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Calendar anomalies in Russian stocks and bonds

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Abstract

Purpose – The paper aims to examine the Russian stock and bond markets for evidence of calendar anomalies in the first decade of the twenty-first century including a monthly seasonality, weekday seasonality, and a turn-of-the-month (TOM) seasonality. The study is motivated by interest in the Russian transition to a free market economy and provides an opportunity to examine an important emerging market in the process of transition, while adding to the extensive body of research on calendar anomalies.

Design/methodology/approach – Parametric and non-parametric tests are used to examine two Russian stock indices and two Russian bond indices for evidence of persistent calendar patterns in daily returns. The paper also includes in the study a US bond index and US stock index.

Findings – There is strong evidence of a persistent monthly pattern (but no January effect) and strong evidence of weekday seasonality (but no Monday effect) in the Russian bond market. There is also strong support for a TOM effect in the Russian and US stock and bond markets.

Research limitations/implications – The stock return data cover a ten-year period covering two recessions, two bull markets, and two bear markets, including the 2008 crisis. The bond market data are limited to six years of data and the results may be biased by the time period analyzed.

Originality/value – This is the first study, to the knowledge, that extensively examines the Russian stock and bond markets for evidence of calendar anomalies and finds a significant monthly pattern in Russian bonds.

Keywords Calendar, Emerging markets, Bonds, International investments, Seasonal patterns, Stocks

Paper type Research paper

1. Introduction

This study is motivated by the rapid growth and modernization of the Russian stock and bond markets following the country's transition to a free market economy and its emergence as an economic power. The Russian bond market in particular presents an interesting study, considering the scale of growth of that market in the past decade. Using parametric and non-parametric methods, we examine the daily returns of stock and bond markets in the Russian Federation and the USA from 1998 through 2008 for evidence of persistent calendar patterns. We find a significant weekday, monthly, and turn-of-the-month (TOM) pattern in the Russian corporate (non-guaranteed) bond market and, to our knowledge, this is the first study to examine the Russian corporate bond market for a monthly seasonal pattern.

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1.1 Russian Federation and the former Soviet Union

Since the collapse of the Soviet Union, the Russian Federation has made steady progress toward the diversification of the economy and transformation of the financial infrastructure. After recovering from the 1998 debt default and devaluation of the ruble, the Russian Federation doubled its gross domestic product (GDP) and averaged a real GDP growth rate near 6 percent, moving the country from 11th place in 1998 to sixth place in the world in 2011, behind the USA, China, India, Japan and Germany (IMF, 2012). With the exception of pro-Western Estonia, the Russian Federation has arguably been the most successful of the 15 former Soviet Union countries in improving its economy and developing efficient financial markets.

1.2 Post Soviet Union trends

Economic development in the Russian Federation has been heavily reliant on commodity exports. The eight largest oil exporters in Russia are responsible for 60 percent of total market capitalization. In 2011 the Russian Federation became the world's largest oil producer and second largest producer of natural gas (OECD, 2012). However, the Russian economy was hard hit by the financial crisis of 2008, due primarily to its dependence on oil and the collapse of oil prices following the crisis, and since then progress toward modernization has been slowed.

In an effort to deal with the unstable nature of oil markets the Russian Federation established the stabilization fund in 2004 as a buffer against the volatile revenue flows from commodity exports and to provide diversification funding for strategically important industries in emerging sectors of the national economy. The fund aided Russia's recovery from the 2008 financial crisis (Kononova, 2010).

Russia's long-term public and publically guaranteed debt-to-GDP ratio has been significantly reduced since the 1998 crisis, primarily due to effective use of the stabilization fund and favorable oil prices. In 2008 the debt-to-GDP ratio hit a low of 9 percent. In contrast, private corporate borrowing has soared as outstanding domestic bonds, Eurobonds and syndicated loans have found a receptive external market (Table I). Corporate borrowing is highly concentrated in the oil and gas sector and banking sectors. According to a 2011 report, 12 percent of companies account for 80 percent of corporate borrowing, with oil and gas holding a 52 percent share of bonds and syndicated loans (Arakelyan and Nestmann, 2011).

Despite the wealth of natural resources, the Russian Federation faces significant headwinds in its struggle to modernize due to fundamental structural problems. These include a declining population, an aging workforce that is 43 percent as productive as that in developed countries, and a low capital investment policy that is more typical of developed countries than developing ones (*New York Times*, 2012). In addition, much of the income that is being generated from the country's natural resources is concentrated in a few hands. In the Heritage Foundation's 2012 Index of Economic Freedom Russia ranks 144 out of 179 in wealth disparity. That places Russia in the bottom third of former Soviet Union countries. By contrast, the USA ranks 10th and Estonia ranks 16th.

Yet, the country is making significant progress in developing its financial infrastructure. 10 percent annual growth in real disposable income has made equity markets attractive to the Russian public. 2007 was a pivotal year in the Russian stock market, with banking, consumer goods, electricity, and construction industries raising

Year	Total external debt[a]	GDP	Total debt/GDP (%)	PPG debt[b]	PNG debt[c]	Private debt/total debt (%)
1996	126.4	392	32	101.9	0.0	0.0
1997	127.6	405	32	106.5	1.9	1.5
1998	175.3	271	65	119.1	22.2	12.6
1999	180.0	196	92	118.7	22.6	12.5
2000	146.5	260	56	90.2	21.8	14.8
2001	141.1	307	46	85.3	22.3	15.8
2002	138.4	345	40	79.4	28.5	20.6
2003	185.9	430	43	84.9	57.0	30.7
2004	214.2	591	36	102.1	73.3	34.2
2005	249.8	764	33	95.2	119.4	47.8
2006	308.8	990	31	130.3	129.4	41.9
2007	471.2	1,300	36	151.1	210.9	44.8
2008	493.9	1,661	30	151.1	259.9	52.6
2009	479.0	1,223	39	197.4	219.7	45.9
2010	510.2	1,525	33	183.2	258.0	50.6
2011	543.0	1,899	29	192.2	272.1	50.1

Table I.
Russian Federation's total external debt, GDP, total external debt as a percent of GDP, public and publically guaranteed external debt, PNG external debt, and private debt as a percent of total debt

Notes: [a]Total external debt: debt owed to non-residents repayable in foreign currency, goods, or services; total external debt is the sum of PPG, and PNG long-term debt, use of IMF credit, and short-term debt; [b]PPG debt which comprises long-term external obligations of public debtors, including the national government, political subdivisions, and autonomous public bodies, and external obligations of private debtors that are guaranteed for repayment by a public entity; [c]PNG external debt comprises long-term external obligations of private debtors that are not guaranteed for repayment by a public entity; all debt and GDP in US$ billion
Source: The World Bank (2013)

nearly $30 billion in over 30 public offerings that year, more than any other European country (*Institutional Inversot Magazine* and MICEX Stock Exchange, 2007). Russia's market capitalization at the time was comparable to that of India and China, with only 190 companies trading on Russian exchanges. 2007 was a watershed not only for foreign investors, whose involvement on the Moscow Interbank Currency Exchange (MICEX) increased from 15 to 25 percent of daily trading volume, but also for domestic investors. It was predicted that the rise in IPOs would promote a more competitive and efficient market (*Institutional Inversot Magazine* and MICEX Stock Exchange, 2007).

2. Russian financial markets

2.1 Russian financial landscape

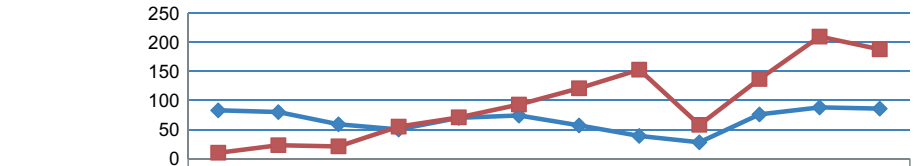
Prior to the 2008 financial meltdown, global stock market capitalization hit a peak of $65 trillion in 2007 before falling to $34 trillion in the 2008. The market capitalization of Russian companies fell 74 percent in 2008, from $1.5 trillion to $397 million. By contrast, the US markets lost 38 percent of their value, falling from $19.9 trillion to $11.7 trillion. By the end of 2010 the Russian market had recovered 40 percent of its value and ended the year just over $1 trillion, while the US market ended the year at just over $17 trillion in market value.

Global debt markets were not as severely affected by the crash and, in fact, rose in value $2 trillion in 2008. Outstanding world public and private debt (financial institution and non-financial corporate bonds) increased from $79 trillion in 2007 to

$93 trillion in 2010 (McKinsey Global Institute, August 2011). While emerging markets accounted for only 18 percent of global financial stock at the end of 2010, the outstanding debt and equity of emerging markets has grown by an average 18.3 percent annually from 2000 to 2009, compared with 5 percent in developed countries. The debt of emerging markets is playing a greater role in global financing (McKinsey Global Institute, August 2011). Since 2000, growth in emerging market corporate debt has outpaced government debt and by 2003 corporate bond issues surpassed government debt for the first time (Figure 1). Improving credit fundamentals for emerging market public and private issuers stand in stark contrast to deteriorating government balance sheets in many developed markets. It is expected that emerging markets corporate bonds will dominate the market for US$-denominated emerging debt for the foreseeable future. With nominal emerging market GDP comprising near 40 percent of global GDP, up from 20 percent a decade ago, corporate debt has become an increasingly important asset class addition for sophisticated investors as the market grows and liquidity continues to improve (Duda, 2013).

Historically, developing countries have depended primarily on bank financing for private sector investment. However, the Central and Eastern European economies are not homogeneous in their capital structures. According to Delcoure (2007) the Russian banking sector has failed to perform the traditional intermediation role due to a fundamental lack of trust in the system. Bank credit financed only 12 percent of investments in 2009 and this still represented only 2 percent of new investment financing. The most important source of Russian investment financing has been, and continues to be, retained earnings (Gotlewsk *et al.*, 2010).

Bond financing has, until recently, been available only to top-tiered state-owned or oligarch-controlled companies. Poyry and Maury (2010) show that state-controlled firms, which make up 37 percent of Russian traded companies, have had easier access to debt financing through state banks and have higher debt levels than firms with controlling shareholders that are either foreign owned or controlled by Russian oligarchs. Those firms' debt levels are in line with privately controlled Russian firms, meaning low debt levels and more reliance on less expensive internal funds. Recent evidence, however, indicates that the use and maturity of debt financing has increased and this increase signals a developing capital market (Delcoure, 2007). Just prior to the 2008 credit crisis corporate bond financing increase sixfold, from $10 billion to $64 billion, between 2004 and 2008 (Gotlewsk *et al.*, 2010). The rapid growth of bond



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sovereign debt	83	80	59	50	70	74	57	39	28	76	88	86
Corporate debt	10	23	21	55	71	93	121	153	58	137	210	188

Source: JPMorgan (December 31, 2011), in Duda (2013)

Figure 1.
New emerging market bond issues (in US$ billions)

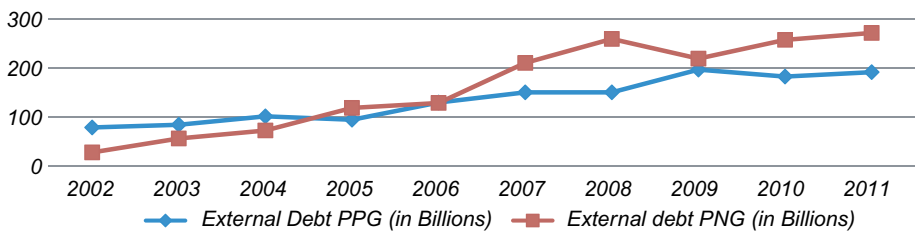
financing mirrors the growth of Russian total public and publicly guaranteed external debt (PPG) and private non-guaranteed external debt (PNG) that has occurred since 2002 (Figure 2).

2.2 Institutional changes

Despite deficiencies in the Russian financial markets, such as governmental control of strategic industries and a weak corporate governance environment, recent developments in the financial infrastructure and regulatory framework is generating interest and providing investors with attractive financing opportunities in the Russian Federation. Important changes in antitrust legislation, currency liberalization, and derivatives regulation, signal a significant effort to modernize the Russian financial system. The introduction of amendments to old legislation and passage of new rules has contributed to this effort. Among the most significant legislative acts is the law "On Foreign Investment in the Russian Federation" which guarantees equal rights to foreign and domestic investors and allows foreigners to transfer revenues outside of Russia.

Another major change is the conversion from Russian Accounting Standards (RAS) to International Financial Reporting Standards (IFRS). In April 2011, the Russian National Accounting Standards Board (NASB) signed an agreement with the IFRS Foundation allowing Russia to adopt the global accounting standards, which should be fully implemented by 2015.

Also, in 2011, Russia's financial regulators, the Federal Financial Markets Service, moved aggressively to implement international standards of liquidity and settlement (FT.com, June 19, 2011). The establishment of a Central Securities Depository (CSD) infrastructure codifies the protections of foreign investors and ensures that domestic brokers-dealers and international investors are operating on a level playing field (Dechert, LLP, May 2012). In June 2012 the Russian Finance Minister, Petr Kazakevich, announced that the international central depositories Clearstream and Euroclear would be allowed to operate in the Russian Government bond market in late 2012 and in the corporate bond and equity markets in 2013. This move eliminates one more barrier to foreign investment, since US institutional investors are legally barred from placing money in any country that does not provide this protection.



Notes: Stock of Russian external debt in current US$; PPG debt comprises long-term external obligations of public debtors, including the national government, political subdivisions (or an agency of either), and autonomous public bodies, and external obligations of private debtors that are guaranteed for repayment by a public entity; PNG external debt comprises long-term external obligations of private debtors that are not guaranteed for repayment by a public entity
Source: The World Bank (2013)

Figure 2.
Long term Russian debt (public and private): 2002-2011

2.3 Market indexes

Since the first Russian IPO in 1997, Russian companies have preferred to list on foreign exchanges, initially on the NYSE, then on the London Stock Exchange (LSE). From 2008 through the end of 2011 five of the ten largest Russian IPOs were offered exclusively on the LSE, and three more were a cooperative effort of the LSE, the Russian Trading System (RTS) and the MICEX (*Institutional Investor Magazine*, 2012).

Until their merger in December 2011, the RTS and the MICEX were the country's largest trading platforms (MICEX, 2008, 2009; RTS, 2008a, b). Established in 1995, RTS was designed similar to the NASDAQ Stock Exchange, specializing in smaller companies' equity securities, and was the initial platform for the Russian derivatives market, futures and options on RTS (FORTS). MICEX began in 1992 as a currency exchange and expanded into equity trading, offering trading in foreign currency, government bonds, derivatives, and corporate stocks and bonds (*Institutional Inversot Magazine* and MICEX Stock Exchange, 2007).

In addition to RTS and MICEX, there are multiple regional currency and stock exchanges in Russia. Until recently the St Petersburg Stock Exchange accounted for 15 percent of the total volume of trades in the Russian securities market, due to the fact that it had the exclusive right to trade the shares of the nation's largest oil and natural gas company, Gazprom. Starting in 2006, shares of this company could be traded on RTS and MICEX, thus diminishing the role of the St Petersburg exchange. Other regional currency and stock exchanges include Yekatirenburg, Rostov-on-Don, Samara, Vladivostok, Novosibirsk, and Novgorod (American Bankers Association, 2006).

MICEX calculates several stock and bond indices, including the ruble-denominated MICEX Index (INDEXCF), which was introduced in 1997 as a capitalization weighted composite index of the 30 most liquid stocks of Russia's largest companies representing approximately 80 percent of the Russian stock market. The RTS Index (RTSI$), a dollar-denominated capitalization weighted index of 50 stocks traded on the RTS, was introduced in 1995. In 2006 Standard and Poor's added the RTS Index to its global index portfolio. The interest of foreign direct investors in Russian financial markets and the significance of the RTS Index in reflecting the behavior of Russian equities became the driving forces behind the creation of a partnership between RTS and Standard & Poor's (Standard & Poor's, 2007). In December 2011 RTS and MICEX were joined to form a single exchange (renamed the MICEX-RTS Exchange) and in October 2012 MICEX announced plans to add 20 stocks to make the composition of the ruble-denominated MICEX index identical to the 50 stock RTS Index.

The MICEX Corporate Total Return Bond Index (MICEX CBI) is the successor to the Russian Corporate Bond Index (RCBI), with data going back to December 31, 2002. This total return (TR) index is revised quarterly based on bond rating, market capitalization, liquidity, and the investment grade of companies issuing bonds.

The RUX Cbond Index, with data going back to January 1, 2002, was the first Russian Index to track bond activity and was a joint effort of two agencies: Interfax International Information Group and the Cbonds.ru agency. The name was changed to IFX-Cbonds on January 1, 2009. The Index base is revised monthly and is based upon similar factors as the MICEX CBI Index. In December 2010 there were 56 bonds of 27 issuers in the MICEX CBI Index and 30 bonds of 19 issuers in the IFX-Cbonds Index (Russian Stock Market 2010-Events and Facts).

In 2012, the country's financial regulators opened the domestic debt market to international clearing houses (Dow Jones Newswire, May 2012) and introduced new securities clearing legislation (Euromoney FXNews.com, October 2011), paving the way for more foreign investment in the Russian bond market.

3. Relevant literature

3.1 Calendar anomalies in the USA

The existence of a January effect in the US stock market, in which January was shown to have higher returns than any other month of the year, was first documented by Wachtel in 1942. 14 years later this market anomaly was confirmed by Rozeff and Kinney (1976) and several explanations have been proposed as contributing to its persistence, including: increased January risk premiums (Rozeff and Kinney, 1976; Rogalski and Tinic, 1986), a surge in liquidity after the turn of the year (Ogden, 1990; Ligon, 1997), year-end window dressing by institutional investors (Haugen and Lakonishok, 1988), and tax motivated selling by individual investors (Lakonishok and Smidt, 1984; Ritter, 1988; Ritter and Chopra, 1989). Beside the different theories in explanation of the January effect, scholars have found mixed evidence of its persistence in the US markets (Haugen and Jorion, 1996; Compton and Kunkel, 2000).

Some of the earliest research on the weekend (or Monday) effect, defined by negative returns between Friday's closing stock price and Monday's closing stock price, include Cross (1973), French (1980) and Gibbons and Hess (1981). Explanations for this effect: release of negative information on weekends (Patell and Wolfson, 1982; Penman, 1987; Fishe *et al.*, 1993), and the trading patterns exhibited by individual and institutional investors (Lakonishok and Maberly, 1990; Abraham and Ikenberry, 1994).

The TOM effect, the third calendar anomaly that we examine, was first reported by Ariel (1987), in the daily returns for equal-weighted stock index and value-weighted stock market indexes for the period 1963-1981. Ariel found that the cumulative returns for the first half of the month, defined as the last trading day of the previous month and the first eight days of the month, were 2,552 percent on the equal-weighted index and 565 percent on the value-weighted index. However, cumulative returns for the second half of the month were negative.

The most popular explanation for the TOM effect is the liquidity effects of buying patterns of pension funds and the "standardization of payments system" in the US market (Lakonishok and Smidt, 1988; Ogden, 1990). Further studies conducted by Lakonishok and Smidt (1988) on daily stock returns from 1897 to 1987, and by Kunkel and Compton (1998) on private equity fund (CREF) returns have confirmed the persistence of the TOM effect.

3.2 Calendar anomalies globally

Of the many calendar anomalies studies conducted on foreign financial markets, Cadsby and Radner (1992) found a TOM effect in six out of the ten examined countries: Australia, Canada, Germany, Switzerland, the UK and the USA, while Kunkel *et al.* (2003) identified a TOM effect in 16 of the 19 countries. Agrawal and Tandon (1994) found a January effect and a weekend effect in the stock markets of 16 out of 18 countries for the period from 1971 to 1987. Jaffe and Westerfield (1985) confirmed the existence of weekend effect in the stock markets of Australia, Canada, Japan and the UK. Of particular interest are the studies of calendar anomalies in the emerging

markets of Asia (Aggarwal and Rivoli, 1989), Africa (Ayadi *et al.*, 1998), Eastern Europe (Ajayi *et al.*, 2004; Tonchev and Kim, 2004), and India (Raj and Kumari, 2006). Heininen and Puttonen (2009) examined the stock markets of 11 Central and East European countries from 1997 to 2008, finding inconsistent evidence of weekly and monthly patterns, and the patterns that do exist fade when countries are admitted to the European Union. While few studies have focused on bond market returns in emerging markets, one study (Bespalko, 2009) that examines the day-of-the-week effect and day-of-the-month effect in the stock and bond markets of seven emerging market countries found significantly higher bond market returns on Tuesday. The bond markets of emerging markets appear to be less efficient than the stock markets, which the author attributes to the longer history of operations in stocks in emerging markets. Table II shows select single country studies.

4. Data and methodology

In our study, the Russian indices include the dollar-denominated RTS Index and the ruble-denominated MICEX Index, both market capitalization weighted, and the RUX Cbonds and CBI TR bond indices. All data, except RUX Cbonds, was obtained from the web sites of the trading platforms. The RUX Cbonds daily returns were taken from the web site of "Cbonds" agency, which coordinates the index as a joint venture with RTS.

The US stock and bond indices chosen for comparative purposes are the S&P 500 stock index and the Dow Jones Corporate Bond Index. The daily returns for these indices were obtained from www.finance.yahoo.com and the Dow Jones Indexes web site. The daily returns for the three stock indices cover the period from January 1, 1998 through December 31, 2008. The data for the three bond indices cover the period from January 1, 2003 through December 31, 2008.

4.1 The January effect

This study includes two OLS regression tests for January effect. We first run a regression to test whether all months have the same mean daily returns. We use the following equation for our first (F1) test:

Study	Country	Period	JE	WE	TOM
Alexaxis and Xanthakis (1995)	Greece	1985-1994		x	
Arsad and Coutts (1997)	UK	1935-1994	x	x	
Athanassakos and Robinson (1994)	Canada	1975-1989		x	
Balbina and Martins (2002)	Portugal	1988-2001	x	x	x
Barone (1989)	Italy	1975-1989	x	x	x
Coutts and Sheikh (2002)	South Africa	1987-1997	x	x	
Demirer and Karan (2002)	Turkey	1988-1996		x	
Depenchuk *et al.* (2010)	Ukraine	2003-2007	x	x	x
Easton and Faff (1994)	Australia	1974-1985		x	
Holden *et al.* (2005)	Thailand	1995-2000	x	x	x
Lauterbach and Ungar (1992)	Israel	1977-1990		x	x
Madureira and Leal (2001)	Brazil	1986-1998		x	
Martikainen and Puttonen (1997)	Finland	1989-1990		x	
Raj and Kumari (2006)	India	1987-1998	x	X	

Notes: JE – January effect; WE – weekend effect; TOM – turn-of-the-month effect

Table II.
Select single country studies on calendar anomalies

$$R_t = \beta_1 D_{1t} + \beta_2 D_{2t} + \cdots + \beta_{12} D_{12t} + \varepsilon_t \quad (1)$$

where coefficients $\beta_1 \ldots \beta_{12}$ show mean daily returns for each month, the dummy variables $D_1 \ldots D_{12}$ are 1, if the mean daily return occurs in that month, and zero otherwise, and ε_t is the error term. The rejection of the null hypothesis of equal returns across months would imply that there is seasonality in returns in months of the year.

If the null hypothesis is rejected, we run a second regression to determine whether mean daily returns during January are significantly different than mean daily returns for other months of the year. We use the following equation for our second (F2) test:

$$R_t = \alpha + \beta_1 D_{1t} + \beta_2 D_{2t} + \cdots + \beta_{11} D_{11t} + \varepsilon_t \quad (2)$$

where α represents mean January daily return, coefficients $\beta_1 \ldots \beta_{11}$ represent the difference between expected mean daily returns for January and mean daily returns for other months of the year, the dummy variables $D_1 \ldots D_{11}$ are 1, if the mean daily return occurs in that month, and zero otherwise, and ε_t is the error term.

4.2 The weekend effect

To test for a day-of-the-week effect we run a regression to test the null hypothesis that all days of the week have the same mean daily returns. The following equation is used for our first (F1) test:

$$R_t = \beta_1 D_{1t} + \beta_2 D_{2t} + \cdots + \beta_5 D_{5t} + \varepsilon_t \quad (3)$$

where coefficients $\beta_1 \ldots \beta_5$ represent mean daily returns for each trading day of the week, the dummy variables $D_1 \ldots D_5$ are 1, if the mean daily return occurs on that day of the week, and zero otherwise, and ε_t is the error term. Rejection of the null hypothesis indicates that mean daily returns are different during the week and the day-of-the-week calendar anomaly exists. To test specifically for the weekend effect, we run a second regression which tests the null hypothesis that Monday mean daily returns are different from mean daily returns for other days of the week. We use the following equation for our second (F2) test:

$$R_t = \alpha + \beta_1 D_{1t} + \beta_2 D_{2t} + \cdots + \beta_4 D_{4t} + \varepsilon_t \quad (4)$$

where α represents mean daily returns on Monday, coefficients $\beta_1 \ldots \beta_4$ show difference between mean daily returns on Monday and mean daily returns for other days of the week, the dummy variables $D_1 \ldots D_4$ are 1, if the mean daily return occurs on that day of the week, and zero otherwise, and ε_t is the error term. The rejection of null hypothesis indicates the presence of a weekend effect.

4.3 The TOM effect

To test for the TOM effect, we first run a regression to determine whether mean daily returns during the 18 days surrounding the TOM are significantly different from zero. The following equation is used for our first (F1) test:

$$R_t = \beta_{-9} D_{-9t} + \beta_{-8} D_{-8t} + \cdots + \beta_8 D_{8t} + \beta_9 D_{9t} + \varepsilon_t. \quad (5)$$

where coefficients $\beta_{-9} \ldots \beta_9$ show mean daily returns for each day during the TOM, the dummy variables $D_{-9} \ldots D_9$ are 1, if the mean daily return occurs on that day, and zero otherwise, and ε_t is the error term.

If the mean daily returns are significantly different from zero, we run a second regression to test the null hypothesis that mean daily returns around the TOM are the same as the mean daily returns during the rest-of-the-month (ROM). We use the following equation for our second (F2) test:

$$R_t = \alpha + \beta \ D_{TOM} + \varepsilon_t \quad (6)$$

where α is the mean return for the ROM period, β is the difference between the mean TOM return and the mean ROM return, D_{TOM} is a binary dummy variable for the TOM period, and ε_t is the error term. The turn-of-the month period is defined as days $-1 \ldots +3$, as discussed in earlier papers. The rejection of the null hypothesis would indicate that a TOM effect is present in the index data we examined.

In addition to running OLS regression tests, we also conduct two non-parametric tests to account for the fact that the data is not normally distributed. First, we use a sign test to determine whether the daily returns during the TOM are significantly different from the ROM returns in more than 50 percent of the months. Second, we use the Wilcoxon signed-rank test, which is free from distributional assumptions and is therefore more robust than OLS regression. To implement the Wilcoxon test, we first sort the absolute values of differences between the TOM and the-ROM returns from smallest to largest. We then assign ranks to the absolute values and determine the sums of the ranks of positive and negative differences. If the sum of the ranks of positive differences is not equal to the sum of the ranks of negative differences, the null hypothesis will be rejected and we can support the conclusion that the TOM effect is present in the index data.

5. Results and conclusion

The existence of calendar anomalies in the RTS Index, MICEX Index, S&P 500 Index, RUX-Cbond Index, CBI TR Bond Index and the Dow Jones Corporate Index were examined by conducting OLS regression tests and non-parametric tests.

5.1 The January effect

The results of our test for the January effect, reported in Table III, show no evidence of a monthly calendar pattern or a January effect in either of the Russian stock indices or the S&P 500 Index. However, both Russian bond indices exhibit a significant monthly pattern. For both indices, the mean daily returns for January, February, March, and April are significantly greater than the mean daily returns for other months of the year. The F1 test for a month-of-the-year effect is significant at the 1 percent level for both Russian bond indices and the F2 test for a January effect in the RUX Cbond Index and the CBI TR Index is significant at the 5 percent level and the 10 percent level, respectively. The Dow Jones Corporate Bond Index shows a month-of-the-year effect at the 10 percent level, but the test for a January effect is not statistically significant.

5.2 The weekend effect

The results of the day-of-the-week and weekend effect tests are reported in Table IV. None of the stock or bond indices shows a significant weekend effect (F2). The Russian RTS and MICEX stock indices show *F*-values of 2.19 and 1.94, respectively, which are significant at the 10 percent level. The S&P 500 Index did not display any day-of-the-week effect.

Month	Return	*t*-statistic	Return	*t*-statistic	Return	*t*-statistic
			Stock indices			
	RTS		*MICEX*		*S&P 500*	
January	−0.018	−0.09	0.127	0.57	−0.013	−0.14
February	0.384	2.02**	0.453	2.12**	−0.064	−0.70
March	0.336	1.84*	0.378	1.84*	0.064	0.75
April	0.188	1.04	0.183	0.90	0.081	0.91
May	−0.179	−0.94	−0.122	−0.57	0.019	0.21
June	0.032	0.18	0.020	0.09	−0.023	−0.26
July	−0.084	−0.47	−0.102	−0.51	−0.068	−0.77
August	−0.157	−0.88	−0.073	−0.36	−0.038	−0.45
September	−0.351	−1.93*	0.017	0.08	−0.104	−1.16
October	0.114	0.64	0.167	0.83	0.079	0.92
November	0.135	0.73	0.221	1.06	0.055	0.61
December	0.283	1.56	0.204	0.99	0.074	0.85
F1	1.47		1.05		0.51	
F2	0.15		0.00		0.05	
			Bond indices			
	RUX-Cbond		*CBI TR Bond*		*DJ Corporate*	
January	0.073	3.52***	0.062	2.74***	0.036	1.06
February	0.073	3.69***	0.072	3.34***	0.047	1.34
March	0.054	2.86***	0.043	2.10**	−0.024	−0.72
April	0.040	2.13**	0.037	1.82*	0.015	0.45
May	0.040	2.07**	0.017	0.80	0.012	0.36
June	0.016	0.86	0.013	0.63	0.002	0.06
July	0.013	0.68	0.019	0.97	−0.027	−0.79
August	0.026	1.40	0.009	0.44	0.069	2.12**
September	−0.004	−0.19	−0.001	−0.03	−0.015	−0.43
October	−0.006	−0.31	−0.025	−1.26	−0.036	−1.09
November	0.023	1.18	0.002	0.12	0.057	1.68*
December	0.070	3.72***	0.028	1.36	0.092	2.76***
F1	5.13***		2.67***		1.72*	
F2	3.85**		3.36*		0.28	

Note: Significant at: *10, **5 and ***1 percent levels

Table III.
Mean daily percent returns and *t*-statistics by month

The strongest results are exhibited by the Russian bond indices, which show a significant day-of-the-week effect at the 1 percent level. Thus, we reject the null hypothesis that returns on Mondays and the returns for other days of the week are jointly equal to zero. However, the OLS regression of the weekend effect was not statistically significant. In summary, we find no weekend effect in either the Russian or US stock and bond markets.

5.3 The TOM effect

The results of our tests for a TOM effect are presented in Tables V and VI. As indicated in Table V, when testing the entire sample period from January 1, 1998 to December 31, 2008, the RTS stock index and the MICEX stock index have significant positive mean daily returns for the first and second day of the month. The S&P 500 stock index also shows evidence of a TOM effect.

	Monday	Tuesday	Wednesday	Thursday	Friday	F_1	F_2
			Stock indices				
RTS							
Mean return	0.091	0.041	−0.249**	0.127	0.258**	2.19*	0.10
SD	2.880	2.684	2.284	2.899	2.654		
MICEX							
Mean return	0.248*	0.100	−0.161	0.199	0.198	1.94*	1.05
SD	3.420	3.302	2.947	3.033	2.976		
S&P 500							
Mean return	−0.009	0.031	0.006	0.004	−0.001	0.07	0.09
SD	1.455	1.384	1.293	1.333	1.208		
			Bond indices				
RUX-Cbond							
Mean return	0.041***	0.005	0.031**	0.036***	0.058***	9.57***	0.41
SD	0.216	0.225	0.187	0.191	0.235		
CBI TR Bond							
Mean return	0.030**	0.000	0.018	0.025*	0.036***	3.42***	0.46
SD	0.237	0.258	0.208	0.190	0.258		
DJ Corporate							
Mean return	0.058***	0.027	0.008	−0.009	0.013	1.79	3.75*
SD	0.319	0.412	0.338	0.380	0.426		

Note: Significant at: *10, **5 and ***1 percent levels

Table IV.
Mean daily percent returns and standard deviations by weekday

Trading day	Stock indices RTS	Stock indices MICEX	Stock indices S&P 500	Bond indices RUX-Cbond	Bond indices CBI TR Bond	Bond indices DJ Corporate
−9	−0.145	0.334	0.062	−0.008	−0.017	0.070
−8	0.112	−0.067	−0.106	0.026	−0.011	0.077*
−7	0.101	0.162	−0.195*	0.040	0.022	0.025
−6	0.099	−0.013	−0.124	0.021	0.005	−0.006
−5	−0.017	0.373	0.053	0.013	0.057**	0.035
−4	−0.062	0.044	0.152	0.038	0.024	0.045
−3	−0.155	0.016	0.007	0.041	−0.021	0.055
−2	−0.195	−0.165	0.101	−0.009	0.004	0.105**
−1	0.380	0.137	0.008	0.112***	0.127***	0.108**
1	0.420*	0.553**	0.223*	0.056**	0.026	−0.018
2	0.054**	0.539**	−0.009	0.054**	0.023	0.036
3	−0.179	0.109	−0.081	0.049*	0.058**	−0.039
4	0.061	0.289	0.046	0.060**	0.012	0.076*
5	0.026	0.283	−0.038	0.020	0.003	0.001
6	0.044	−0.198	−0.111	0.021	0.005	0.050
7	−0.182	−0.234	−0.241**	0.405	0.051**	−0.060
8	0.019	0.050	−0.044	0.030	0.031	−0.018
9	0.124	−0.033	0.130	0.055	0.059**	−0.069

Note: Significant at: *10, **5 and ***1 percent levels

Table V.
Mean daily percent returns for trading days around the TOM

Table VI.
Mean daily percent returns for the TOM, ROM, and entire month (EM) along with TOM tests

	Mean return TOM	Mean return ROM	Mean return EM	*F*-statistic	Non-parametric sign *t*-test	Wilcoxon signed-rank test *p*-value
Stock indices						
RTS	0.2911***	−0.0123	0.0551	5.95**	9	0.0338
MICEX	0.3349***	0.0605	0.1216*	3.11*	5	0.0499
S&P 500	0.0354	−0.0220	−0.0093	0.77	17***	0.0989
Bond indices						
RUX-Cbond	0.0674***	0.0282***	0.0370***	7.52***	12***	0.0019
CBI TR Bond	0.0584***	0.0157**	0.0253***	8.48***	15***	0.0002
DJ Corporate	0.0214	0.0133	0.0151	0.11	−2	0.8655

Note: Significant at: *10, **5 and ***1 percent levels

As indicated in Table VI, the TOM effect is significant in both of these indexes, with an average daily return for the TOM period of 0.2911 percent vs a −0.0123 for the ROM period for the RTS Index, and 0.3349 vs 0.0605 for the MICEX Index. The Wilcoxon signed-rank test is also statistically significant at the 5 percent level. Based on these results, we conclude that the Russian stock indices show a significant TOM effect.

The RUX-Cbond Index has significant positive mean daily returns for the TOM period. The mean daily return for the TOM period is 0.0674 percent vs 0.0282 percent for the ROM, significant at the 1 percent level for all three of our parametric and non-parametric tests. The CBI TR Bond Index also has significant positive mean daily returns for the TOM period, which are significant at the 1 percent level for all three tests. The mean daily return for the TOM period is 0.0584 percent vs 0.0157 percent for the ROM.

We find no TOM effect in the US corporate bond index. While the TOM return of 0.0214 percent is greater than the ROM returns of 0.0133 percent, none of the test results are significant at even the 10 percent level. These results support the findings of earlier studies.

5.4 Conclusions

This study examined the existence of three calendar market anomalies, the January effect, the weekend effect and the TOM effect, in the stock and bond markets of the USA and the Russian Federation. Although the Russian Federation is one of the most rapidly developing markets in Eastern Europe, our results indicate that Russian stock and corporate bond markets are still not as efficient as the markets in the USA, and the Russian bond market in particular exhibits strong seasonal patterns.

A statistically significant weekday pattern is present in Russian bonds, but not the Tuesday effect reported in previous research. Russian bonds also exhibit unusually high returns in the first months of the year, which we do not find to be the case in the Russian stock market. Finally, a significant TOM effect is found in the both Russian stock and bond markets. Future research may shed light on the source of unusually high returns in the Russian bond market in the first half of the year, but we suspect that as the corporate bond market matures, this pattern will fade.

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