Department of Applied Mathematics
Faculty of EEMCS

University of Twente
The Netherlands

P.O. Box 217
7500 AE Enschede
The Netherlands
Phone: +31-53-4893400
Fax: +31-53-4893114
Email: memo@math.utwente.nl
www.math.utwente.nl/publications

Memorandum No. 1772

The festivity effect and liquidity constraints: a test on countries with different calendars

K.M. Abadir[1] and L. Spierdijk

August, 2005

ISSN 0169-2690

[1]Tanaka Business School, Imperial College London, South Kensington campus, London SW7 2AZ, United Kingdom

The festivity effect and liquidity constraints: a test on countries with different calendars

Karim M. Abadir and Laura Spierdijk*
Imperial College London and University of Twente

August 25, 2005

ABSTRACT: We show how investors' liquidity patterns can provide a common framework to explain autocorrelation of returns and volumes, and some calendar anomalies. The method helps us find new anomalies, and contribute to the explanation of older ones. We uncover a "festivities effect" that is composed of a pre-festivity period of negative returns and relatively low trading activity, and a post-festivity period of positive returns and increased trading activity. We demonstrate this effect for ten countries in the Middle- and Far-East where the main festivities occur every year at a different time of the Western Gregorian calendar. In particular, we consider the Muslim Ramadan and Chinese New Year festivities in these countries.

KEYWORDS: Liquidity constraints, festivity effect, January effect, anomalies.

AMS Classification: 91B28, 91B84
JEL Classification: G14, G15

Corresponding author:
Karim Abadir
Tanaka Business School
Imperial College London
South Kensington campus
London SW7 2AZ, UK
(k.m.abadir@imperial.ac.uk)
(l.spierdijk@ewi.utwente.nl)

*The authors gratefully acknowledge support from the British ESRC grant RES000230176. We also thank Michel Vellekoop for providing us with the data on volumes.

1 Introduction

Liquidity plays a role in the pricing of financial assets. There is an increasing body of evidence and explanation for this, mostly coming from the microstructure literature and high frequency data; for example, see the survey by Easley and O'Hara (2003). The focus has been mostly on the liquidity of the asset directly, rather than on the liquidity constraints facing market participants. The latter's indirect role has been less prominent and more recent. For example, McGrattan and Prescott (2001) show how changes in borrowing constraints can explain away the long-standing Mehra-Prescott equity premium puzzle; see also Mehra and Prescott (2003).

In this paper, we show how investors' liquidity patterns can help us uncover new anomalies, and contribute to the explanation of older ones such as the January effect. We provide this common framework by considering a liquidity-constrained investor that faces a money market where borrowing and lending rates differ. We show how her rational behavior can lead to 'inefficient' patterns in the demand for assets. Such inefficiencies include periods of underreaction, and others of overreaction, with persistence in each type of period. They also include calendar effects, especially in periods where liquidity changes dramatically. Festivities such as Christmas and New Year are one important example, contributing to the January effect.

We also consider festivities other than the January effect. The latter may be due to alternative factors such as tax effects. We therefore study countries where the main festivities occur every year at a different date. In particular, we consider markets with either (or both) of two types of festivities: Muslim Ramadan or Chinese New Year. Both festivities follow a calendar that is different from the Western Gregorian calendar, and their location on the Gregorian calendar moves over time. For example, Ramadan occurs about 11 days earlier every year, gradually moving from summer to winter and so on. This provides us with a means of testing whether price patterns occurring around the times of festivities are a genuine effect, or whether they are a fixed-calendar effect (e.g. possibly due to the end of the tax year which is fixed by the Gregorian calendar).

We consider returns and, where available, volumes data. We find that anomalies exist around festive times, and that they generally follow the patterns that our theoretical model predicts. For example, we find that index returns tend to be negative before festivities, as investors liquidate positions, followed by periods of strong positive gains after the festivities are over and re-investment takes place. Similar patterns are established for index volumes.

The anomalies we uncover reflect economically significant effects on returns, which can amount to as much as 4% on a weekly basis. However, as

market participants start detecting these effects, they may also move over time to earlier calendar locations. We find this in a few cases, by means of recursive least squares (RLS). As Schwert (2003) indicates, these anomalies could also disappear once they are pointed out, and there is some evidence of this in the most established of the markets we consider.

The setup of this paper is as follows. Section 2 introduces a simple model to illustrate the effect of changes in the liquidity constraint of an individual investor. In Section 3 we discuss Muslim Ramadan and Chinese New Year as festivities that move over time relative to the Western calendar. Moreover, we explain how to assess the impact of these festivities on the index returns and volumes in the ten countries under consideration. This leads us to Section 4, where we report the results of the data analysis. Finally, we conclude the paper with some comments in Section 5.

2 Liquidity constraints and the demand for assets

We introduce a simple graphical two-period model to illustrate the effect of a change in the liquidity constraint of an individual. Let c_t and c_{t+1} denote consumption flows at times t and $t+1$, which are the axes in Figure 1. Point E is the endowment point, where all income is consumed in the period where it occurs. Borrowing to finance additional current consumption can be undertaken at a rate r_b, leading to the solid line to the right of point E with slope $-1-r_b$. The person may consume less than is earned in period t, and save the balance to finance future consumption, giving rise to the solid line to the left of point E with slope $-1-r_d$, where r_d is the rate of return on an investment. We may take r_d initially to be a deposit rate, or a risk-free rate of return, so we typically observe $r_d < r_b$ for individuals, and a tendency to remain at the kink point E for an equilibrium. (The two solid lines form the budget constraint, which would be a straight line if $r_d = r_b$.) Indifference curve I represents the highest level of utility that can be achieved, given this budget constraint.

Suppose now that the rate of return r_d increases, and that the dashed line becomes the new budget constraint to the left of E. The highest level of utility will still be achieved at point E, and no changes will occur to the asset allocation of this individual. This seeming underreaction will persist until r_d increases more, for example up to the level given by the dotted line. At this point, the optimal current consumption declines from C to C', and the higher level of utility is achieved at I'. In practice, both parts of the

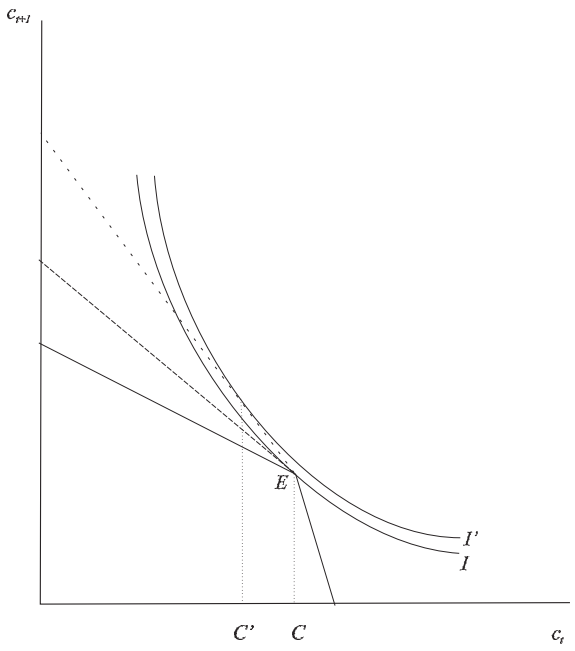

Figure 1: Changing returns and their effect on consumption (c_t and c_{t+1}) and asset allocation; with E as the point of endowment, and I, I' as two indifference curves.

solid line move in the same direction. However, this simple illustration has a couple of interesting implications.

First, investors may underreact to changes in market conditions, until a certain level of return r_d is reached. After that level, a slight change in r_d will lead to a reallocation, which may seem like an overreaction, given the earlier inaction. Market overreaction has been documented, for example, in Chopra et al. (1992) and Daniel et al. (1998). The former paper shows that overreactions are more prevalent in smaller firms and that it increases around the time of earnings announcements. As implied by our Figure 1, extended periods of underreaction, followed by others of overreaction, will give rise to positive serial correlation (or momentum) in the short term, followed by negative serial correlation in the medium term. If these changes are calendar-related, they can also give rise to a succession of significant dummy variables, switching from positive to negative or vice-versa.

Second, festivities are periods where consumption levels are higher than usual, and individuals need to finance this by borrowing or liquidating some

of their financial assets. (The reverse will happen when the festivities are over, and new salaries or gifts are partly reinvested in the market.) Such effects can be detected by seasonal dummy variables. If r_d and r_b differ substantially, the kink at E will be more pronounced and the adjustment will seem less gradual than if the budget line were straight ($r_d = r_b$). This overreaction is therefore more likely to be the case in countries with financial markets that are less developed, in the sense of accessibility of credit markets, ease of margin trading, and so on. But it can also exist in developed market. For example, Ariel (1987) finds that the two weeks starting with the last day of each month (i.e., pay day for high-salary earners) provide significant positive excess returns compared to the rest of the month, and similarly for two weeks that follows Christmas and New Year festivities. Furthermore, Hensel and Ziemba (1996) show how abnormal returns can be earned by exploiting this anomaly.

3 The data and related studies

We divide this part into four subsections. First, we introduce the festivities that we will analyze. Second, we describe the data. Third, we review the literature on the effect of festivities in these markets, and related literature on the effects of other holidays on stock prices in different markets. Fourth, we consider existing interpretations of effects other than Ramadan or Chinese New Year.

3.1 Ramadan and Chinese New Year

The Islamic year is based on a lunar calendar, referred to as the Higri or Hijri calendar. This calendar contains twelve months that start with the new moon. Since a lunar month contains only 29.53 days, the Islamic year is approximately eleven days shorter than the Gregorian year. Ramadan is the ninth month of the Muslim calendar. During the entire month of Ramadan, able adults are supposed to fast while the sun shines. At the end of the day, a lavish meal breaks the fast, including special expensive dishes that are not consumed on a daily basis in other months. It is well documented that food prices increase substantially during the month of Ramadan, thus making the budget constraints of most individuals even more binding than usual. Ramadan ends with the feast of Eid al-Fitr.

Chinese New Year, alternatively referred to as Lunar New Year, is celebrated by more than a quarter of the world population. In addition to China, Hong Kong, Macau, Taiwan, and Singapore, it is a public holiday in South

Korea, Indonesia, Malaysia, Brunei, Laos, Vietnam, and Mauritius. Chinese New Year is based on a lunisolar calendar; i.e. it is determined by the orbital positions of the sun and the moon. Like the Gregorian calendar, the Chinese is a yearly one. A new month starts with each new moon. The start of the lunar year is determined by the cycles of the moon. Chinese New Year starts with the new moon on the first day of the new year and ends on the full moon 15 days later. The celebration on the 15th day is called the Lantern Festival. Chinese New Year falls on different dates each year, and the calculation of the precise date is quite complicated; see Aslaksen (2002). It generally falls on the day of the second new moon after the winter solstice . However, when there is an intercalary eleventh or twelfth month in the lead up to the New Year, the New Year falls on the third new moon after the solstice. In all countries under consideration in our sample (see the following subsection), Chinese New Year holidays last 2–4 days.

3.2 Data description

The analysis focuses on ten markets: four predominantly Muslim in the Middle-East (Egypt, Jordan, Pakistan, Turkey) and six in the Far-East (Malaysia, Singapore, China, Hong Kong, Taiwan, Korea). For the first four countries, we analyze the impact of the festive month of Ramadan on index prices. For Chinese markets (China, Hong Kong, Taiwan), countries with a substantial Chinese population (Malaysia, Singapore) and Korea, we investigate how index prices evolve around Lunar New Year. Since Malaysia and Singapore are not only characterized by a large Chinese population, but are also populated by a considerable percentage of Muslims, we analyze both the effect of Ramadan and the Lunar New year on their index prices.

Countries like Malaysia and Singapore are characterized by a variety of ethnic minorities with their own holy days and festivities. For instance, Hindu celebrate Deepvali ("The Festival of Lights") and Buddhists celebrate Vesak Day. However, we confine the current analysis to Muslims and Chinese, representing the most important population groups in the countries under consideration; see Table 1. Ramadan and Chinese New Year last for several weeks (four and two, respectively), so that it is possible not only to analyze before and after, but also what happens during the festivity period.

The trading platforms we consider have witnessed substantial growth during recent years and belong to the most important ones of the regions. We notice that other prominent exchanges (e.g. Saudi Arabia, Kuwait, and Iran) certainly merit attention, but are excluded from the analysis because no data was available in Datastream. Table 2 provides some stock market statistics for the exchanges under consideration, including market capitalization (total

dollar value of domestic shares outstanding), total value traded (total value of the shares traded), turnover ratio (ratio of total value traded to market capitalization), and the total number of stocks listed on the exchanges. All figures apply to the end of the year 2004 and have been obtained from the websites of the Federation of Euro-Asian Stock Exchanges (Egypt, Jordan Pakistan, Turkey) and the World Exchange Federation (Malaysia, Singapore, China, Hong Kong, Taiwan, Korea). Of the latter group, the Istanbul Stock Exchange is the largest in terms of market capitalization, and also features relatively high turnover (which can be regarded as a measure of stock market liquidity). The Karachi Stock Exchange in Pakistan, although smaller than the Turkish and Egyptian trading platforms, is characterized by extremely high turnover and has been repeatedly ranked among the best performing exchanges in the world by "Business Week" and "USA Today". The bourse of Hong Kong is largest in our group, and even belongs to the ten largest exchanges in the world, but features much lower turnover than the trading platforms in Taiwan, Korea, and Shanghai.

We focus on the most widely quoted stock indexes for each case. By focusing on indexes, we avoid the issues of price limits for individual stocks. For example, for most of the sample period, Egypt had price limits on each stock, so that it stopped trading for the whole day once the limit of $\pm 5\%$ was reached; for example, see Osler and Tooma (2004). The aggregate index is less sensitive to these irregularities than individual stocks. Such irregularities would bias estimates, if not accounted for, and introduce complications that are interesting to study but unnecessary for our endeavor.

Weekly closing prices for the most important stock indexes have been obtained from Datastream for our ten cases. The names of the stock indexes, the sample periods, and the number of observations are the displayed in the first three columns of Table 3. Logarithmic returns are obtained from the index prices. Corresponding to each weekly return, we construct dummies for the Ramadan weeks using an Excel add-in called CalendarMath, available from http://www.geocities.com/couprie/calmath/index.html and written by Kees Couprie. This program has been double-checked by comparing the generated Ramadan weeks to some known Ramadan dates in the past. Dummies for the two weeks of the Chinese New Year have been constructed by means of the LunarCal program available from http://www.lunarcal.org/ which we also verified using known dates from the past. For both festivities, we also constructed dummy variables for the four weeks preceding the festivities as well as for the four weeks that follow the event. These will be denoted in the tables by "befRam$j$" for week j before Ramadan, "Ram$j$" for week j of Ramadan, "aftRam$j$" for week j after Ramadan; and similarly for Chinese New Year, with "CNY" instead of "Ram". We constructed dummy variables

for the weeks of January (for the January effect) and February (to separate the Chinese New Year effect from the fixed calendar effect). Week j of January will be denoted by "Jan$j$", and similarly for February. Finally, some return series contain strong outliers, for example due to the Black Monday crisis (1987) or the Asian crisis (1997–1998). To deal with this, we created dummy variables for the prominent outliers in the series.[1]

Apart from index returns, this paper also analyzes index volumes. Since volume series are not available in Datastream for the markets under consideration, we considered Bloomberg data. Unfortunately, for Egypt, Jordan, Pakistan, and Turkey there is no or too few volume data available in Bloomberg. For China, index volumes are available, but the weekly volume series contain many missing values during the New Year period. Therefore, we cannot estimate the effect of festivities for these five markets. For the remaining ones (Malaysia, Singapore, Hong Kong, Taiwan, and South Korea), Bloomberg provides weekly index volumes for a reasonably long time period, and these are listed in the last two columns of Table 3.

3.3 Related literature

Although the literature has paid relatively little attention to the impact of Ramadan on stock returns, some research is available. Alper and Aruoba (2001) analyze various macroeconomic variables in Turkey, and show that the usual seasonal adjustment procedures based on fixed holidays often fail to remove all seasonality when the series are subject to moving holidays like Ramadan. However, the stock indexes that they analyze do not exhibit any significant Ramadan periodicities. Furthermore, Husain (1998) analyzes the Pakistani stock market and demonstrates that volatility is significantly lower during the weeks of Ramadan. He does not find any significant changes in average returns during Ramadan. Comparable results are established by Seyyed, Abraham, and Al-Hajji (2005) for the Saudi Arabian stock market. They analyze several sector indexes in this market and show that volatility and trading activity drop significantly during Ramadan. Similar to Husain, they do not find any significant effects in average returns during Ramadan, but they do not look before and after.[2]

[1] Jordan has three dummies: 08/10/90, 05/03/02, 05/10/02; Malaysia one: 10/23/87; China two: 05/22/92, 08/05/94; Hong Kong three: 10/30/87, 10/24/97, 01/09/98; Singapore two: 10/30/87, 01/09/98.

[2] Less well-documented evidence for Ramadan effects in average returns is given in a recent IMF country report on Pakistan (2004), where it is noticed that prices tend to increase during Ramadan. Additionally, various Arabic investment websites report that stocks prices show distinct behavior around Ramadan; see

Similarly, the impact of Chinese New Year on stock prices have been given only little attention in the literature. In a recent paper, Gao and Kling (2005) examine calendar effects in the Chinese stock market. They establish a strong year-end effect in Shanghai and Shenzhen up to 1991, after which it disappeared.

A related issue is the behavior of stock indexes around the holy days of other religions. Frieder and Subrahmanyam (2004) analyze the S&P500 index and NYSE trading volumes around open-market religious holidays, focusing on the Jewish High Holy Days of Rosh Hashanah and Yom Kippur and the Christian holy day of St. Patrick's. They show that volume drops on Rosh Hashanah and Yom Kippur, and that prices tend to increase during the two days that precede Rosh Hashanah and St. Patrick's.

Another related issue is the pre-holiday effect. Lakonishok and Smidt (1988), Ariel (1990), and Cadsby and Ratner (1992) show that pre-holiday returns are higher than usual. However, the holiday effect is not about festivities in particular. Two differences come to mind. First, festivities are not just any holiday. They are infrequent and expensive, hence the relevance of the budget constraint setup of Section 2. Second, recursive estimates in Section 4 show that, when positive, this effect is a move of the post-festivities positive effect to earlier times.

3.4 Existing interpretations for other effects

There exists a vast literature on the role of mood in investments. Generally, when people are in a optimistic mood, they feel confident and want to buy assets. This causes prices to rise. Similarly, when people have a pessimistic state of mind, they are less confident. A tendency to sell assets ensues, leading to price decreases. A typical example is highlighted in the literature on the relation between weather-induced mood and equity returns. Saunders (1993), Hirshleifer and Shumway (2003), and Kamstra, Kramer, and Levi (2002) all find that stock returns increase with sunshine. Another example that is more related to the subject of this paper is found in the paper by Frieder and Subrahmanyam (2004), mentioned earlier. Stock returns tend to be negative after Yom Kippur (which is solemn), whereas they tend to be positive after Rosh Hashanah (which is festive). Stulz and Williamson (2003) consider interesting comparative cultural features, and their effects on creditor's rights. See also Nofsinger (2003).

Various explanations have been given for the January effect, including

http://www.adcci.gov.ae:90/public/media/Magazines/jan_2000/stock_market_.htm for example.

window dressing and the tax-loss selling hypothesis. Window dressing is a phenomenon related to institutional trading and applies to institutional investors who want to get rid of low-return stocks before the reporting date in December. In January they simply buy back those stocks to maintain the original portfolios, resulting in higher returns in January relative to the other months of the year. However, Odean (1998) shows that the opposite behavior (profit-taking) is more prominent. Also, although window dressing might play a role, institutional investment play a much smaller role in the markets in the Middle East and Asia than in developed markets.[3] Since the Far-Eastern countries under consideration impose no taxes on capital gains, the tax-loss selling hypothesis obviously cannot hold for these countries.

Finally, one might wonder whether the results are merely caused by seasonal effects in returns. However, seasonality is not an issue here, since Ramadan occurs almost two weeks earlier every year, relative to the Gregorian calendar. Over the years 1985–2004, Ramadan took place in the months of May to October, so seasonality cannot account for Ramadan effects. For the Far-Eastern countries the situation is slightly different, as the variations in the data of the Chinese New year are much smaller. As mentioned by Aslaksen (2002), in the 1000 years between 1645 (the last calendar reform) and 2644, Chinese New Year will always fall between January 21 and February 21. To avoid that the results only reflect seasonal patterns, we correct for seasonality in the analysis of the Far-Eastern markets by including dummy variables for January and February.

4 Empirical findings

We start with the analysis of returns, then we turn to volumes.

4.1 Returns

For the four Muslim countries, returns are regressed on their lags, as well as

$$\text{(1)} \qquad \text{befRam}j,\ \text{Ram}j,\ \text{aftRam}j,\ \text{Jan}j; \quad \text{for } j = 1, 2, 3, 4$$

[3]For example, see http://www.exchange-handbook.co.uk/articles_story.cfm?id=43108 for information on this from the Middle East Exchange Handbook, and also http://www.fibv.com/WFE/home.asp?action=document&menu=266&nav=ie for the World Federation of Exchanges.

and the relevant outlier dummies (see the footnote of Section 3.2). The regression takes the form

$$r_t = \mu_0 + \sum_{i=1}^{p} \rho_i r_{t-i} + \sum_{i=1}^{d} \mu_i D_{i,t} + \varepsilon_t \tag{2}$$

where $D_{i,t}$ is the value of dummy i (e.g. Ram1) at time t, and information criteria (e.g. Akaike and Schwarz) indicate that $p \leq 4$ in our dataset. We report heteroskedasticity and autocorrelation consistent (HAC) t-ratios in parentheses, which takes care of inference in the presence of omitted heteroskedasticity of unspecified form (including ARCH-type).[4] We remove insignificant coefficients when the p-value exceeds 10%, and we omit reporting the coefficients of the outliers' dummies.

As expected from Section 2, we find positive autocorrelations in Table 4. The long-run contribution of each dummy to expected returns is given by

$$\frac{\mu_j}{1 - \sum_{i=1}^{p} \rho_i}, \quad j = 0, 1, \ldots, d, \tag{3}$$

where $\sum_{i=1}^{p} \rho_i < 1$ since the return series are stationary. For example, Table 4 indicates that in Pakistan the average additional return from week 1 after Ramadan is

$$\frac{0.013}{1 - 0.20 - 0.062} \approx 0.018.$$

The table indicates that all but one of the coefficients follow the expected signs, and that their effect on average returns is economically substantial relative to the weekly average (compare the dummies to the first line of the table). During the month of Ramadan, none of the dummies are significant, except the one for the second week in Turkey's case. This tends to confirm the results of Husain (1998) and Seyyed et al. (2005). However, as expected from Section 2, we consistently find effects before and after the month of Ramadan: negative before, followed by positive afterwards. Notice that the hypotheses that we are testing here are one-sided.

Turkey's positive coefficient in week 2 of Ramadan (Ram2) prompted us to investigate the evolving dynamics of this coefficient, by RLS, which are displayed in Figure 2. We found that this effect only became significant at the turn of the century, and can be regarded as the after-Ramadan positive

[4] We found evidence of asymmetric EGARCH volatility in these series. A few dummies were effective there as well. Volatility tended to drop near the feast of Eid al-Fitr, and week 1 of CNY. Volumes will be analyzed in Section 4.2, and they too reflect this pattern. The analysis of Section 2 has direct implications for patterns in returns and volumes, but only indirectly for volatility, hence our focus.

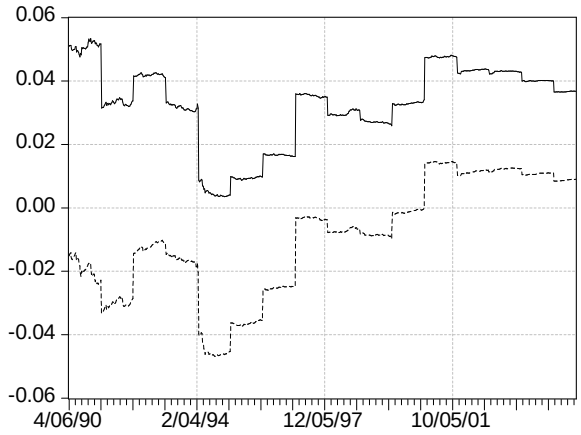

Figure 2: Recursive parameter estimates for Turkey's "Ram2" (solid line), and their 10% critical value or lower bound (dotted line).

effect becoming known, and market participants starting to take advantage of it earlier.

The negative effect in the fourth week after Ramadan (aftRam4) in Egypt is an indication of a correction to the larger positive jump in the first week after Ramadan (aftRam1). We also find that the first two weeks of January have a positive impact on the markets in Table 4, as expected from Ariel (1987), with the exception of Egypt where the effect happens later in week 3. This is because approximately 18% of the population of Egypt are Orthodox Christians who celebrate Christmas on January 7 (it is a national holiday in Egypt for this reason), two weeks later than the Western Christmas of December 25. This delay to the January effect is predicted by our theoretical model, and illustrates the effect of one more festivity.

Table 5 gives the corresponding results for our Far-Eastern markets, where the relevant dummies are

$$\text{(4)} \quad \text{Jan}j,\ \text{befCNY}j,\ \text{CNY1},\ \text{CNY2},\ \text{aftCNY}j,\ \text{Feb}j; \quad \text{for } j = 1, 2, 3, 4$$

as well as the outlier dummies. For Malaysia and Singapore, we have in addition Ramadan dummies as in (1). The autocorrelations are all positive as expected. We now analyze the dummies.

Table 5 shows that in Malaysia, the Ramadan effect on returns is nonexistent, and there is a faint positive effect during/after Chinese New Year. In

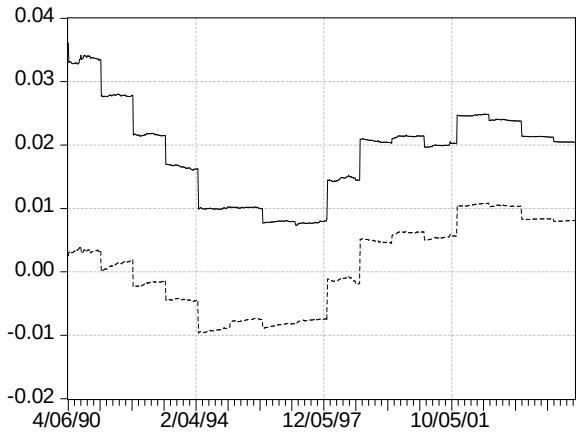

Figure 3: Recursive parameter estimates for Singapore's "Ram3" (solid line), and their 10% critical value or lower bound (dotted line).

Singapore, the effects before and after CNY are as expected, but there is an unexplained positive effect four weeks before Ramadan. The significance of the third week of Ramadan can be attributed to an early post-Ramadan effect similar to Turkey's. This is displayed for Singapore in Figure 3, which shows that the coefficient has become significant in 1998.

The other markets in Table 5 do not have a negative pre-CNY effect, but they have a positive one during and after. The last negative coefficient for Hong Kong occurs 4 weeks after CNY, and can be seen as a correction to the earlier positive effect. Korea has almost no CNY effect. One reason is that Lunar New Year does not have the same importance there as it has for the Chinese.

4.2 Volumes

In Table 6, we carry out the same regression as in (2) but for the logarithm of volumes, and with a linear time trend as an additional explanatory variable to account for market growth. We do not report the constant, trend, or outlier dummies for space considerations, but we find that the log-volumes exhibit a significant linear trend in all cases but one (Malaysia). The augmented Dickey Fuller test on this equation shows that the log-volume series are trend-stationary, which can be illustrated as follows. Using the notation of (2),

$\sum_{i=1}^{p} \rho_i$ indicates a large positive autoregressive component in Table 6, which nevertheless falls well short of a unit root.

In the two countries with Muslim populations, the first week after Ramadan (aftRam1) includes the period of the Eid al-Fitr feast, and therefore turns out to be one of reduced activity. There is a very strong positive post-Ramadan effect in week 2 in Malaysia, then a correction a couple of weeks later.

Whenever significant, the dummies for January and February are all positive, whereas from before CNY up to (and inclusive of) week 1 they are all negative. Once the first week of CNY celebrations are over, all significant dummies are positive. Not only is this in accordance with the pattern we expected, but there is a clear distinguishing impact between CNY and February dummies. February per se increases activity, while the advent of CNY lowers it.

5 Concluding comments

This paper has provided a common framework to explain some liquidity-induced phenomena like autocorrelation patterns in stock returns and trading volumes, as well as some calendar anomalies. This method can be used to explain well-known anomalies like the January effect, but it has also helped us to explain a new anomaly uncovered in this paper, which we call the festivity effect. This effect refers to the pre-festivity period of negative returns and relatively low trading activity, and the post-festivity period of positive returns and increased trading activity. In ten countries in the Middle- and Far-East, we have established significant effects of this kind around the Muslim Ramadan and Chinese New Year festivities. Since these take place every year at a different time of the Western calendar, we have been able to classify the findings as genuine festivity effects rather than year-end effects caused by tax-loss motives or window dressing.

Since emerging markets have witnessed increased interest from both individual and institutional investors during recent years, it is important to address the economic value of the effects found in this paper. We have shown that Ramadan and the Chinese New Year currently exert substantial impact on index returns and trading volumes. For instance, Ramadan can even contribute an additional 4% to weekly index returns. Therefore, the influence of these festivities on returns deserves the attention of any investor.

Finally, we notice that our approach is not limited to the festivity effects discussed in this paper. Other anomalies may be interpreted and/or uncovered by our method in the future. This is a challenging task for further

research.

References

Alper, C. E., Aruoba, S. B., 2001. Moving holidays and seasonality: an application in the time and the frequency domains for Turkey. Mimeo.

Ariel, R. A., 1987. A monthly effect in stock returns. Journal of Financial Economics 18, 161–174.

Ariel, R. A., 1990. High stock returns before holidays: existence and evidence on possible causes. Journal of Finance 45, 1611–1626.

Aslaksen, H., 2002. When is Chinese New Year? Griffith Observer 66, 1–17.

Cadsby, B., Ratner, M., 1992. Turn-of-month and pre-holiday effects on stock returns: some international evidence. Journal of Banking and Finance 16, 497–509.

Chopra, N., Lakonishok, J., Ritter, J. R., 1992. Measuring abnormal performance: Do stocks overreact? Journal of Financial Economics 31, 235–268.

Daniel, K., Hirshleifer, D., Subrahmanyam, A., 1998. Investor psychology and security market under- and overreactions. Journal of Finance 53, 1839–1885.

Easley, D., O'Hara, M., 2003. Microstructure and asset pricing. In: Constantinides, G. M., Harris, M., Stulz, R. (Eds.), Handbook of the Economics of Finance, Vol. 1B. Elsevier North-Holland, Amsterdam, pp. 1021–1051.

Encyclopædia Britannica, 1985, Micropædia (12 vols) and Macropædia (17 vols), 15th ed. Encyclopaedia Britannica Inc, Chicago.

Frieder, L., Subrahmanyam, A., 2004. Nonsecular regularities in returns and volume. Financial Analysts Journal 60, 29–34.

Gao, L., Kling, G., 2005. Calendar effects in Chinese stock market. Annals of Economics and Finance 6, 75–88.

Hensel, C. R., Ziemba, W.T., 1996. Investment results from exploiting turn-of-the-month effects. Journal of Portfolio Management 22, 17–22.

Hirshleifer, D., Shumway, T., 2003. Good day sunshine: stock returns and the weather. Journal of Finance 58, 1009–1032.

Husain, F., 1998. A seasonality in the Pakistani equity market: the Ramadhan effect. Pakistani Development Review 7, 77–81.

International Monetary Fund, 2004, Pakistan: selected issues and statistical approach. IMF Country Report 04/415.

Lakonishok, J., Smidt, S., 1988. Are seasonal anomalies real? A ninety-year perspective. Review of Financial Studies 1, 403–425.

Kamstra, M. J., Kramer, L. A., Levi, M. D., 2002. Winter blues: a sad stock market cycle. American Economic Review 93, 324–343.

McGrattan, E. R., Prescott, E. C., 2001. Taxes, regulations, and asset prices. NBER Working Paper No. 610.

Mehra, R., Prescott, E. C., 2003. The equity premium in retrospect. In: Constantinides, G. M., Harris, M., Stulz, R. (Eds.), Handbook of the Economics of Finance, Vol. 1B. Elsevier North-Holland, Amsterdam, pp. 889–938.

Nofsinger, J. R., 2003. Social mood and financial economics. Working paper, Washington State University.

Odean, T., 1998. Are investors reluctant to realize their losses? Journal of Finance 53, 1775–1798.

Osler, C. L., Tooma, E., 2004. The magnetic attraction of price limits. Working paper, American University Cairo.

Saunders, E. M., 1993. Stock prices and Wall Street weather. American Economic Review 83, 1337–1345.

Schwert, G. W., 2003. Anomalies and market efficiency. In: Constantinides, G. M., Harris, M., Stulz, R. (Eds.), Handbook of the Economics of Finance, Vol. 1B. Elsevier North-Holland, Amsterdam, pp. 937–972.

Seyyed, F. J., Abraham, A., Al-Hajji, M., 2005. Seasonality in stock returns and volatility: the Ramadan effect. Research in International Business and Finance, forthcoming.

Stulz, R. M., Williamson, R., 2003. Culture, openness, and finance. Journal of Financial Economics 70, 313–349.

Table 1: Percentage of Muslims and Chinese in the countries of our sample.

	% Muslims	% Chinese (Han)
Egypt	82	
Jordan	95	
Pakistan	97	
Turkey	99	
Malaysia	50	36
Singapore	15*	76
China		94
Hong Kong		95
Taiwan		98
Korea		4*

Sources: Encyclopædia Britannica (Macropædia whenever the percentage is stated explicitly there, Micropædia otherwise); except the two starred entries which are obtained from the US State Department.

Table 2: Statistics on the stock exchanges, end 2004.

	capitalization (billion $)	value traded (billion $)	turnover (%)	companies (#)
Cairo & Alexandria Stock Exchanges	38	5	14	795
Amman Stock Exchange	18	5	29	212
Karachi Stock Exchange	29	74	256	661
Instanbul Stock Exchange	98	147	149	297
Bursa Malaysia	182	62	34	959
Singapore Exchange	218	107	49	633
Shanghai Stock Exchange	314	323	103	837
Hong Kong Exchanges	861	439	51	1096
Taiwan Stock Exchange	441	719	163	702
Korea Exchange	389	488	125	683

In this table, "capitalization" is defined as the dollar value of the total number of domestic shares outstanding at the end of 2004, "value traded" refers to the total dollar value of all shares traded in 2004, "turnover" is the ratio of value traded to market capitalization, and "companies" gives the number of companies listed on the exchange.

Table 3: Samples of returns and volumes for the ten markets.

	start sample (returns)	# obs.	start sample (volumes)	# obs.
Egypt: Hermes General	3/21/1997	431		
Jordan: MSCI Jordan	1/1/1988	911		
Pakistan: Karachi SE 100	6/23/1989	835		
Turkey: ISE National 100	1/8/1988	910		
Malaysia: KLCI Composite	6/14/1985	1044	4/23/1993	634
Singapore: Straits Times (new)	6/14/1985	1044	1/8/1993	650
China: Shanghai SE Composite	1/4/1991	754		
Hong Kong: Hang Seng	6/14/1985	1044	1/8/1993	650
Taiwan: SE 100	6/30/1995	520	5/12/1995	522
Korea: SE Composite (KOSPI)	6/14/1985	1044	1/12/1990	796

Table 4: Regression of returns, r_t, for the four Middle-Eastern markets.

r_t	Egypt	Jordan	Pakistan	Turkey
constant	0.0053	0.0016	–	0.0053
	(2.09)	(2.30)		(2.06)
r_{t-1}	–	0.088	0.20	–
		(2.57)	(4.59)	
r_{t-2}	–	–	0.062	0.11
			(1.80)	(2.57)
r_{t-3}	0.098	0.088	–	–
	(1.80)	(2.08)		
befRam3	–	−0.0069	−0.012	–
		(−1.85)	(−1.72)	
Ram2	–	–	–	0.037
				(1.78)
aftRam1	0.020	0.0035	0.013	0.017
	(2.45)	(2.20)	(2.18)	(1.86)
aftRam4	−0.013	–	–	–
	(−1.68)			
Jan1	–	0.012	0.028	0.042
		(1.99)	(3.55)	(4.24)
Jan2	–	–	–	0.048
				(2.50)
Jan3	0.028	–	–	–
	(1.74)			

This table reports the regression estimates for (2), for four countries in the Middle-East. The t-values are reported in parentheses, and are based on heteroskedasticity and autocorrelation consistent (HAC) robust standard errors. Estimates are only reported when their p-value is less than 10%, but outlier dummies are not reported. The other regression variables are defined as follows. Lagged returns are denoted by r_{t-i} for $i = 1, 2, 3, 4$. The dummies for the j-th week before, during, and after Ramadan are named, respectively, befRam$j$, Ram$j$, and aftRam$j$ for $j = 1, 2, 3, 4$. The variables Jan$j$ for $j = 1, 2, 3, 4$ represent dummy variables for the j-th week of January.

Table 5: Regression of returns, r_t, for the six Far-Eastern markets.

r_t	Malaysia	Singapore	China	Hong Kong	Taiwan	Korea
constant	–	–	–	0.0029 (2.73)	–	–
r_{t-1}	0.080 (1.86)	0.078 (1.90)	–	0.058 (1.99)	–	–
r_{t-2}	0.075 (1.67)	–	–	–	–	–
r_{t-3}	–	–	–	–	0.094 (1.66)	–
r_{t-4}	–	–	–	–	–	0.077 (2.07)
befRam4	–	0.011 (2.42)	–	–	–	–
Ram3	–	0.020 (2.26)	–	–	–	–
Jan2	–	–	–	–	0.016 (1.77)	–
befCNY3	–	–	–	–	–	0.024 (2.10)
befCNY1	–	−0.0086 (−2.07)	0.022 (1.89)	–	0.025 (2.62)	–
CNY1	–	–	–	0.012 (1.83)	–	–
aftCNY1	–	–	0.024 (1.99)	–	–	–
aftCNY2	–	–	–	–	0.022 (2.96)	–
aftCNY4	–	–	–	−0.021 (−2.80)	–	–
Feb1	0.026 (1.95)	0.018 (1.94)	–	–	–	–
Feb3	–	0.011 (2.25)	–	–	–	–

This table reports the regression estimates for (2), for six Far-Eastern markets. The t-values are reported in parentheses, and are based on heteroskedasticity and autocorrelation consistent (HAC) robust standard errors. Estimates are only reported when their p-value is less than 10%, but outlier dummies are not reported. The other regression variables are defined as follows. Lagged returns are denoted by r_{t-i} for $i = 1, 2, 3, 4$. The dummies for the j-th week before, during, and after Ramadan are named, respectively, befRam$j$, Ram$j$, and aftRam$j$ for $j = 1, 2, 3, 4$. The dummies for the j-th week before and after Chinese New Year are named, respectively, befCNYj and aftCNYj for $j = 1, 2, 3, 4$. CNY1 and CNY2 denote the first and second week of Chinese New Year. The variables Jan$j$ and Feb$j$ for $j = 1, 2, 3, 4$ represent dummy variables for the j-th week of January and February.

Table 6: Regression of the logarithm of volumes, $\log(\text{volume}_t)$.

$\log(\text{volume}_t)$	Malaysia	Singapore	Hong Kong	Taiwan	Korea
$\log(\text{volume}_{t-1})$	0.68 (19.73)	0.62 (16.94)	0.51 (12.86)	0.50 (11.02)	0.54 (9.66)
$\log(\text{volume}_{t-2})$	0.13 (4.03)	0.11 (2.73)	0.092 (2.63)	0.27 (5.47)	0.14 (3.75)
$\log(\text{volume}_{t-3})$	–	–	–	–	0.21 (3.58)
$\log(\text{volume}_{t-4})$	–	0.083 (2.74)	–	–	–
befRam4	−0.19 (−1.74)	–	–	–	–
befRam2	–	−0.25 (−2.77)	–	–	–
aftRam1	−0.65 (−3.13)	−0.25 (−3.21)	–	–	–
aftRam2	0.56 (5.10)	–	–	–	–
aftRam4	−0.23 (−3.61)	–	–	–	–
Jan1	0.29 (3.77)	0.31 (2.34)	0.52 (4.58)	–	–
Jan2	0.62 (4.90)	0.82 (6.10)	0.79 (6.93)	0.54 (5.35)	0.57 (3.87)
Jan3	–	0.26 (2.23)	0.35 (3.87)	0.29 (3.24)	0.28 (3.11)
Jan4	–	0.22 (2.41)	0.27 (2.98)	0.15 (1.97)	–
befCNY4	−0.26 (−2.04)	−0.43 (−3.27)	−0.54 (−3.75)	−0.25 (−2.85)	–
befCNY3	–	–	−0.27 (−3.21)	–	–
befCNY2	–	–	−0.16 (−1.69)	–	–
befCNY1	–	−0.18 (−3.02)	−0.17 (−2.56)	−0.32 (−2.74)	–
CNY1	−0.85 (−4.50)	−0.84 (−6.45)	−0.84 (−7.05)	−0.96 (−1.94)	−0.60 (−4.34)
CNY2	0.81 (4.76)	0.51 (4.74)	0.35 (3.73)	0.61 (8.45)	0.29 (2.92)
aftCNY1	–	–	–	0.55 (3.90)	–
aftCNY3	–	–	–	0.18 (3.15)	–
Feb1	–	0.31 (3.44)	0.18 (1.84)	–	–
Feb2	–	–	0.22 (1.93)	–	–

This table reports the regression estimates for (2), with the logarithm of volumes as the dependent variable, and with a linear trend as an additional explanatory variable. The estimates of trend and constant are not reported. The descriptive note of Table 5 applies here as well. We consider only countries for which enough volume data were available.