_{\overline{DH1}}$	0.005	1.641	-0.412	4.422	0.022	1.828	-0.584	2.966	0.031	1.910	0.000	7.402	0.010	1.443	0.021	9.885
	(0.189)		(0.000)	(0.000)	(0.711)		(0.000)	(0.000)	(0.969)		(0.991)	(0.000)	(0.431)		(0.601)	(0.000)
r	0.095	1.509	-0.280	3.507	0.123	1.718	-0.482	2.834	-0.044	1.406	0.018	6.975	-0.037	1.023	0.257	14.43
	(3.849)		(0.000)	(0.000)	(4.381)		(0.000)	(0.000)	(-1.937)		(0.651)	(0.000)	(-2.209)		(0.000)	(0.000)
r_{DH1}	0.207	1.457	-0.262	4.661	0.341	1.587	-1.327	6.419	0.392	1.5947	1.483	6.381	0.211	1.179	1.284	7.827
	(1.594)		(0.000)	(0.000)	(2.399)		(0.000)	(0.000)	(2.616)		(0.000)	(0.000)	(1.886)		(0.000)	(0.000)
$r_{\overline{DH1}}$	0.091	1.511	-0.263	3.485	0.115	1.722	-0.458	2.762	-0.056	1.403	-0.018	7.102	-0.044	1.018	0.204	14.75
	(3.625)		(0.000)	(0.000)	(4.035)		(0.000)	(0.000)	(-2.371)		(0.661)	(0.000)	(-2.632)		(0.000)	(0.000)

Notes: Sample period 01/01/2002 - 30/06/2017. r_{DH1}= returns on 1 day before and after holidays, $r_{\overline{DH1}}$= returns on all days except 1 day before and after holidays. MEAN = Test for the null that average mean over the full sample is equal to zero. SD = Standard deviation. SK = Test for the null that skewness is equal to zero. KURT= Test for the null that excess kurtosis is equal to zero. P-values in parentheses. Statistics for close-to-close returns set out in the upper panel. The same statistics for open-to-close returns reported in the lower panel.

Table 2: 2-sample *t*, Mann-Witney, Barnett-Eisen and Kolmogorov-Smirnov tests for equality in mean, median and distributions for returns adjacent and non-adjacent to holidays.

	SH				SZ				HSCE				HS			
	2-sample t	**M-W**	**B-E**	**K-S**	**2-sample t**	**M-W**	**B-E**	**K-S**	**2-sample t**	**M-W**	**B-E**	**K-S**	**2-sample t**	**M-W**	**B-E**	**K-S**
r_{DH1}; $r_{\overline{DH1}}$	2.376	2.546	15.27	1.394	2.814	2.941	6.863	1.446	2.460	2.708	10.66	1.272	2.493	2.939	9.727	1.323
	(0.018)	(0.005)	(0.001)	(0.021)	(0.005)	(0.002)	(0.076)	(0.015)	(0.014)	(0.003)	(0.014)	(0.039)	(0.013)	(0.001)	(0.021)	(0.031)
r_{DBH1}; $r_{\overline{DBH1}}$	1.655	1.936	4.441	1.073	2.148	1.794	3.149	1.001	0.834	1.075	3.913	0.863	0.834	1.085	1.739	0.699
	(0.098)	(0.026)	(0.217)	(0.098)	(0.032)	(0.041)	(0.369)	(0.731)	(0.404)	(0.141)	(0.271)	(0.272)	(0.404)	(0.138)	(0.628)	(0.356)
r_{DAH1}; $r_{\overline{DAH1}}$	1.424	1.647	12.85	1.512	2.023	2.409	9.286	1.358	2.280	2.694	11.31	1.399	2.492	3.345	10.02	1.508
	(0.155)	(0.047)	(0.005)	(0.011)	(0.043)	(0.008)	(0.026)	(0.025)	(0.023)	(0.004)	(0.011)	(0.019)	(0.013)	(0.001)	(0.018)	(0.011)
r_{DH1}; $r_{\overline{DH1}}$	1.020	0.893	3.054	0.631	1.673	1.715	3.185	0.831	3.026	3.183	9.343	1.613	2.281	2.254	5.789	0.759
	(0.308)	(0.185)	(0.383)	(0.410)	(0.094)	(0.043)	(0.363)	(0.247)	(0.002)	(0.001)	(0.025)	(0.005)	(0.023)	(0.012)	(0.122)	(0.306)
r_{DBH1}; $r_{\overline{DBH1}}$	2.176	1.031	0.565	0.858	2.176	1.076	4.182	0.776	2.633	2.303	9.596	1.166	2.230	2.023	6.747	0.907
	(0.030)	(0.151)	(0.904)	(0.226)	(0.030)	(0.141)	(0.242)	(0.291)	(0.009)	(0.011)	(0.022)	(0.066)	(0.026)	(0.021)	(0.079)	(0.191)
r_{DAH1}; $r_{\overline{DAH1}}$	1.748	0.287	5.979	0.668	2.149	1.385	11.19	1.317	1.725	1.815	4.041	1.166	1.070	1.136	2.332	0.883
	(0.081)	(0.387)	(0.112)	(0.331)	(0.032)	(0.083)	(0.011)	(0.031)	(0.085)	(0.034)	(0.257)	(0.065)	(0.285)	(0.128)	(0.506)	(0.245)

Notes: Sample period 01/01/2002 - 30/06/2017. r_{DH1}= returns on 1 day before and after holidays, $r_{\overline{DH1}}$= returns on all days except 1 day before and after holidays, r_{DBH1}= returns on 1 day before holidays, $r_{\overline{DBH1}}$= returns on all days except 1 day before holidays, r_{DAH1}= returns on 1 day after holidays, $r_{\overline{DAH1}}$= returns on all days except 1 day after holidays. 2-sample = t-test for the null of equality in mean. M-W = Mann-Witney test for the null of equality in median. B-E = Barnett-Eisen (1982) test for the null of no difference in distribution. K-S = Kolmogorov - Smirnov test for the null of no difference in distribution. Asymptotic p-value in parentheses. Statistics for close-to-close returns set out in the upper panel. The same statistics for open-to-close returns reported in the lower panel.

Table 3: Empirical estimates of holiday effects 1, 2 and 3 days before and after holidays.

	close-to-close		open-to-close		close-to-close		open-to-close	
	SH	**SZ**	**SH**	**SZ**	**HSCE**	**HS**	**HSCE**	**HS**
α_0	-0.165	-0.138	0.024	-0.019	0.027	-0.037	-0.014	-0.049 *
	(0.116)	(0.130)	(0.109)	(0.124)	(0.046)	(0.034)	(0.039)	(0.027)
	[-0.315; 0.111]	[-0.343; 0.161]	[-0.197; 0.239]	[-0.264; 0.233]	[-0.054; 0.107]	[-0.087; 0.026]	[-0.092; 0.068]	[-0.108 0.006]
α_{DH1}	0.404 ***	0.474 ***	0.129	0.247	0.589 ***	0.520 ***	0.484 ***	0.294 ***
	(0.149)	(0.166)	(0.138)	(0.157)	(0.173)	(0.127)	(0.139)	(0.097)
	[0.160; 0.727]	[0.169; 0.789]	[-0.147; 0.405]	[-0.069; 0.559]	[0.351; 0.986]	[0.294; 0.731]	[0.211; 0.762]	[0.095 0.488]
α_{DH2}	0.249	0.293 *	0.297 **	0.335 **	-0.132	0.032	-0.001	0.080
	(0.149)	(0.166)	(0.138)	(0.157)	(0.173)	(0.127)	(0.140)	(0.097)
	[-0.079; 0.495]	[-0.079; 0.548]	[0.022; 0.577]	[0.017; 0.653]	[-0.308; 0.322]	[-0.226; 0.224]	[-0.277; 0.282]	[-0.110 0.275]
α_{DH3}	0.204	0.220	0.169	0.185	-0.124	0.017	-0.105	-0.019
	(0.149)	(0.166)	(0.139)	(0.158)	(0.173)	(0.127)	(0.139)	(0.097)
	[-0.150; 0.425]	[-0.071; 0.379]	[-0.105; 0.452]	[-0.133; 0.503]	[-0.420; 0.254]	[-0.309; 0.168]	[-0.383; 0.178]	[-0.214 0.172]
$\alpha_{S\&P}$	0.154 ***	0.155 ***	-0.031	-0.023	0.400 ***	0.395 ***	-0.062 ***	-0.057 ***
	(0.021)	(0.023)	(0.019)	(0.022)	(0.022)	(0.016)	(0.018)	(0.012)
	[0.101; 0.181]	[0.097; 0.179]	[-0.070; 0.011]	[-0.074; 0.023]	[0.392; 0.475]	[0.350; 0.409]	[-0.106; -0.020]	[-0.082 -0.029]
α_{INT}	-0.002	-0.002	-0.001	-0.001	-0.017 ***	-0.018 ***	-0.001	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.005)	(0.005)	(0.004)
	[-0.006; 0.001]	[-0.006; 0.002]	[-0.010; 0.008]	[-0.006; 0.011]	[-0.024; 0.002]	[-0.024; -0.005]	[-0.018; 0.010]	[-0.015 0.009]
α_{GDP}	0.018	0.018	0.000	0.005	-0.001	0.004	-0.005	0.002
	(0.012)	(0.013)	(0.011)	(0.012)	(0.009)	(0.006)	(0.007)	(0.005)
	[-0.011; 0.036]	[-0.019; 0.036]	[-0.023; 0.023]	[-0.029; 0.037]	[-0.019; 0.015]	[-0.007; 0.016]	[-0.023; 0.015]	[-0.015 0.016]
α_{FEB}	-	0.138 ***	-	-	-	-	-	-
	(-)	(0.049)	(-)	(-)	(-)	(-)	(-)	(-)
		[0.064; 0.533]						
α_{DEC}	0.124 ***	-	0.112 ***	-	-	-	-	-
	(0.039)	(-)	(0.035)	(-)	(-)	(-)	(-)	(-)
	[-0.040; 0.333]		[0.039; 0.188]					
α_{THU}	-0.176 ***	-0.205 ***	-	-	-	-	-0.106 *	-0.061
	(0.067)	(0.075)	(-)	(-)	(-)	(-)	(0.058)	(0.040)
	[-0.320; -0.071]	[-0.357; -0.075]					[-0.228; -0.010]	[-0.143; 0.028]
α_{MAY}	-	-	-	0.101 **	-	-	-	-
	(-)	(-)	(-)	(0.041)	(-)	(-)	(-)	(-)
				[0.015; 0.185]				
α_{TUE}	-	-	-	0.065 **	-	-	-	-
	(-)	(-)	(-)	(0.031)	(-)	(-)	(-)	(-)
				[0.003; 0.133]				
α_{WED}	-	0.038	0.145 **	0.194 ***	-	-	-	-
	(-)	(0.032)	(0.064)	(0.073)	(-)	(-)	(-)	(-)
		[-0.014; 0.276]	[0.019; 0.275]	[0.050; 0.340]				
α_{FRI}	-	-	0.066	0.045	-	-	-	-
	(-)	(-)	(0.064)	(0.073)	(-)	(-)	(-)	(-)
			[-0.066; 0.193]	[-0.103; 0.189]				
α_{APR}	-	-	-	-	-	0.078	-	-
	(-)	(-)	(-)	(-)	(-)	(0.047)	(-)	(-)
						[0.004; 0.289]		
α_{AUG}	-	-	-	-	-	-	-0.068	-
	(-)	(-)	(-)	(-)	(-)	(-)	(0.056)	(-)
							[-0.180; 0.050]	
R^2	0.021	0.021	0.009	0.011	0.085	0.114	0.011	0.016
H_1	0.559	0.611	0.756	0.161	8.961	7.574	6.259	2.511
	(0.454)	(0.434)	(0.384)	(0.688)	(0.003)	(0.006)	(0.123)	(0.113)
H_2	1.024		3.428		0.442		4.215	
	(0.311)		(0.064)		(0.506)		(0.041)	
H_3	0.417		0.359		2.514		0.767	
	(0.518)		(0.548)		(0.113)		(0.381)	
H_4	1.394		3.718		3.023		5.101	
	(0.999)		(0.998)		(0.963)		(0.825)	
H_5	4.922	5.484	2.674	6.796	6.176	8.351	6.084	4.819
	(0.007)	(0.004)	(0.068)	(0.033)	(0.002)	(0.000)	(0.002)	(0.007)
Q(4)	19.59	28.05	20.96	8.278	10.19	34.09	27.44	33.36
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LM(8)	31.07	34.44	31.96	16.37	14.83	44.28	29.78	55.43
	(0.005)	(0.002)	(0.004)	(0.291)	(0.389)	(0.000)	(0.008)	(0.000)
$Q^2(4)$	417.2	544.1	414.3	520.6	1493	2019	966.1	1361
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ARCH(4)	283.7	350.1	276.4	331.6	807.4	1036	560.6	813.5
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIGN	1.863	7.846	3.659	7.738	2.902	3.072	2.433	1.311
	(0.133)	(0.000)	(0.012)	(0.000)	(0.033)	(0.026)	(0.062)	(0.268)

Notes: SUR empirical estimates of eq.(1) for j=SH, SZ, HSCE and HS. Sample period 01/01/2002 - 30/06/2017. Standard deviations in parentheses. * (**) [***] statistically significant at 10% (5%) [1%] level. Bootstrapped Bias-Corrected confidence intervals at 5% level in squared brackets (DiCiccio and Efron (1996)). Q(4) and $Q^2(4)$ are LjungBox statistics for serial correlation up to lag 4 in residuals and squared residuals. LM(8) is the LM test for serial correlation in residuals up to lag 8. ARCH(4) is the ARCH LM test for heteroscedasticity in residuals up to lag 4. SIGN is the Sign Bias test for joint significance of $I(e_t^j < 0)$, $I(e_t^j < 0)e_t^j$ and $[1 - I(e_t^j < 0)]e_t^j$ for j=SH,SZ,HS and HSCE. $I(e_t^j < 0)$ is an indicator variable which takes value 1 if $e_t^j < 0$, and zero otherwise. P-values in parentheses.

Table 4: Empirical estimates of ARMA-GARCH for holiday effects 1, 2 and 3 days before and after holidays.

	close-to-close		**open-to-close**		**close-to-close**		**open-to-close**	
	SH	**SZ**	**SH**	**SZ**	**HSCE**	**HS**	**HSCE**	**HS**
α_0	0.003	-0.006	0.120 ***	0.023	0.023	0.018	-0.036 ***	-0.047 ***
	(0.041)	(0.013)	(0.035)	(0.019)	(0.029)	(0.023)	(0.012)	(0.018)
α_{DH1}	0.269 **	0.327 ***	0.083	0.218	0.418 **	0.167 ***	0.281 ***	0.115 ***
	(0.126)	(0.125)	(0.086)	(0.141)	(0.168)	(0.057)	(0.090)	(0.040)
α_{DH2}	0.398 **	0.237 *	0.387 **	0.289 ***	-	-	-	-
	(0.169)	(0.123)	(0.161)	(0.089)	(-)	(-)	(-)	(-)
α_1	0.285 ***	0.532 ***	0.477 ***	0.017	0.246	0.847 ***	0.414 ***	0.694 ***
	(0.086)	(0.099)	(0.028)	(0.068)	(0.215)	(0.055)	(0.083)	(0.046)
α_2	-0.719 ***	-0.451 ***	-0.911 ***	-0.106	-0.028 *	-0.743 ***	-	-0.783 ***
	(0.077)	(0.096)	(0.026)	(0.075)	(0.016)	(0.052)	(-)	(0.037)
α_3	-	0.597 ***	-	0.773 ***	-0.037 ***	-0.053 ***	-	-0.049 ***
	(-)	(0.075)	(-)	(0.077)	(0.010)	(0.009)	(-)	(0.009)
α_4	-	-	-	-	-	-	-	-0.079 ***
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(0.009)
θ_1	-0.269 ***	-0.471 ***	-0.544 ***	-0.017	-0.194	-0.862 ***	-0.430 ***	-0.780 ***
	(0.087)	(0.104)	(0.031)	(0.071)	(0.214)	(0.056)	(0.081)	(0.048)
θ_2	0.683 ***	0.397 ***	0.952 ***	0.099	-	0.773 ***	-0.069 ***	0.794 ***
	(0.081)	(0.098)	(0.026)	(0.078)	(-)	(0.052)	(0.011)	(0.041)
θ_3	0.057 ***	-0.533 ***	-0.048 ***	-0.763 ***	-	-	-	-
	(0.012)	(0.081)	(0.012)	(0.078)	(-)	(-)	(-)	(-)
γ_0	0.013 ***	0.032 ***	0.010 ***	0.030 ***	0.035 ***	0.017 ***	0.015 ***	0.009 ***
	(0.003)	(0.005)	(0.003)	(0.004)	(0.007)	(0.003)	(0.003)	(0.002)
γ_1	0.064 ***	0.063 ***	0.060 ***	0.067 ***	0.079 ***	0.062 ***	0.058 ***	0.050 ***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
γ_2	0.933 ***	0.927 ***	0.937 ***	0.922 ***	0.909 ***	0.928 ***	0.933 ***	0.941 ***
	(0.004)	(0.005)	(0.004)	(0.006)	(0.008)	(0.006)	(0.006)	(0.006)
γ_{DH1}	0.358 ***	0.349 **	0.244 ***	0.239 *	0.315 **	0.124	0.123	0.029
	(0.076)	(0.144)	(0.092)	(0.127)	(0.136)	(0.077)	(0.088)	(0.046)
γ_{DH2}	-0.360 ***	-0.288 *	-0.234 **	-0.150	-0.186	-0.142 *	-0.075	-0.056
	(0.075)	(0.151)	(0.094)	(0.136)	(0.141)	(0.082)	(0.091)	(0.047)
R^2	0.009	0.014	0.012	0.005	0.006	0.007	0.009	0.020
H_1	0.961	0.289	8.895	0.292	-	-	-	-
	(0.326)	(0.591)	(0.003)	(0.589)	(-)	(-)	(-)	(-)
H_5	6.192	9.672	9.126	10.59	-	-	-	-
	(0.045)	(0.008)	(0.011)	(0.005)	(-)	(-)	(-)	(-)
H_6	25.30	6.026	7.061	4.373	6.271	3.017	2.659	2.439
	(0.000)	(0.049)	(0.029)	(0.112)	(0.043)	(0.221)	(0.264)	(0.295)
Q(4)	4.203	5.897	5.415	4.223	11.66	15.64	7.552	10.75
	(0.379)	(0.207)	(0.247)	(0.377)	(0.021)	(0.004)	(0.111)	(0.031)
$Q^2(4)$	3.151	2.503	4.185	2.342	15.42	14.62	1.196	1.481
	(0.533)	(0.644)	(0.382)	(0.673)	(0.004)	(0.006)	(0.879)	(0.831)
ARCH(4)	3.130	2.464	4.096	2.278	15.95	14.94	1.212	1.445
	(0.536)	(0.651)	(0.393)	(0.684)	(0.003)	(0.005)	(0.876)	(0.836)

Notes: Maximum Likelihood estimates of eqs.(3)-(4) for j=SH, SZ, HSCE and HS. Sample period 01/01/2002 - 30/06/2017. Standard deviations in parentheses. * (**) [***] statistically significant at 10% (5%) [1%] level. Q(4) and $Q^2(4)$ are LjungBox statistics for serial correlation up to lag 4 in standardized residuals and squared residuals. ARCH(4) is the ARCH LM test for heteroscedasticity in standardized residuals up to lag 4. P-values in parentheses.

Table 5: Empirical estimates of holiday effects 1, 2 and 3 days before or after holidays.

	close-to-close		open-to-close		close-to-close		open-to-close	
	SH	SZ	SH	SZ	HSCE	HS	HSCE	HS
α_0	-0.155	-0.129	0.064	0.036	0.027	-0.037	-0.014	-0.049 *
	(0.117)	(0.130)	(0.108)	(0.123)	(0.045)	(0.034)	(0.039)	(0.027)
	[-0.292; 0.117]	[-0.316; 0.186]	[-0.152; 0.277]	[-0.214; 0.281]	[-0.071; 0.099]	[-0.097; 0.022]	[-0.086; 0.049]	[-0.093; -0.001]
α_{DBH1}	0.409 *	0.395 *	0.257	0.282	0.450 *	0.361 **	0.615 ***	0.407 ***
	(0.209)	(0.233)	(0.194)	(0.221)	(0.243)	(0.179)	(0.195)	(0.135)
	[0.049; 0.827]	[-0.024; 0.831]	[-0.128; 0.642]	[-0.154; 0.718]	[-0.126; 0.829]	[-0.110; 0.597]	[0.104; 0.822]	[0.041; 0.567]
α_{DBH2}	0.470 **	0.393 *	0.368*	0.280	0.009	0.167	0.039	0.144
	(0.210)	(0.234)	(0.193)	(0.220)	(0.243)	(0.179)	(0.196)	(0.136)
	[0.101; 0.901]	[-0.073; 0.798]	[0.012; 0.748]	[-0.157; 0.720]	[-0.500; 0.456]	[-0.261; 0.447]	[-0.338; 0.399]	[-0.172; 0.378]
α_{DBH3}	0.059	0.006	0.083	0.054	0.076	0.071	0.045	0.055
	(0.209)	(0.233)	(0.193)	(0.220)	(0.243)	(0.179)	(0.195)	(0.135)
	[-0.352; 0.441]	[-0.574; 0.319]	[-0.298; 0.463]	[-0.386; 0.494]	[-0.198; 0.771]	[-0.350; 0.389]	[-0.191; 0.544]	[-0.285; 0.256]
α_{DAH1}	0.397 *	0.587 **	0.005	0.216	0.729 ***	0.680 ***	0.353 *	0.180
	(0.209)	(0.232)	(0.193)	(0.220)	(0.243)	(0.179)	(0.195)	(0.135)
	[0.058; 0.846]	[0.147; 1.015]	[-0.378; 0.392]	[-0.222; 0.648]	[0.313; 1.251]	[0.301; 1.019]	[-0.012; 0.741]	[-0.117; 0.427]
α_{DAH2}	0.029	0.228	0.198	0.360	-0.274	-0.103	-0.043	0.016
	(0.209)	(0.233)	(0.194)	(0.221)	(0.243)	(0.179)	(0.195)	(0.136)
	[-0.464; 0.373]	[-0.342; 0.577]	[-0.246; 0.584]	[-0.076; 0.796]	[-0.586; 0.393]	[-0.494; 0.215]	[-0.281; 0.468]	[-0.293; 0.255]
α_{DAH3}	0.348 *	0.470 **	0.343*	0.425 *	-0.324	-0.037	-0.255	-0.093
	(0.209)	(0.232)	(0.193)	(0.220)	(0.243)	(0.179)	(0.195)	(0.135)
	[-0.164; 0.632]	[-0.258; 0.679]	[0.041; 0.722]	[0.007; 0.901]	[-0.897; 0.076]	[-0.466; 0.234]	[-0.708; 0.074]	[-0.433; 0.128]
$\alpha_{S\&P}$	0.155 ***	0.156 ***	-0.031	-0.023	0.400 ***	0.395 ***	-0.062 ***	-0.057 ***
	(0.021)	(0.023)	(0.019)	(0.022)	(0.022)	(0.016)	(0.018)	(0.012)
	[0.082; 0.182]	[0.089; 0.179]	[-0.074; 0.016]	[-0.066; 0.027]	[0.383; 0.427]	[0.338; 0.406]	[-0.119; -0.052]	[-0.111; -0.062]
α_{INT}	-0.002	-0.002	-0.001	-0.001	-0.017 ***	-0.018 ***	-0.001	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.005)	(0.005)	(0.004)
	[-0.006; 0.001]	[-0.007; 0.001]	[-0.005; 0.010]	[-0.013; 0.003]	[-0.025; -0.001]	[-0.024; -0.007]	[-0.008; 0.011]	[-0.010; 0-003]
α_{GDP}	0.018	0.018	0.000	0.005	-0.001	0.004	-0.005	0.002
	(0.012)	(0.013)	(0.011)	(0.013)	(0.009)	(0.006)	(0.007)	(0.005)
	[-0.014; 0.035]	[-0.028; 0.035]	[-0.031; 0.022]	[-0.020; 0.034]	[-0.015; 0.018]	[-0.006; 0.017]	[-0.014; 0.010]	[-0.003; 0.013]
α_{FEB}	-	0.131 *	-	0.194 ***	-	-	-	-
	(-)	(0.049)	(-)	(0.073)	(-)	(-)	(-)	(-)
		[0.045; 0.511]		[0.049 0.337]				
α_{DEC}	0.126	-	0.102 ***	-	-	-	-	-
	(0.094)	(-)	(0.035)	(-)	(-)	(-)	(-)	(-)
	[-0.053; 0.311]		[-0.010 0.210]					
α_{THU}	-0.186 ***	-0.210 ***	-	-	-	-	-0.104 *	-0.061
	(0.067)	(0.075)	(-)	(-)	(-)	(-)	(0.058)	(0.040)
	[-0.342; -0.083]	[-0.363; -0.077]					[-0.187; 0.033]	[-0.138; 0.024]
α_{MAY}	-	-	-	0.086 **	-	-	-	-
	(-)	(-)	(-)	(0.042)	(-)	(-)	(-)	(-)
				[0.001; 0.178]				
α_{TUE}	-	-	-	0.050	-	-	-	-
	(-)	(-)	(-)	(0.031)	(-)	(-)	(-)	(-)
				[-0.018; 0.110]				
α_{WED}	-	0.038	-0.007	-	-	-	-	-
	(-)	(0.032)	(0.027)	(-)	(-)	(-)	(-)	(-)
		[-0.013; 0.257]	[-0.074; 0.082]					
α_{FRI}	-	-	0.022	-0.011	-	-	-	-
	(-)	(-)	(0.062)	(0.071)	(-)	(-)	(-)	(-)
			[-0.197; 0.197]	[-0.158; 0.135]				
α_{APR}	-	-	-	-	-	0.082 *	-	-
	(-)	(-)	(-)	(-)	(-)	(0.048)	(-)	(-)
						[0.041; 0.330]		
α_{AUG}	-	-	-	-	-	-	-0.068	-
	(-)	(-)	(-)	(-)	(-)	(-)	(0.056)	(-)
							[-0.261; 0.025]	
R^2	0.022	0.020	0.009	0.009	0.086	0.115	0.011	0.015
H_7	1.428	0.911	0.854	0.045	0.671	1.616	0.905	1.527
	(0.232)	(0.339)	(0.355)	(0.832)	(0.412)	(0.203)	(0.343)	(0.221)
H_8	2.552		0.075		0.374		2.552	
	(0.110)		(0.783)		(0.541)		(0.109)	
H_9	1.775		5.489		0.113		1.775	
	(0.182)		(0.019)		(0.736)		(0.182)	
H_{10}	4.251		6.209		0.485		4.251	
	(0.999)		(0.999)		(0.998)		(0.998)	
H_{11}	2.062	2.509	1.543	1.661	2.623	3.276	2.509	2.062
	(0.054)	(0.019)	(0.159)	(0.126)	(0.015)	(0.003)	(0.019)	(0.054)
Q(4)	33.00	27.28	20.86	8.552	10.01	33.81	27.28	33.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LM(8)	55.74	29.75	27.27	15.41	14.83	43.85	29.75	55.74
	(0.000)	(0.008)	(0.054)	(0.566)	(0.389)	(0.000)	(0.008)	(0.000)
$Q^2(4)$	1357	964.4	416.7	518.4	1491	2014	964.4	1357
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ARCH(4)	814.5	559.6	277.7	330.6	806.5	1036	559.1	814.5
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIGN	1.292	2.431	3.604	8.576	2.956	3.057	2.431	1.292
	(0.275)	(0.063)	(0.012)	(0.000)	(0.031)	(0.027)	(0.063)	(0.275)

Notes: Notes: SUR empirical estimates of eq.(2) for j=SH, SZ, HSCE and HS. Sample period 01/01/2002 - 30/06/2017. Standard deviations in parentheses. * (**) [***] statistically significant at 10% (5%) [1%] level. Bootstrapped Bias-Corrected confidence intervals at 5% level in squared brackets (DiCiccio and Efron (1996)). Q(4) and $Q^2(4)$ are LjungBox statistics for serial correlation up to lag 4 in residuals and squared residuals. LM(8) is the LM test for serial correlation in residuals up to lag 8. ARCH(4) is the ARCH LM test for heteroscedasticity in residuals up to lag 4. SIGN is the Sign Bias test for joint significance of $I(\varepsilon_t^j < 0)$, $I(\varepsilon_t^j < 0)\varepsilon_t^j$ and $[1 - I(\varepsilon_t^j < 0)]\varepsilon_t^j$ for j=SH, SZ, HSCE and HS. $I(\varepsilon_t^j < 0)$ is an indicator variable which takes value 1 if $\varepsilon_t^j < 0$, and zero otherwise. P-values in parentheses.

Table 6: Empirical estimates of ARMA-GARCH models for holiday effects 1, 2 and 3 days before or after holidays.

	close-to-close		open-to-close		close-to-close		open-to-close	
	SH	**SZ**	**SH**	**SZ**	**HSCE**	**HS**	**HSCE**	**HS**
α_0	0.013	-0.002	0.066 **	0.304 ***	0.028	0.018	-0.031 ***	-0.046 ***
	(0.044)	(0.011)	(0.028)	(0.076)	(0.033)	(0.022)	(0.011)	(0.017)
α_{DBH1}	0.069	0.445 **	-	-	0.185	0.247 *	0.492 **	0.250 ***
	(0.170)	(0.200)	(-)	(-)	(0.332)	(0.126)	(0.197)	(0.096)
α_{DBH2}	0.396 *	-	0.402 **	-	-	-	-	-
	(0.232)	(-)	(0.201)	(-)	(-)	(-)	(-)	(-)
α_{DAH1}	0.371 *	0.223	-	-	0.711 ***	0.015	-0.006	-0.006
	(0.213)	(0.167)	(-)	(-)	(0.213)	(0.132)	(0.180)	(0.093)
α_{DAH2}	-	-	0.313 **	0.183	-	-	-	-
	(-)	(-)	(0.160)	(0.116)	(-)	(-)	(-)	(-)
α_{DAH3}	-	-	-	0.315 ***	-	-	-	-
	(-)	(-)	(-)	(0.116)	(-)	(-)	(-)	(-)
α_1	0.179 **	-0.100 *	0.510 **	-0.298 **	0.121	0.910 ***	0.489 ***	0.692 ***
	(0.083)	(0.058)	(0.223)	(0.119)	(0.215)	(0.047)	(0.081)	(0.051)
α_2	-0.739 ***	0.118 *	-0.333	-0.485 ***	-0.021	-0.776 ***	-	-0.755 ***
	(0.073)	(0.060)	(0.232)	(0.069)	(0.015)	(0.046)	(-)	(0.041)
α_3	-	0.751 ***	-	-0.761 ***	-0.039 ***	-0.051 ***	-	-0.049 ***
	(-)	(0.050)	(-)	(0.115)	(0.010)	(0.009)	(-)	(0.009)
α_4	-	-	-	-	-	-	-	-0.077 ***
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(0.010)
θ_1	-0.162 *	0.161 ***	-0.576 ***	0.307 ***	-0.069	-0.925 ***	-0.505 ***	-0.778 ***
	(0.085)	(0.058)	(0.222)	(0.116)	(0.214)	(0.048)	(0.079)	(0.053)
θ_2	0.698 ***	-0.115 *	0.357	0.486 ***	-	0.802 ***	-0.065 ***	0.766 ***
	(0.077)	(0.059)	(0.244)	(0.068)	(-)	(0.047)	(0.011)	(0.045)
θ_3	0.051 ***	-0.752 ***	0.017	0.789 ***	-	-	-	-
	(0.013)	(0.050)	(0.022)	(0.112)	(-)	(-)	(-)	(-)
γ_0	0.013 **	0.031 ***	0.011 **	0.029 ***	0.034 ***	0.015 ***	0.014 ***	0.008 ***
	(0.005)	(0.005)	(0.004)	(0.009)	(0.007)	(0.003)	(0.003)	(0.002)
γ_1	0.063 ***	0.061 ***	0.062 ***	0.074 ***	0.078 ***	0.059 ***	0.058 ***	0.050 ***
	(0.008)	(0.005)	(0.008)	(0.009)	(0.006)	(0.005)	(0.005)	(0.005)
γ_2	0.933 ***	0.929 ***	0.936 ***	0.916 ***	0.910 ***	0.932 ***	0.933 ***	0.941 ***
	(0.008)	(0.005)	(0.007)	(0.009)	(0.008)	(0.006)	(0.006)	(0.006)
γ_{DBH1}	-	-0.709 ***	-	-0.379	-0.461	-0.045	-0.151	-0.154 *
	(-)	(0.145)	(-)	(0.302)	(0.276)	(0.187)	(0.183)	(0.082)
γ_{DBH2}	-0.274 *	-	0.040	-	-	-	-	-
	(0.151)	(-)	(0.178)	(-)	(-)	(-)	(-)	(-)
γ_{DAH1}	0.529 ***	2.138 ***	-	0.725 **	0.807 ***	0.054	0.273	0.106
	(0.192)	(0.517)	(-)	(0.333)	(0.292)	(0.182)	(0.186)	(0.082)
γ_{DAH2}	-	-1.299 ***	0.063	-	-	-	-	-
	(-)	(0.480)	(0.179)	(-)	(-)	(-)	(-)	(-)
R^2	0.008	0.013	0.008	0.008	0.007	0.008	0.009	0.020
H_7	0.965	0.984	0.161	-	1.648	0.986	2.221	2.351
	(0.326)	(0.321)	(0.688)	(-)	(0.199)	(0.321)	(0.136)	(0.125)
H_{11}	4.403	5.526	6.199	11.36	11.84	7.005	9.239	9.817
	(0.221)	(0.063)	(0.045)	(0.003)	(0.003)	(0.030)	(0.010)	(0.007)
H_{12}	7.661	33.69	0.578	5.139	9.253	0.096	3.331	4.246
	(0.022)	(0.000)	(0.749)	(0.077)	(0.010)	(0.953)	(0.189)	(0.120)
Q(4)	5.944	7.723	3.013	4.395	13.50	16.40	7.594	10.81
	(0.203)	(0.102)	(0.556)	(0.355)	(0.009)	(0.003)	(0.108)	(0.029)
$Q^2(4)$	3.051	2.356	4.486	0.758	18.03	14.29	1.244	1.444
	(0.549)	(0.671)	(0.344)	(0.944)	(0.001)	(0.006)	(0.871)	(0.837)
ARCH(4)	3.059	2.317	4.401	0.759	18.71	14.71	1.261	1.452
	(0.548)	(0.678)	(0.354)	(0.944)	(0.001)	(0.005)	(0.868)	(0.835)

Notes: Maximum Likelihood empirical estimates of eqs.(5)-(6) for j=SH, SZ, HSCE and HS. Sample period 01/01/2002 - 30/06/2017. Standard deviations in parentheses. * (**) [***] statistically significant at 10% (5%) [1%] level. Q(4) and $Q^2(4)$ are LjungBox statistics for serial correlation up to lag 4 in standardized residuals and squared residuals. ARCH(4) is the ARCH LM test for heteroscedasticity in standardized residuals up to lag 4. P-values in parentheses.

Table 7: Sharpe ratios generated by the trading rules TR_B, TR_A and $TR_{B\&A}$ based on New year's, CLNY, Labour and National days.

	SH			SZ			HSCE			HS		
	TR_B	TR_A	$TR_{B\&A}$	TR_B	TR_A	$TR_{B\&A}$	TR_B	TR_A	$TR_{B\&A}$	TR_B	TR_A	$TR_{B\&A}$
NY	80.79	2.750	24.28	20.83	-5.650	0.223	169.4	154.8	185.9	117.8	77.57	136.6
	(1.710)	(0.069)	(0.511)	(0.121)	(-)	(0.000)	(0.823)	(0.756)	(0.901)	(4.991)	(3.285)	(5.786)
CLNY	69.03	-13.22	10.91	123.4	38.75	74.59	1.010	-16.93	-11.76	63.62	-8.667	9.040
	(1.462)	(-)	(0.232)	(0.723)	(0.237)	(0.439)	(0.049)	(-)	(-)	(0.308)	(-)	(0.044)
LAB	119.5	98.68	132.2	63.40	118.7	125.9	17.02	139.5	98.28	44.22	115.5	94.12
	(2.532)	(2.095)	(2.804)	(0.375)	(0.697)	(0.732)	(0.081)	(0.680)	(0.481)	(1.873)	(4.892)	(3.986)
NAT	134.2	65.65	103.7	168.7	92.35	154.2	103.3	137.1	137.7	53.34	128.8	125.9
	(2.852)	(1.391)	(2.201)	(0.984)	(0.543)	(0.905)	(0.504)	(0.666)	(0.673)	(2.259)	(5.456)	(5.332)

Notes: TR_B= rule consisting of buying a given index 2 days before holidays and selling it the day after holidays. TR_A= rule consisting of buying a given index 1 day before holidays and selling it the 2nd day after holidays. $TR_{B\&A}$= rule consisting of buying a given index 2 days before holidays and selling it the second day after holidays. Figures computed for the Shanghai, Shenzhen, HSCE and Hang-Seng composite indices over the period 01/01/2002 - 30/06/2017. Sharpe ratios computed for cumulated returns generated by the rules TR_B, TR_A and $TR_{B\&A}$. Sharpe ratio for cumulated returns obtained from buy-and-hold strategies are 47.13 (SH), 171.7 (SZ), 206.3 (HSCE) and 23.61 (HS). Proportion between Sharpe ratios obtained from rules TR_B, TR_A and $TR_{B\&A}$ and that obtained from the related buy-and-hold rule reported in parentheses. Such proportion is not reported when Sharpe ratio from the rules TR_B, TR_A and $TR_{B\&A}$ is negative.

Table 8: Correlations between impacts of individual holidays, and between cumulated returns generated by the rules TR_B, TR_A and $TR_{B\&A}$, for the Shanghai, Shenzhen, HSCE and HS indices.

	SH/SZ	HSCE/HS	SH/HSCE
DBNY	0.870	0.587	0.027
DANY	0.928	0.862	0.667
$TR_{B_{NY}}$	0.907	0.953	0.721
$TR_{A_{NY}}$	0.903	0.975	0.684
$TR_{B\&A_{NY}}$	0.866	0.974	0.843
DBCLNY	0.775	0.933	0.427
DACLNY	0.941	0.907	0.124
$TR_{B_{CLNY}}$	0.897	0.842	0.352
$TR_{A_{CLNY}}$	0.584	0.823	-0.137
$TR_{B\&A_{CLNY}}$	0.601	0.872	0.255
DBLAB	0.856	0.907	-0.365
DALAB	0.951	0.917	0.542
$TR_{B_{LAB}}$	0.889	0.919	0.536
$TR_{A_{LAB}}$	0.992	0.982	0.876
$TR_{B\&A_{LAB}}$	0.976	0.987	0.891
DBNAT	0.942	0.890	-0.315
DANAT	0.941	0.898	0.131
$TR_{B_{NAT}}$	0.997	0.802	0.577
$TR_{A_{NAT}}$	0.986	0.975	0.718
$TR_{B\&A_{NAT}}$	0.992	0.984	0.766

Notes: DB/DA=individual holiday impacts for 1 day before/after for a given festivity obtained from eq.(7). TR_B= Cumulated returns generated by a rule consisting of buying a given index 2 days before holidays and selling it the day after holidays. TR_A= Cumulated returns generated by a rule consisting of buying a given index 1 day before holidays and selling it the 2nd day after holidays. $TR_{B\&A}$= Cumulated returns generated by a rule consisting of buying a given index 2 days before holidays and selling it the second day after holidays. Figures computed for the Shanghai, Shenzhen, HSCE and Hang-Seng close-to-close indices over the period 01/01/2002 - 30/06/2017.

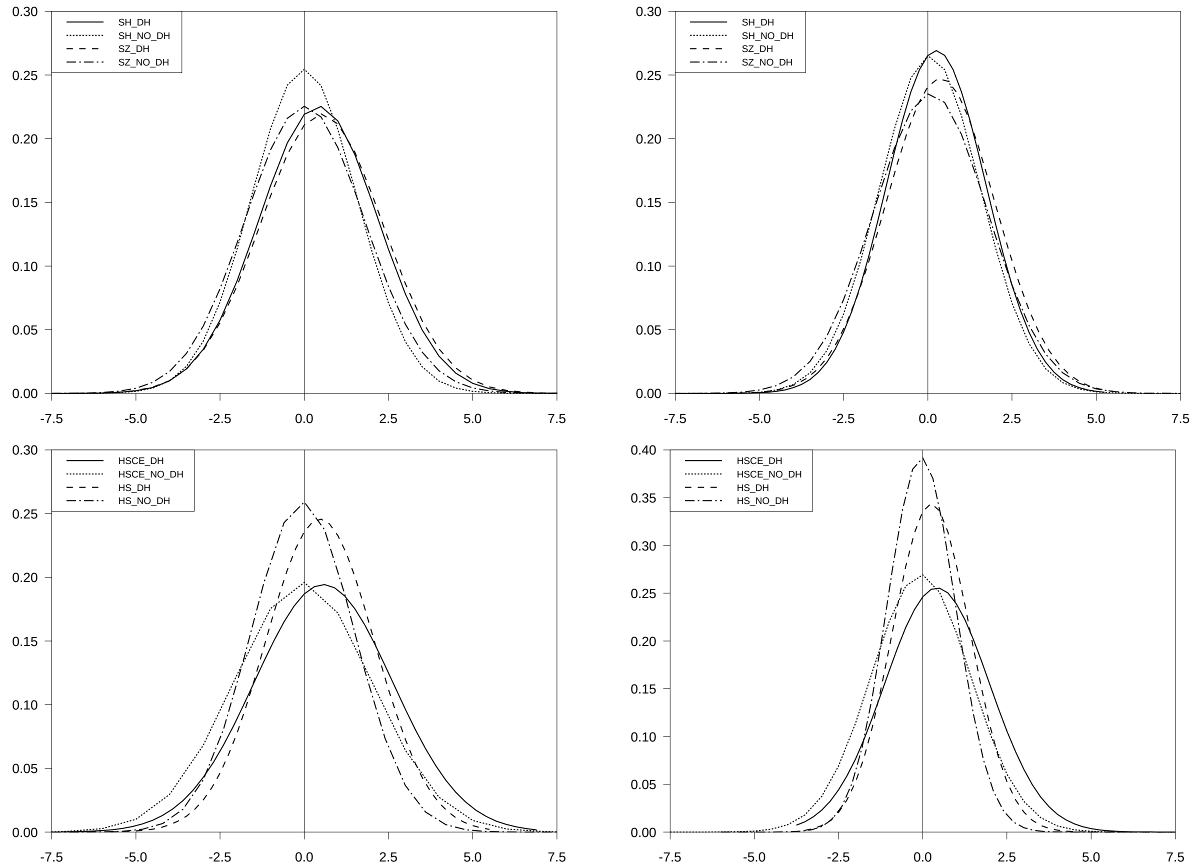

Fig. 1: Empirical probability distributions obtained from bootstrapped series of returns adjacent (DH) and non-adjacent (NO_DH) to holidays for the Shanghai (SH) and Shenzhen (SZ) close-to-close (upper-left panel) and open-to-close returns (upper-right), as well as for the Hang-Seng China Enterprises (HSCE) and Hang-Seng (HS) close-to-close (lower-left) and open-to-close returns (lower-right).

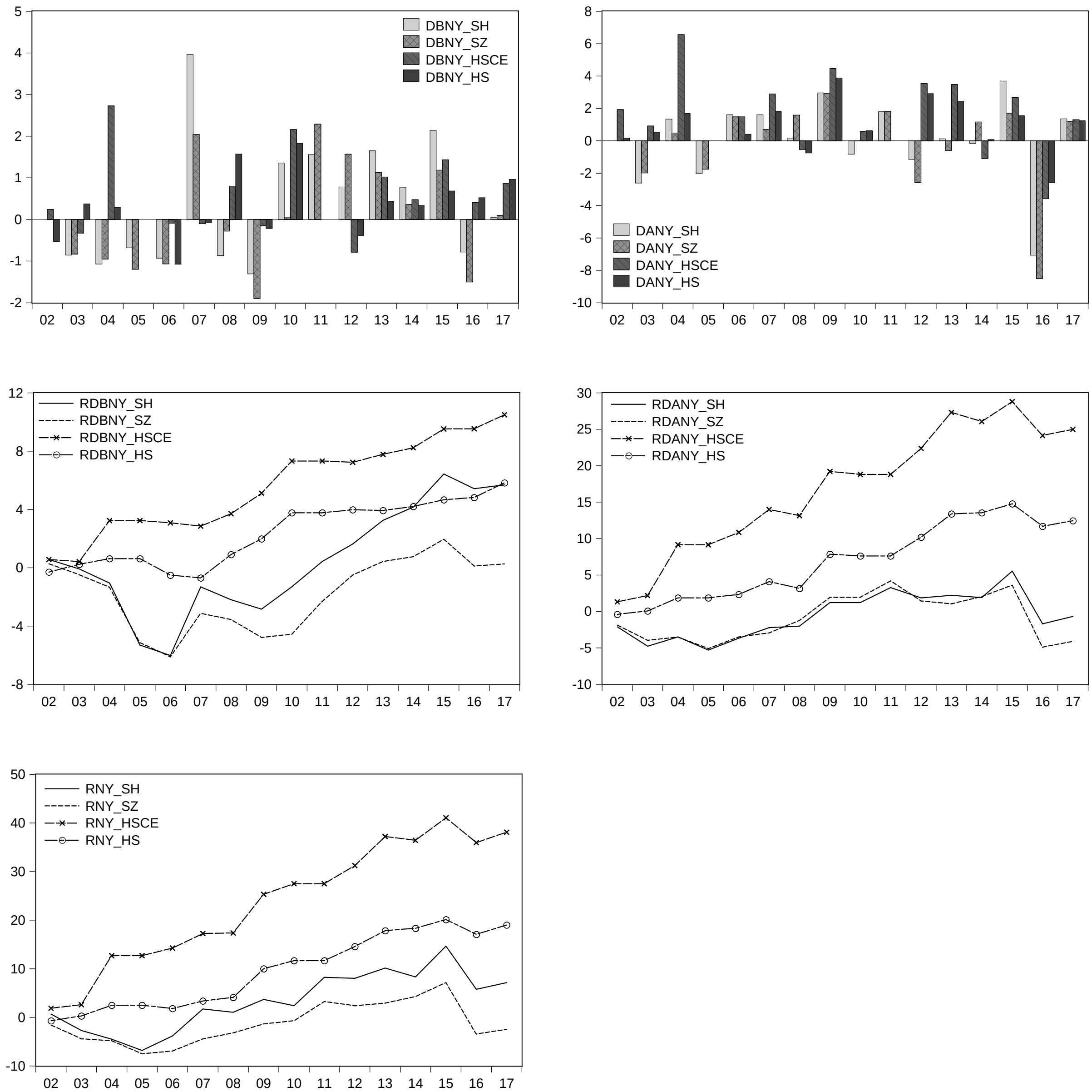

Fig. 2: Impacts of New Year's days on returns of SH, SZ, HSCE and HS markets one day before (DBNY) and after (DANY) (upper panel). Only impacts significant at 5% or lower reported in the chart. Cumulated returns yielded by the trading rules TR_B, TR_A and $TR_{B\&A}$ based on New Year's days (middle and lower panels).

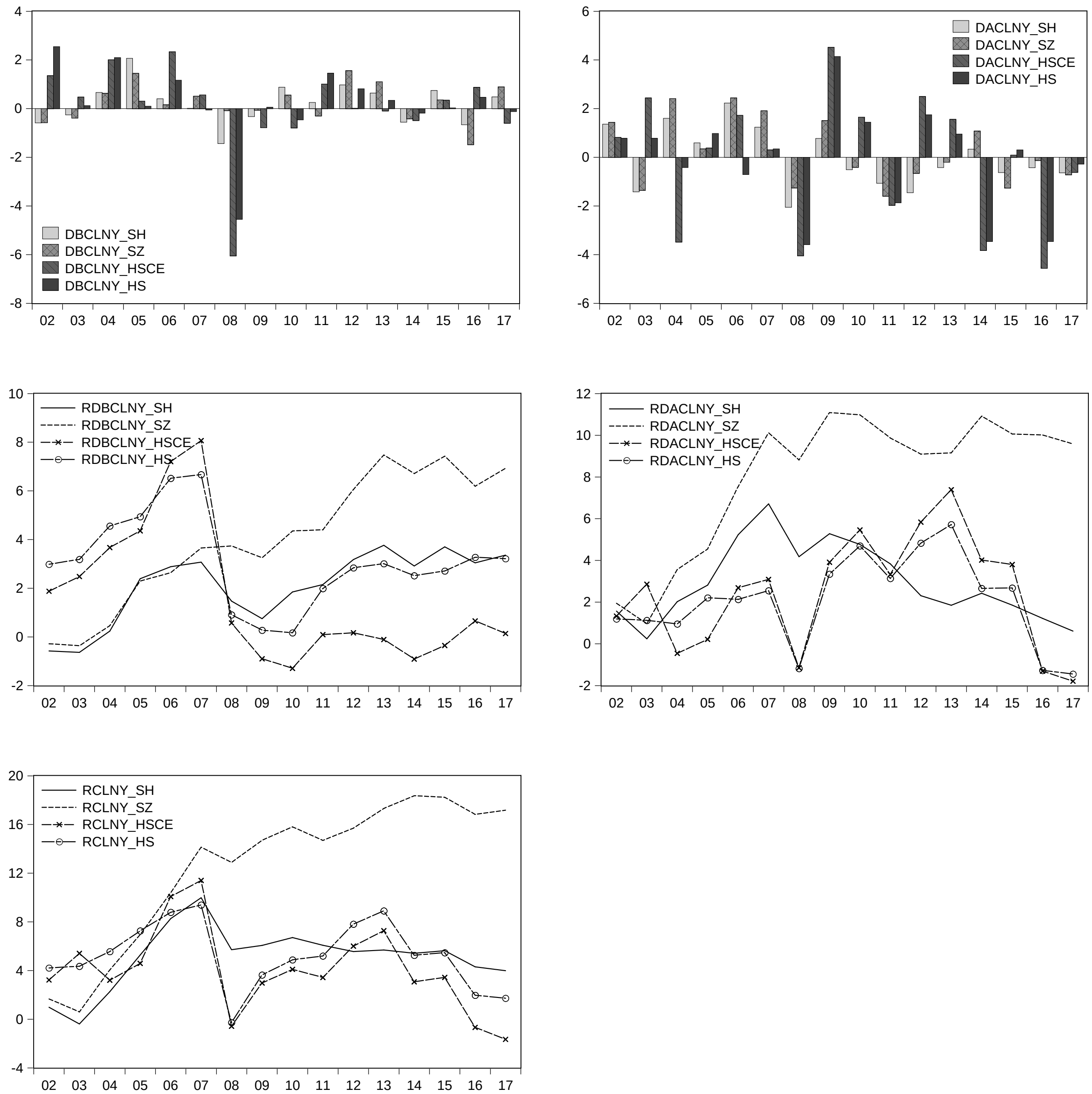

Fig. 3: Impacts of CLNY on daily returns of SH, SZ, HSCE and HS one day before (DBCLNY) and after (DACLNY) (upper panel). Only impacts significant at 5% or lower reported in the chart. Cumulated returns yielded by the trading rules TR_B, TR_A and $TR_{B\&A}$ based on CLNY holidays (middle and lower panels).

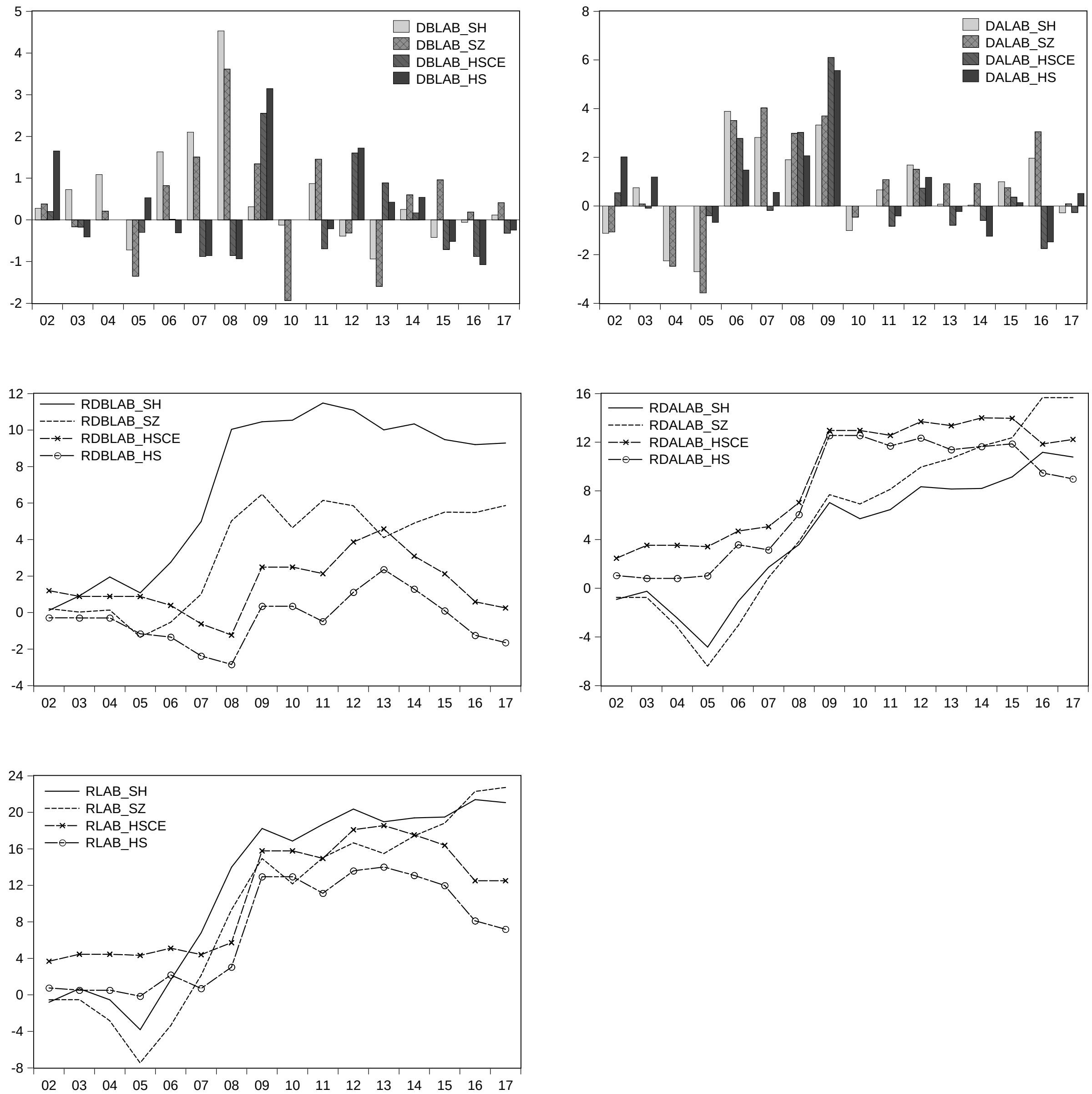

Fig. 4: Impacts of Labour Days on daily returns of SH, SZ, HSCE and HS one day before (DBLAB) and after (DALAB) (upper panel). Only impacts significant at 5% or lower reported in the chart. Cumulated returns yielded by the trading rules TR_B, TR_A and $TR_{B\&A}$ based on Labour holidays (middle and lower panels).

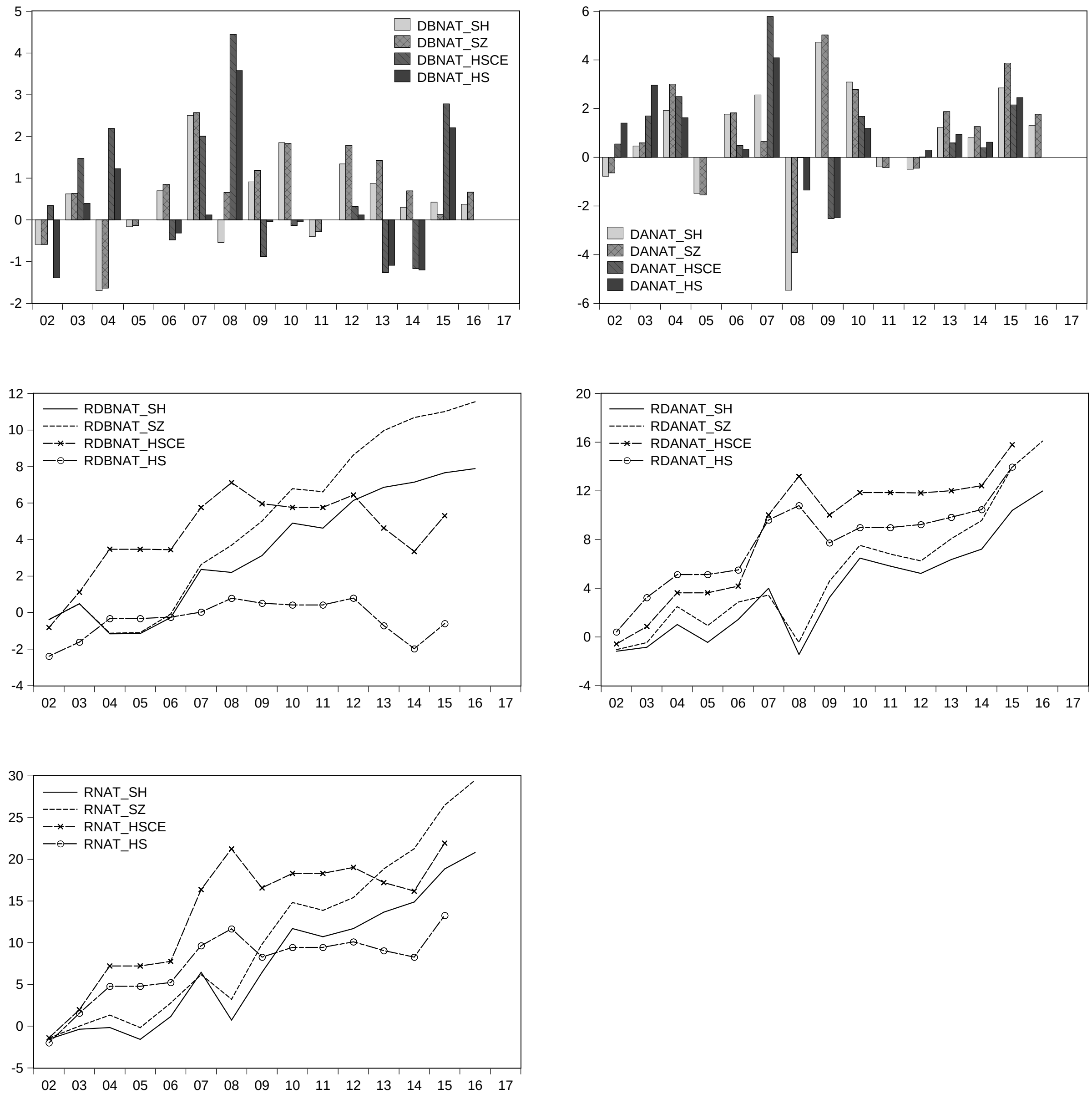

Fig. 5: Impacts of National Days on daily returns of SH, SZ, HSCE and HS one day before (DBNAT) and after (DANAT) (upper panel). Only impacts significant at 5% or lower reported in the chart. Cumulated returns yielded by the trading rules TR_B, TR_A and $TR_{B\&A}$ based on National holidays (middle and lower panels).

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