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Corporate fraud matters if you control firm leverage: evidence from the Russian bond market

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Importance. Financial market turbulence and worldwide economic decline present new challenges to the participants of the bond market. One of these challenges is related to the quality of information on firms' activities provided to stakeholders.
Purpose. Identifying price anomalies in the rouble bond market caused by expectations of fraudulent activities of corporate issuers towards the falsification of information revealed in financial statements (accounting fraud) and of the firms capital structure.
Methods. We consider four working hypotheses on the influence of the capital structure and the tendency of firms towards fraudulent activities on the falsification of reported information. We examine the excess returns and factor model based risk-adjusted returns of bond portfolios consisting of firms with different levels of fraud risk controlling firm capital structure and then check whether our results are robust with respect to bond market hidden states. We use the Hidden Markov Model to recover the sequence of bond market states based on spread of 30-year minus 3-months government bond yields. The authors performed data analysis in RStudio. The sample covers the period from January 2011 to December 2022.
Results. This paper provides evidence of the significant contribution of the newly proposed risk factor, corresponding with corporate fraud controlling for firm capital structure, to the explanatory power of asset pricing models for bond portfolios excess returns. We then introduce hidden bond market states based on spread of government bond yields and show that proposed market states are statistically and economically significant. We further examine the state-dependent explanatory power of the risk factors for test portfolios. We find the strong evidence that the rouble corporate bond market is ineffective in relation to information on the possible firms accounting fraud.
Conclusions. Investors in the Russian bond market should account for bond exposure to the accounting fraud risk factor in the risk-adjusted performance analysis of bond portfolios.

Key words: falsification, debt load, default.

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Introduction

The researchers' heightened interest in studying the issues of risk management in the stock market is justified. A significant share in the global capital market value is occupied by the bond market. The pressure of sanctions from unfriendly countries and increasing financial turbulence explain the need to clarify the composition of risk factors in returns on corporate bonds.

The relationship between the firm capital structure and the returns on its issued financial instruments belongs to the category of fundamental issues considered by modern theorists in the field of finance. Moreover, an analysis of this relationship allows us to reveal some features of market pricing of equities and corporate bonds. Multiple empirical studies cover more than half a century. However, their results are mainly controversial and at least not convincing enough. In a number of cases, the differences in the results of qualitative analysis were due to differences in methodological approaches, and sets of values used to describe the capital structure and evaluate profitability, as well as the differences in the asset classes. For instance, Arditti (1967) found evidence of a negative but statistically insignificant relationship between capital structure and the return on common stock of US firms between 1946 and 1963. The debt-equity ratio was considered as a parameter of the capital structure. In a cross-sectional analysis Bhandari (1988) discovered evidence of a positive relationship between inflation-adjusted common stock returns and the equity-to-asset ratio for both non-financial and financial companies in the US market between 1948 and 1981. Dimitrov and Jain (2005) found a negative relationship between changes in debt-equity ratio and current and future returns of NYSE, AMEX, and NASDAQ common stocks in 1973–2004. Financial firms and firms with a total asset value of less than $10 million were excluded from the sample. Similar results were obtained by Penman et al (2007) for a sample of firms, excluding financial companies, in 1962–2001. In a study of 4,000 stocks of companies from 55 countries over 2000–2009, Bhatt & Sultan (2012) established the presence of a stable impact of the capital structure, assessed using the debt-to-asset ratio, on stock returns, which can increase during economic crises. This was also confirmed in the papers of D. A. Endovitsky and V. V. Korotkikh (2022).

In addition, Bhatt & Sultan expected the equities of Islamic companies to be less sensitive to the level of financial dependence, but the lowest sensitivity was observed among socially responsible firms. Ullah & Shah (2014) discovered a statistically significant positive relationship between the firm financial leverage and the returns of common equities in the Pakistan stock market. However, Allozi & Obeidat (2016) did not find any significant relationship between the capital structure and equity returns of industrial companies in the Jordan stock market in 2001–2011.

As a result of the presented overview, two principal gaps can be found in the literature. First of all, very little attention in the scientific discourse is paid to the analysis of the impact of capital structure on corporate bond risk and return. Second, the reliability of the values of capital structure that is directly connected with the reliability of information revealed in financial reporting was hardly ever discussed. The majority of studies suggested the firms did not falsify the reported information.

As part of the original research, the following working hypotheses were formulated:

H1: Differences in excess returns of rouble corporate bonds may be associated with the firms capital structure.

H2: Differences in excess returns of rouble corporate bonds may be associated with dishonest actions of firms aimed at falsifying reported information.

H3: The firm capital structure should be taken into account in order to identify the impact of the fraud risk on excess returns of rouble corporate bonds.

H4: The risk premium associated with the

firm capital structure and its tendency towards falsification of reported information varies over time.

Methodology and data

The initial data for the calculation of indicators of falsification of reported information as well as evaluation of the capital structure were accounting (financial) reports provided by Interfaks-TSRKI. The total bond returns were calculated according to the approach of Acharya et al. (2013):

$$R_t = \frac{P_t + AI_t + C_t - P_{t-1} - AI_{t-1}}{P_{t-1} + AI_{t-1}}, \quad (1)$$

where R_t is total bond returns in month t; P_t is the bond price at the end of the month t; AI_t is accumulated income by the end of the month t; C_t is a coupon, provided that the coupon income are paid in period $[t - 1, t]$.

As a risk-free interest rate (*RF*), considered for the correction of total bond returns, we used the returns of short-term government zero-coupon bonds at corresponding periods of time published on the website of the Bank of Russia.

The initial data for calculating returns were the data from the daily bulletins of PJSC Moscow Exchange MICEX-RTS on the trading results in securities (Main trading session) and T+ market transactions. The sample included short-term bonds of 341 Russian firms (with a maturity of up to 5 years) without debt amortization and with a par value of 1,000 roubles (Table 1). Bonds issued by financial companies were excluded from the sample due to the specific features of the capital structure as well as risk indicators of falsification of reported information.

To obtain the general idea of the firm capital structure, we used the financial independence ratio (equity-to-asset ratio, EAR), which describes the share of the firm's equity in total assets.

The Beneish model (1999) was used to identify cases of possible accounting fraud, taking into account N. V. Feruleva and M. A. Stefan's (2016) criticism regarding the difficulties in calculating indicators of total accruals to total assets (TATA) and depreciation index (DEPI) by external users.

Let us consider the methodology for the formation of explanatory variables used in cross-sectional analysis. Credit (default) and interest rate risks are considered as primary risk factors in the bond market in (Fama & French, 1993).

Reflections on the risks in the returns on corporate bonds will inevitably lead us to credit (default) risk on the whole and obligation default risk in particular. In this respect, it is not the credit risk of certain bond issues or bond issuers but a change in the total level of credit risk in the market caused by shifts in economic conditions. To assess the impact of credit risk in the returns on corporate bonds, in this paper we use an approach that takes into account differences in the dynamics of the corporate and government bond returns. Our proxy for this common risk factor in the Russian bond market, *DEF*, is difference between the monthly return on a portfolio of long-term corporate bonds and the return on a portfolio of long-term government bonds with a maturity of no less than 10 years.

In the same way, returns on corporate bonds are subject to the impact of unexpected changes in interest rates, which, in turn, explains the interest rate risk. Our proxy for this common risk factor in the Russian bond market, *TERM*, is difference between the monthly return on a portfolio of long-term government bonds with a maturity of at least 10 years and the return on one-year government zero-coupon

Table 1

Sample description (2011–2022)

Parameter	Number of observations	Mean	Median	Std Dev
Monthly excess returns, %	33,639	0.737	0.692	2.112
MOEX listing level	30,161	2.621	3	0.741
Issuing volumes, billion roubles	33,639	6.397	1	23.867

bonds. Assuming that the return on one-year government zero-coupon bonds characterises the overall level of expected return on debt instruments, using variable *TERM* allows identifying deviations of return on long-term bonds from this expected level due to the unexpected shifts in the yield curve.

The result presented in Table 2 show that *DEF* is positive (0,156 % per month), but statistically insignificant (t = 1.01) due to high variance. This can be explained by the fact that the *DEF* may change significantly due to changes in the business cycle. *TERM* is on average twice higher than *DEF* (0.340 %), but it is also statistically insignificant (t = 1.44), which can be explained by the presence of time periods in the studied period when the zero-coupon yield curve changed its normal shape to an inverse one, and vice versa.

The excess returns of portfolios of corporate bonds, formed in accordance with the studied differences in bond issuers, are considered as explained variables in our analysis.

Results

To test the first hypothesis, we split the firms in each July into five equal groups with increasing equity-to-assets ratio determined using the financial statements of the previous year (Table 2). Judging by the median values of EAR, the identified groups had significant differences in capital structure. The strongest differences were observed between the first and the fifth group. In the first group the median EAR was 7.2 % while in the fifth group it was 88.7 %. Tested bond portfolios were formed in accordance with the division of firms into equal groups with a homogeneous capital structure. Portfolio compositions were reviewed every 12 months. All bonds included in the portfolio received equal weights, and portfolios were rebalanced each month. Excess monthly returns were calculated for the obtained portfolios. Statistically significant excess return in the bond portfolios of firms with the lowest level of financial dependence of 0.282 % per month (Table 3) demonstrates that the market correctly take into account information on firm capital structure risk. It should also be noted that the bond portfolio of the most financially independent firms had a statistically significant return (0.352 % per month). Together, these two facts in the Russian bond market allow stating that equity-to-assets ratio indeed captures the risk of a non-optimal firm capital structure.

The conduced cross-sectional analysis of sensitivity pursued two goals. First of all, it allowed evaluating the risk-adjusted average excess return of the tested portfolios, indicating the presence of a risk premium that was "cleared" of the impact of systematic

Table 2

Means and variances for factor returns

Factor	Mean	Variance	t-statistics	p-value
DEF	0.156	0.024	1.01	0.312
TERM	0.340	0.056	1.44	0.151

Table 3

Descriptive Statistics for 5 portfolios formed on firms capital structure

Description	Level of the firm's financial independence				
	Lowest	Low	Medium	High	Highest
Median value EAR	0.072	0.236	0.441	0.642	0.887
Portfolio returns, % a month	0.282** [2.183]	0.172 [1.413]	0.182 [1.211]	0.134 [1.092]	0.352* [1.944]

Note. t-statistics for the average excess returns are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

risk factors and, in the case of statistical significance, showed that the market pricing regarding firm-specific information was inefficient. Second, it allowed assessing the extent of exposure of the tested portfolios' excess returns to systematic risk factors. For the purposes of sensitivity analysis, parametric identification of a two-factor regression was conducted:

$$R_{i,t} - RF_t = \alpha_i + \beta_D DEF_t + \beta_T TERM_t + \varepsilon_{i,t}, \quad (2)$$

where R_t is the return of the tested portfolio at t; RF_t is the risk-free interest rate at t; DEF_t is a proxy for credit risk in the bond market; $TERM_t$ is a proxy for risk of unexpected changes in interest rates; α_i is the risk-adjusted excess return of the tested portfolio; β_D, β_T is the sensitivities of the excess return of the tested portfolio to systematic risk factors of the bond market.

The explanatory power of the two-factor regressions (Table 4) ranges from 39.8 to 47.5 %. All portfolios presented significant exposures to term-structure risks. The greatest exposure to *DEF* (0.330; t = 4.752) was observed in the portfolio of bonds whose issuers had a tendency towards the maximum level of financial leverage. The bond portfolio of firms with minimal leverage was most exposed to *TERM* (0.312; t = 5.170). Rather high sensitivity to *DEF* (0.260; t = 2.720) for the same portfolio was a somewhat counterintuitive result. However, the considered specification was insufficient to explain the statistically significant risk-adjusted returns for portfolios of firms with a suboptimal capital structure, characterised by the lowest (highest) level of financial leverage. It should be noted that the firm's risk of low leverage was estimated higher in the market than the risk of high leverage, 0.279 vs 0.167 % per month.

Hence, there were insufficient evidence for rejecting the first working hypothesis, which indicated that it was possible to form a profitable portfolio strategy in the rouble bond market based on information about the non-optimal firm capital structure.

To test the second hypothesis, every July we sort firms into five equal groups according to their corporate fraud risk expectations based on Beneish M-Score. M-Scores were calculated based on financial statements in the previous year and characterised the level of possible manipulating firm earnings reports (Table 5). Bond portfolios with equal weights were formed in accordance with the composition of these groups. For the obtained portfolio compositions, excess returns were calculated over the next 12 months since the formation of the portfolio, and the portfolios were subject to monthly rebalancing. It should be noted that four of the five groups were quite homogeneous regarding M-Score. Statistically significant excess return at the level of 0.297 % per month (more than 3.5 % per annum) was

Table 4

Using two factors in regressions to explain average monthly percent excess returns on the portfolios from capital structures sort

Factors	Level of the firm's financial independence				
	Lowest	Low	Medium	High	Highest
DEF	0.330*** [4.752]	0.278*** [4.374]	0.306*** [3.977]	0,195*** [2.905]	0.260*** [2.720]
TERM	0,182*** [4.374]	0,171*** [4.484]	0,282*** [6.091]	0,228*** [5.621]	0,312*** [5.170]
(Intercept)	0.167* [1.672]	0.070 [0.765]	0.047 [0.425]	0.036 [0.368]	0,279* [1.951]
R-squared	0.442	0.407	0.475	0.398	0.406

N o t e. In brackets are t-statistics testing the hypothesis that the regression parameter is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

observed only in a bond portfolio of high M-score firms (which reflects low accounting fraud risk).

This confirmed that the Russian market does not correctly price corporate fraud risk expectations, that can be formed upon public information, moreover it can be considered as evidence of the irrationality of bond market participants in the assessment of the risk of falsifying reported information itself.

To explain the excess return of portfolios obtained by sorting firms according to their tendency to falsify reports, we conducted parametric identification of two-factor regressions (Table 6). Despite the low explanatory power of the models, ranging from 18 to 44.8 %, *DEF* and *TERM* risk factors fully explained the excess returns. In all the studied cases, there were no statistically significant risk-adjusted return.

Therefore, there were no evidence obtained sufficient to acknowledge the corporate fraud risk expectations in bond prices, provided that all other conditions were equal.

To test the third hypothesis, each July we use independent EAR and M-Score sorts of firms. Based on the equity-to-assets ratio, firms were divided into three equal groups. Based on corporate fraud risk expectations, firms were divided into two groups. The first group (honest firms) included 20 % of firms with the highest M-Score, while the rest, potentially dishonest, were included into the second group. At their intersection, 2x3 Fraud-EAR bond portfolios were formed. The advantage of this approach is the ability to study the impact of one risk factor on the excess return of bond portfolios at a fixed level of another risk factor, and vice versa.

Controlling for EAR a statistically significant excess return was observed in the portfolio of honest firms with low EAR (0.512; t = 1.792), while an excess return close to statistically significant was observed in the portfolio of potentially

Table 5

Descriptive Statistics for 5 portfolios formed on firms M-Score

Description	The firm's accounting fraud propensity				
	Lowest	Low	Medium	High	Highest
Median value M-Score	5.61	–2.75	–3.26	–3.44	–3.70
Portfolio returns, % a month	0,297** [2.102]	0.212 [0.933]	0,227* [1.912]	0.150 [1.342]	0.188 [0.223]

Note. t-statistics for the average excess returns are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

Table 6

Using two factors in regressions to explain average monthly percent excess returns on the portfolios from accounting fraud sort

Factors	The firm's accounting fraud propensity				
	Lowest	Low	Medium	High	Highest
DEF	0,301*** [3.821]	0.192 [1.322]	0.211*** [3.171]	0,208*** [3.171]	0,348*** [4.332]
TERM	0,205*** [4.341]	0,306*** [3.501]	0,200*** [5.012]	0.159*** [4.042]	0,250*** [5.254]
(Intercept)	0.185 [1.621]	0.095 [0.453]	0.132 [1.381]	0.067 [0.707]	0.033 [0.281]
R-squared	0.381	0.180	0.374	0.314	0.448

Note. In brackets are t-statistics testing the hypothesis that the regression parameter is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

dishonest firms, also with low EAR (0.165; t = 1.568) (Table 7).

The results of the parametric identification of the two-factor regressions are presented in Tables 8–11. The explanatory power of the models did not exceed 50 % (Table 8). The lowest R^2 value was observed in the portfolio of bonds of the most reliable firms, who did not tend to falsify the reported information with high EAR.

The highest sensitivity to credit risk was obtained for a portfolio of bonds of firms with low fraud propensity (0.458; t = 3.252) and with a high share of borrowed capital (Table 9). The corresponding portfolio of bonds of firms with high fraud propensity was less sensitive to credit risk (0.250; t = 4.359). As for other levels of financial independence, the sensitivity of the return on portfolios of potentially dishonest firms exceeded the sensitivity of bond portfolios of firms that did not manipulate financial reporting data.

The sensitivity pattern of excess return to interest rate risk should also be noted (Table 10). As the level of financial independence grew, firms with low fraud propensity showed a decrease in

Table 7

Average monthly percent excess returns on the 6 Fraud-EAR bond portfolios

Level of the firm's financial independence	The firm's accounting fraud propensity	
	Low	High
Low	0.512* [1.792]	0.165 [1.568]
Medium	0.184 [1.254]	0.175 [1.131]
High	0.199 [1.121]	0.197 [1.135]

Note. t-statistics for the average excess returns are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

Table 8

Two-factor regressions performance (R-squared)

Level of the firm's financial independence	The firm's accounting fraud propensity	
	Lowest	High
Low	0.478	0.411
Medium	0.355	0.417
High	0.206	0.398

Table 9

DEF slopes for the 6 Fraud-EAR bond portfolios in the two-factor regressions

Level of the firm's financial independence	The firm's accounting fraud propensity	
	Low	High
Low	0.458*** [3.252]	0,250*** [4.359]
Medium	0.189** [2.368]	0.254*** [3.024]
High	0,172* [1.181]	0,182*** [2.303]

Note. In brackets are t-statistics testing the hypothesis that the regression parameter is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

sensitivity (from 0.522 to 0.163), while potentially dishonest ones showed an increase (from 0.158 to 0.289). The exposures were statistically significant at the level of 1 %.

Credit and interest rate risk factors were sufficient to explain excess returns in five out of the six portfolios. Statistically significant risk-adjusted excess return was typical only for a portfolio of firms with low fraud propensity that actively used borrowed resources and amounted to 0.392 % per month or about 5 % per annum (Table 11).

Therefore, taking into account information about firms' tendency to falsify reported information allows explaining the presence of excess returns on bond portfolios at a fixed level of financial independence. Meanwhile, the absence of a statistically significant risk-adjusted excess return in the portfolios of firms with a tendency to falsify information can be explained by its time-varying nature instead of by the absence of a premium for the accounting fraud risk in the Russian market.

To test the hypothesis regarding the time dependence of the premium for the accounting fraud risk controlling for the firm capital structure, we identified the hidden states related to the stages of the business cycle in the dynamics of the bond market using a model with Markov switching. The interest rate spread, calculated as the difference between the monthly returns of thirty-year and one-year government zero-coupon bonds, was considered as the explanatory variable. Using the Markov regime switching mechanism allowed identifying changes in the parameters of the interest rate spread, accompanied by a change in the shape of the zero-coupon yield curve. The results of parametric identification of the model with Markov switching are presented in table 12. A positive (0.227 % per month) and statistically significant interest rate spread at the level of 1 % in regime 1 indicates a normal (upward sloping) zero-coupon yield curve in the relevant periods. In regime 2, the interest rate spread was zero, and

Table 10

TERM slopes for the 6 Fraud-EAR bond portfolios in the two-factor regressions

Level of the firm's financial independence	The firm's accounting fraud propensity	
	Low	High
Low	0.522*** [5.927]	0,158*** [4.571]
Medium	0.233*** [4.599]	0,295*** [5.844]
High	0.163*** [2.868]	0.289*** [6.063]

Note. In brackets are t-statistics testing the hypothesis that the regression parameter is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

Table 11

Two-factor intercepts for 6 Fraud-EAR bond portfolios

Level of the firm's financial independence	The firm's accounting fraud propensity	
	Low	High
Low	0.392* [1.857]	0.073 [0.879]
Medium	0.139 [1.157]	0.048 [0.394]
High	0.129 [0.852]	0.086 [0.755]

Note. In brackets are t-statistics testing the hypothesis that the average excess return of bond portfolios is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

the zero-coupon yield curve on average had an intermediate shape. Thus, the identified regimes were economically significant and also stable over time, as the probabilities of maintaining the regime at the next step were 96.3 and 95.3 %, respectively.

Average excess returns of tested bond portfolios with account of the current Markov regime in the market are presented in Table 13. The presence of statistically significant returns was observed only during those periods when the market was in regime 1. Most average excess returns of portfolios in regime 2 had values around zero.

In most cases, taking into account the current market Markov regime resulted in an increased explanatory power of two-factor regressions regarding excess returns of portfolios (Table 14).

The only exception in regime 1 was the portfolio of honest firms with the lowest financial leverage, where a decrease was observed in the R^2 value from 20.6 (Table 8) to 18.7 %.

The return of bond portfolios of potentially dishonest firms was significantly affected by the DEF, while increased exposure was observed during those periods when the shape of the zero-coupon yield curve was normal (Table 15).

For portfolios of firms with the lowest debt burden, such differences were more than two times (0.590 and 0.221, respectively).

Table 12

2-Regime Markov-switching models

Regime	Estimated parameters		Transition Probabilities	
	Mean	Std Dev	Regime 1	Regime 2
Regime 1	0.227*** [37.148]	0.006	0.963	0.047
Regime 2	0.012 [0.983]	0.012	0.037	0.953

Note. t-statistics for the average excess returns are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

Table 13

Average excess returns of 6 Fraud-EAR portfolios depending on Markov regime

Level of the firm's financial independence	The firm's accounting fraud propensity			
	Low	High	Low	High
	Regime 1		Regime 2	
Low	0.832 [1.412]	0,372** [2.217]	0.387 [1.138]	0.060 [0.469]
Medium	0,303* [1.974]	0.283 [1.238]	0.132 [0.644]	0.071 [0.372]
High	0.298 [1.382]	0.247 [1.169]	−0.024 [−0.109]	0.008 [0.051]

Note. In brackets are t-statistics testing the hypothesis that the average excess return of bond portfolios is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

Table 14

Two-factor regressions performance (R-squared) depending on Markov regime

Level of the firm's financial independence	The firm's accounting fraud propensity			
	Low	High	Low	High
	Regime 1		Regime 2	
Low	0.507	0.445	0.503	0.638
Medium	0.579	0.386	0.503	0.536
High	0.187	0.543	0.511	0.451

As for most of the tested portfolios, the sensitivity of excess return to interest rate risk was significantly positive and rather homogeneous. The portfolio of low accounting fraud firms exceeded the portfolio of high accounting fraud firms in terms of sensitivity to interest rate risk only at a low level of financial independence (0.801 and 0.336 vs 0.258 and 0.106, respectively). At other gradations of the capital structure, exposures were higher for portfolios of potentially dishonest firms (Table 16).

Taking into account the current market regime and clearing excess returns from exposure to systematic risk factors in the bond market allowed obtaining statistically significant risk-adjusted returns for all tested portfolios, with an upward sloping zero-coupon yield curve (Table 17). The

Table 15

DEF slopes for the 6 Fraud-EAR bond portfolios in the two-factor regressions depending on Markov regime

Level of the firm's financial independence	The firm's accounting fraud propensity			
	Low	High	Low	High
	Regime 1		Regime 2	
Low	0.176 [0.847]	0.709*** [3.219]	0.001 [0.008]	0.462*** [6.769]
Medium	−0.834 [1.661]	0,701*** [4.578]	0.003 [0.035]	0,381*** [3.342]
High	−0.619 [−0.636]	0.590*** [4.799]	−0.018 [−0.248]	0.221** [2.161]

N o t e. In brackets are t-statistics testing the hypothesis that the average excess return of bond portfolios is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

Table 16

TERM slopes for the 6 Fraud-EAR bond portfolios in the two-factor regressions depending on Markov regime

Level of the firm's financial independence	The firm's accounting fraud propensity			
	Low	High	Low	High
	Regime 1		Regime 2	
Low	0.801*** [4.206]	0,258*** [4.289]	0.336*** [3.309]	0,106*** [2.903]
Medium	0.259*** [5.621]	0,327*** [3.787]	0.109 [1.521]	0,283*** [4.604]
High	0,213** [2.336]	0,365*** [5.309]	0.109 [1.637]	0,245** [4.463]

N o t e. In brackets are t-statistics testing the hypothesis that the average excess return of bond portfolios is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

Table 17

Two-factor intercepts for 6 Fraud-EAR bond portfolios depending on Markov regime

Level of the firm's financial independence	The firm's accounting fraud propensity			
	Low	High	Low	High
	Regime 1		Regime 2	
Low	1.162** [2.372]	0.526*** [3.609]	0.306 [1.439]	0.034 [0.416]
Medium	0,524*** [4.421]	0.476** [2.277]	0.136 [0.927]	−0.050 [−0.365]
High	0,481** [2.103]	0,477*** [2.872]	0.007 [0.042]	−0.101 [−0.847]

N o t e. In brackets are t-statistics testing the hypothesis that the average excess return of bond portfolios is equal to zero. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

absence of significant risk-adjusted returns in the regime corresponding to the crisis period was economically justified.

Strong evidence was obtained proving the dependence of the sensitivity values of excess return on bond portfolios formed with account of the information on the capital structure and the accounting fraud propensity.

Discussion

The performed study contributed to the scientific research in the following aspects. First of all, despite the active study of the bond market for the presence of price anomalies associated with reported information (Teplova & Sokolova, 2017; Dickerson et al., 2023), issues related to the impact of the level of falsification of reported information by firms have rarely been considered. The evidence obtained in the course of this paper regarding the information on corporate fraud associated with falsification of reported information may seem counterintuitive, as it demonstrates the irrationality of participants of the Russian bond market. However, when studying the US stock market, Beneish et al. (2013) achieved a similar result: statistically significant positive excess returns were observed in the portfolios of less risky honest firms. It can be assumed that this distortion was due to the specific features of investors' interpretation of falsification indicators used in the Beneish (1999) model, as in the author's previous paper (Korotkikh, 2023), in the course of selection and consideration of falsification indicators that were significant from the point of market participants, evidence was obtained proving the presence of excess returns in the portfolios of firms with high accounting fraud propensity.

Second, the authors contributed to the study of time-varying parameters of the Russian bond market. As for the stock markets of other countries, this aspect is being widely studied (Korotkikh, 2022; Beneish et al., 2023). It should also be noted that during the periods of crisis, the market sees changes not only in the sensitivity of returns of portfolios formed by the levels of tendency to falsification of reported information. Jaroszek et al. (2018) noted that the level of interest of firms in deliberate distortion of the information disclosed in financial statements increased during periods of economic recession.

In this paper we obtained evidence of the relationship between the shape of the zero-coupon yield curve and the sensitivity of the tested portfolios to systematic risk factors of the bond market. Taking into account the time-varying nature of indicators of exposure of excess return to systematic risk factors allowed identifying the presence of significant risk-adjusted return in the bond portfolios of firms with tendency to falsifying reported information when the zero-coupon yield curve had a normal shape. The premium for the risk of falsification of reported information and for the risk of a non-optimal firm capital structure disappeared during periods of crisis in the market. This dependence can be seen in the stock markets of other countries. Endovitsky et al. (2021) named the appearance of anomalous correlations in market pricing during periods of crisis as one of the main reasons for it.

Conclusions

The conducted study allowed formulating the following conclusions.

When testing the hypothesis about the capital structure, it was established that in the Russian corporate bond market, information about the firm capital structure was taken into account in bond returns, while the risk premium for a non-optimal capital structure of the firm varied in the range of 0.282–0.352 % per month. With account taken of the exposure to systematic risk factors, the risk premium for non-optimal capital structure decreased to 0.167–0.279 % per month although remained statistically significant.

An attempt to explain differences in excess returns of corporate bond portfolios from the point of view of firms' tendency to falsify reported information showed that using the information on possible falsification allowed receiving 0.272 % per month in terms of excess returns. A cross-sectional analysis showed that, provided that all other conditions were equal, this return

decreased to 0.185 % per month and became close to the one statistically insignificantly different from zero at the level of 10 %. Owners of rouble corporate bonds showed limited rationality in the assessment of the falsification risk regarding the information reported by firms from the point of the hypotheses included in the risk indicators in the Beneish model.

When analysing the excess return of 6 portfolios formed by gradations of the levels of financial independence of firms and their propensity to falsify reported information, we confirmed an increase in the effectiveness of the portfolio strategy, which included purchasing bonds of honest firms with a high debt burden. The excess return for this strategy was 0.512 % per month, which, excluding the exposure to systematic risk factors, reduced to 0.392 % but still remained statistically significant.

In the course of testing an additional hypothesis about the time-varying nature of the sensitivity of the excess returns of the 6 tested portfolios to credit and interest rate risk factors, we confirmed significant differences in the excess returns of portfolio strategies during those periods when the zero-coupon yield curve had normal (upward sloping) and intermediate forms. Positive and statistically significant returns were observed for all tested portfolios with an upward sloping yield curve. The portfolio of honest firms with a high degree of dependence on borrowed capital had the highest excess return (1.162 %).

The Russian bond market is not effective regarding the data on possible falsification of reported information and the firm capital structure. The empirical patterns identified in the study indicated stable price anomalies, which confirmed the possibility of forming profitable portfolio strategies using information about the capital structure of bond issuers and their tendency to falsify reported information.

Conflict of Interest

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

References

1. Acharya, V. V., Amihud, Y., & Bharath, S. T. (2013). Liquidity risk of corporate bond returns: Conditional approach. *Journal of Financial Economics*, *2*(110), 358–386.

2. Allozi, N. M., & Obeidat, G. S. (2016). The Relationship between the Stock Return and Financial Indicators (Profitability, Leverage): An Empirical Study on Manufacturing Companies Listed in Amman Stock Exchange. *Journal of Social Sciences*, *5*(3), 408–424.

3. Arditti, F. D. (1967). Risk and Return on Equity. *Journal of Finance*, *22*(1), 19–36.

4. Beneish, M. D. (1999). The Detection of Earnings Manipulation. *Financial Analysts Journal*, *5*(55), 24–36.

5. Beneish, M. D., Farber, D. B., Glendening, M., & Shaw, K. W. (2023). Aggregate Financial Misreporting and the Predictability of U.S. Recessions and GDP Growth. *The Accounting Review*, *98*(5). 129–159. https://doi.org/10.2308/TAR-2021-0160

6. Beneish, M. D., Lee, C. M. C., & Nichols, D. C. (2013). Earnings manipulation and expected returns. *Financial Analysts Journal*, *69*(2), 57–82.

7. Bhandari, L. C. (1988). Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence. *Journal of Finance*, XLIII, 507–528.

8. Bhatt, V., & Sultan, J. (2012). Leverage Risk, Financial Crisis, and Stock Returns: A Comparison Among Islamic, Conventional, and Socially Responsible Stocks. *Islam. Econ. Stud*, *20*, 87–119.

9. Dickerson, A., Mueller, P., & Robotti, C. (2023). Priced risk in corporate bonds. *Journal of Financial Economics*, *150*(2), 103707. https://doi.org/10.1016/j.jfineco.2023.103707

10. Dimitrov, V., & Jain, P. C. (2005). The Value Relevance of Changes in Financial Leverage. *SSRN*. http://dx.doi.org/10.2139/ssrn.708281

11. Endovitsky, D. A., Korotkikh, V. V., & Khripushin, D. A. (2021). Equity risk and return across hidden market regimes. *Risks*. *9*(11), 188. https://doi.org/10.3390/risks9110188.

12. Endovitsky, D. A., & Korotkikh, V. V. (2022). Regime shifts in equity risk premium: international evidence. *Proceedings of Voronezh State University. Series: Economics and Management*, (1), 3–27. (In Russian). https://doi.org/10.17308/econ.2022.1/3842

13. Fama, E., & French K. (1993). Common risk factors on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3–56. https://doi.org/10.1016/0304-405X(93)90023-5

14. Feruleva, N. V., & Shtefan, M. A. (2016). Detection of Financial Statements Fraud in Russian Companies: Analysis of the Beneish and Roxas Models Applicability. *Russian Management Journal*, *14*(3), 49–70. (In Russian.)

15. Jaroszek, L., Niessen-Ruenzi, A., & Ruenzi, S. (2018). Corporate Fraud Risk and Stock Market Performance. *SSRN Electronic journal*. URL: https://dx.doi.org/10.2139/ssrn.2636633

16. Korotkikh, V. V. (2022). Term structure of risk factor premiums: evidence from international equity markets. *Proceedings of Voronezh State University. Series: Economics and Management*, (2), 83–98. (In Russian). https://doi.org/10.17308/econ.2022.2/8989

17. Korotkikh, V. V. (2023). Corporate fraud, inertia and market conditions in explaining the differences in the exchange characteristics of bonds in the Russian market. *Finance and Credit*, *29*(12), 2813–2840. (In Russian). https://doi.org/10.24891/fc.29.12.2813

18. Penman, S. H., Richardson, S. A., & Tuna, I. (2007). The Book-to-Price Effect in Stock Returns: Accounting for Leverage. *Journal of Accounting Research*, *45*(2), 427–467.

19. Teplova, T. V., & Sokolova, T. V. (2017). The non-parametric data envelopment analysis method for portfolio design in the Russian bond market. *Economics and Mathematical Methods, 53*(3), 110–128. (In Russian).

20. Ullah, I., & Shah, A. (2014). The Effect of Capital Structure on Abnormal Stock Returns: Evidence from Pakistan. *Business & Economic Review*, *6*, 1–18.

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Структура капитала эмитента и корпоративное мошенничество в анализе риска на рынке облигаций: свидетельства с Мосбиржи

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Предмет. Кризисные периоды в экономике ставят перед участниками рынка облигаций новые вызовы. Один из таких вызовов связан с качеством информации о деятельности эмитентов, предоставляемой стейкхолдерам.
Цель. Идентификация на рынке рублевых облигаций ценовых аномалий, обусловленных склонностью корпоративных эмитентов к фальсификации информации, раскрываемой в отчетности, а также структурой капитала эмитентов.
Методы. В исследовании рассматривается группа из четырех рабочих гипотез о влиянии структуры капитала и склонности эмитента к корпоративному мошенничеству в отношении фальсификации отчетной информации. Для тестирования каждой гипотезы были сформированы специальные портфели облигаций и вычислена их избыточная доходность. Само тестирование осуществлялось в двух вариантах: без учета факторов систематического риска и с учетом факторов кредитного и процентного рисков в рамках процедуры кросс-секционного анализа избыточной доходности. Аналитические процедуры проводились в среде разработки RStudio. Выборочная совокупность охватывает период с января 2011 по декабрь 2022 г.
Результаты. На российском рынке облигаций были выявлены статистически значимые премии за риск неоптимальной структуры капитала эмитента, т. е. структуры капитала с ничтожной либо крайне высокой долей заемного капитала. Информация о склонности к фальсификации корпоративной отчетности учитывается в показателях доходности и риска облигаций. Кроме того, избыточные доходности тестируемых портфелей в значительной степени обусловлены фазой делового цикла.
Выводы. Владельцы рублевых корпоративных облигаций демонстрируют ограниченную рациональность в оценках риска фальсификации отчетной информации корпоративными эмитентами с позиции гипотез, закладываемых в индикаторы риска в модели Beneish. Можно утверждать, что рынок рублевых корпоративных облигаций неэффективен в отношении информации о возможной фальсификации отчетной информации. Соответствующие ценовые аномалии могут быть использованы для формирования прибыльных портфельных стратегий на рынке российских корпоративных облигаций.

Ключевые слова: фальсификация, долговая нагрузка, дефолт.

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