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Determinants of the Development of the Corporate Bond Market in Latvia

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Abstract

The development of the corporate bond market in Latvia while being quick and robust in the period 2012–2017 (the average growth rate 131%, median 44%), has faced major challenges in 2018 (Nasdaq Baltic, 2018). The latter has demonstrated the vulnerability of this alternative to banking financing method in Latvia. In the environment, where the ongoing changes in the banking financing as initiated by the Basel III and Capital Markets Union initiatives, besides to the decision on creation of pan-Baltic capital market with the support of the European Commission and the European Bank for Reconstruction and Development, are bringing more emphasis on the increasing role of the corporate bond market in Latvia; the need to understand its development and factors affecting this development is essential. The goal of this article is to explore the corporate bond market development frameworks as elaborated by the academic research and recognise corporate bond market development determinants, identify the determinants of the corporate bond market in Latvia by running the statistical analysis. Tasks of the research include examining types of corporate bond development frameworks with the focus on revealing the determinants of the corporate bond market development as recognised by the academics, performing the econometric analysis of the determinants selected and building an econometric model of the determinants of the development of the corporate bond market in Latvia as well as drawing corresponding conclusions. In order to accomplish the tasks of the research the following research methods were used: analysis of the previously performed research, analysis of the legislative framework; quantitative research methods: statistical data analysis of macroeconomic data from Bank for International Settlement, The World Bank Database, Bloomberg and Reuters databases; financial market indicator and data analysis from Nasdaq Baltic, Bank for International Settlement, Treasury of the Republic of Latvia, Bloomberg and Reuters databases; correlation analysis, regression analysis. In the result of the analysis, the determinants of the corporate bond market development in Latvia were analysed, where 27 factors as detected by the theoretical analysis to be influencing the corporate bond market development in a country were applied to Latvia. The regression analysis has demonstrated the influence of Gross Domestic Product (GDP) per capita, amount of domestic savings, real GDP growth, amount of government bonds as the share of GDP and regulatory quality on the amount of the corporate bonds outstanding.

KEYWORDS: corporate bonds, corporate bond market, development, factors, Latvia.



The academic interest analysing the area of financial instruments and financial markets is high. While the majority of research concentrates in more transparent equity and sovereign bond segments, the corporate bond segment gets low while increasing coverage in the academic research. Previous academic studies on the corporate bond market have detected two types of the frameworks as provided by the academics to analyse the development of the corporate bond market of a country: the expositive elements frameworks and comparative elements frameworks. The expositive elements frameworks provide dimensions for qualitative assessment of the corporate bond market in a country and detect the factors to influence the development. The comparative elements frameworks provide the numeric metrics for measuring the relative development of the corporate bond market in a country, thus enabling the comparison between countries besides to finding the stage of development. The study of Tocelovska (2016) identified the frameworks of Fabella and Madhur (2003), Burger and Warnock (2005), Braun and Briones (2006), Stewart (2009), and Dittmar and Yuon (2008) as expositive elements frameworks and World Bank (2004) and Wyman (2015) as comparative elements frameworks, where the expositive elements framework grouped the factors into two clusters: 1) measurement factors: size of the bond market, secondary market turnover, maturity structure of the bonds, investor base, bond issuers, 2) legal and macroeconomic factors: tax treatment of bonds, market infrastructure, and qualitative assessment of the legal and regulatory framework. While providing the fundamental background and analytical application to Latvia, the analysis lacks recent increasing academic coverage in the area. Moreover, the existing academic studies outstanding lack to summarise the factors as recognised to affect the development of the corporate bond market in a country and apply them to Latvia in order to identify Latvia specific determinants of the development of the corporate bond market.

The goal of this article is to explore the corporate bond market development frameworks as elaborated by the academic research and recognise corporate bond market development determinants, identify the determinants of the corporate bond market in Latvia by running the statistical analysis. In order to accomplish the tasks of the research the following research methods of analysis were used: analysis of the previously performed research, analysis of the legislative framework; quantitative research methods: statistical data analysis of macroeconomic data from *Bank for International Settlement*, *The World Bank Database*, *Bloomberg* and *Reuters* databases; financial market indicator and data analysis from *Nasdaq Baltic*, *Bank for International Settlement*, *Treasury of the Republic of Latvia*, *Bloomberg* and *Reuters* databases; correlation analysis, regression analysis. In the result of the analysis, the determinants of the corporate bond market development in Latvia were analysed, where 27 factors as detected by the theoretical analysis to be influencing the corporate bond market development in a country were applied to Latvia. The regression analysis has demonstrated the influence of GDP per capita, amount of domestic savings, real GDP growth, amount of government bonds as the share of GDP and regulatory quality on the amount of the corporate bonds outstanding.

The expositive elements frameworks provide the dimensions for the assessment of the current situation of the corporate bond market, where the number of studies reveal one or several main factors as influencing the development of the corporate bond market based on the qualitative or statistical analysis made. While the factors as identified by the academics to determine the development of the corporate bond market in a country or group of countries vary between the studies, the factors should be identified and then applied to the corporate bond market in Latvia. The study of Tocelovska (2016) identified the size of the bond market, secondary market turnover,

Introduction

Literature Reviews

maturity structure of the bonds, investor base, bond issuers, the tax treatment of bonds, market infrastructure, and qualitative assessment of the legal and regulatory framework as influencing the development of the corporate bond market in a country. The study of Fabella and Madhur (2003) identified primary issuance method and cross-country electronic connection, Astrauskaite (2016) stressed the importance of information and communication technologies, presence of the credit rating agencies was emphasised by Laeven (2014), Sui (2011) and Stewart (2009)), additionally, Stewart (2009) detected the importance of efficient 'REPO' market and active market makers (dealers). The study of Sui (2011) pointed to information disclosure, Burger and Warnock (2005) identified growth rates, the research of Ayala *et al.* (2017) detected global cyclical factors, while Rajan and Zingales (2003) and Eichengreen and Leungnareumitchai (2004) openness of the economy and internationally recognized accounting standards respectively. The factor of size the country and lending to SME segment, foreign ownership of the banks were identified by the majority of the studies as influencing the development of the corporate bond market: Mu *et al.* (2013), Bae (2012) Eichengreen *et al.* (2008), Braun and Briones (2006), Burger and Warnock (2005), Eichengreen and Leungnareumitchai (2004); and Astrauskaite (2016), Behr *et al.* (2015), Hasan *et al.* (2014), Hakenes *et al.* (2014), Popov and Udell (2012), Bae (2012), Stewart (2009), Adelegan and Radzewicz-Bak (2009), Eichengreen and Leungnareumitchai (2004), Jiang *et al.* (2001) respectively.

While the analysis of the expositive elements frameworks as explored and developed by the academics indicates four main groups of corporate bond market indicators as determined to be influencing the development of the corporate bond market of a country: size, macroeconomic indicators, legal factors (including market regulations and taxation), and presence of the securities market infrastructure; the Authors group the factors into two main clusters: measurement elements of the bond market and legal and macroeconomic elements (Table 1).

Table 1
Expositive elements
framework

Measurement elements of the bond market	Legal and macroeconomic elements
Size of the bond market (sovereign and corporate, local and international segment)	Qualitative assessment of the legal and regulatory framework (including information disclosure, primary issuance method)
Secondary market turnover, transactions of the corporate bond market	Lending to SME segment, foreign ownership of the banks
Maturity structure of government bonds (including the presence of a benchmark yield curve)	Tax treatment of bonds
Investor and issuer base of the corporate bond market	Internationally recognised accounting standards
Market infrastructure (including cross-country electronic connection, information and communication technologies, presence of the credit rating agencies, efficient 'REPO' market, active market makers (dealers)) of the corporate bond market	Macroeconomic factors: country size, growth rates, global cyclical factors, openness of the economy, stable exchange rate, interest rate volatility
Stock market development	

Source: Author's construction based on theoretical findings

The measurement elements of the bond market are size of the bond market (sovereign and corporate, local and international segment), secondary market turnover and transactions of the corporate bond market, maturity structure of government bonds (including presence of a benchmark yield curve), investor and issuer base of the corporate bond market, market infrastructure (including cross-country electronic connection, information and communication technologies, presence of the credit rating agencies, efficient 'REPO' market, active market makers (dealers)) of the corporate bond market, and stock market development. The legal and macroeconomic elements are qualitative assessment of the legal and regulatory framework (including information disclosure, primary issuance method), lending to SME segment, foreign ownership of the banks, tax treatment of bonds, macroeconomic factors: country size, growth rates, global cyclical factors, openness of the economy, stable exchange rate, interest rate volatility; internationally recognized accounting standards.

The comparative elements framework as presented by World Bank (2004) and Wyman (2015) and further developed by Tocelovska (2016a) complement the additional factors as influencing the development of the corporate bond market in a country (Table 2).

Size	Efficiency
Ratio of sovereign bonds to GDP	Quoted bid-ask spreads (10-yr government bond yield)
Ratio of corporate bonds to GDP	Number of the counterparties providing the prices
Ratio of international bonds to GDP	Size of the quote
Access	Stability
Government bond yield (3 months and 10 years)	Volatility of sovereign bonds
Ratio of domestic to total debt securities	Skewness of sovereign bonds
Ratio of corporate to total debt securities (domestic)	Ratio of short-term to total bonds (domestic)

Table 2

Comparative elements framework

Source: Author's construction based on theoretical findings

While both expositive and comparative elements frameworks provide the models for assessing the development of the corporate bond market, the frameworks contain determinants as identified by the academic studies to be influencing the development of the corporate bond market. In the result of the theoretical analysis of both expositive and comparative frameworks outstanding, the Authors have identified 27 factors, which are claimed by the researchers to influence the development of the corporate bond market in a country (Table 3). The Authors have grouped similar determinants and provided the details of the most frequent measure as applied by the researchers.

Table 3

Determinants of corporate bond market development

Factor	Source
1. country size (most frequent measure as defined by the academic studies: GDP per capita)	Mu et al. (2013), Bae (2012) Eichengreen et al. (2008), Braun and Briones (2006), Burger and Warnock (2005), Eichengreen and Leungnareumitchai (2004)
2. qualitative assessment of the legal and regulatory framework (most frequent measures as defined by the academic studies: influence of rule of law, creditor rights, property rights, lack of capital control)	Astrauskaite (2016), Laeven (2014), Stewart (2009), Adelegan and Radzewicz-Bak (2009), Burger and Warnock (2005), Eichengreen and Leungnareumitchai (2004), Fabella and Madhur (2003)
3. lending to SME segment, foreign ownership of the banks	Astrauskaite (2016), Behr et al. (2015), Hasan et al. (2014), Hakenes et al. (2014), Popov and Udell (2012), Bae (2012), Stewart (2009), Adelegan and Radzewicz-Bak (2009), Eichengreen and Leungnareumitchai (2004), Jiang et al. (2001)
4. size of the sovereign bond market (most frequent measures as defined by the academic studies: sovereign debt to GDP, turnover of sovereign debt on the exchange)	Bae (2012), Dittmar and Yuan (2008), The World Bank (2004), Harwood (2000)
5. stable exchange rate	Adelegan and Radzewicz-Bak (2009), Eichengreen and Leungnareumitchai (2004)
6. investor and issuer base	Felman et al. (2014), Fabella and Madhur (2003)
7. market infrastructure	Felman et al. (2014), Stewart (2009), Fabella and Madhur (2003)
8. tax treatment of bonds	Astrauskaite (2016), Fabella and Madhur (2003)
9. internationally recognised accounting standards	Eichengreen and Leungnareumitchai (2004)
10. growth rates (most frequent measure as defined by the academic studies: annual GDP growth over the preceding ten years).	Burger and Warnock (2005)
11. secondary market turnover and transactions	The World Bank (2004), Fabella and Madhur (2003)
12. interest rate volatility	Eichengreen et al. (2008)
13. global cyclical factors	Ayala et al. (2017)
14. information and communication technologies	Astrauskaite (2016)
15. size of the bond market	The World Bank (2004), Fabella and Madhur (2003)
16. active market makers (dealers)	Stewart (2009)
17. quoted bid-ask spreads(10-yr government bond yield)	The World Bank (2004)
18. presence of a benchmark yield curve	Stewart (2009)
19. maturity structure of government bonds (most frequent measure as defined by the academic studies: ratio of short-term to total bonds (domestic), ratio of short-term bond to total bonds (international))	The World Bank (2004), Fabella and Madhur (2003)
20. international debt (measure as defined by the academic study: international debt to GDP)	The World Bank (2004)
21. stock market development	Sui (2011)
22. openness of the economy	Rajan and Zingales (2003)
23. efficient 'REPO' market	Stewart (2009)
24. primary issuance method	Fabella and Madhur (2003)
25. information disclosure	Sui (2011)
26. cross-country electronic connection	Fabella and Madhur (2003)
27. presence of the credit rating agencies	Laeven (2014); Sui (2011), Stewart (2009)

Source: Author's construction based on theoretical findings

Methods and Procedures

The factors as revealed by the theoretical part of this paper to determine the development of the corporate bond market in a country should be further analysed for the corporate bond market in Latvia. Existing limitations in the availability of the historical dataset on the corporate bond segment in Latvia is present. The latter is justified by the lack of consistency of corporate bond issues in the period before the growth comprehended in 2013, where the mixture of occasional corporate bonds and mortgage bonds issued before 2013 was substituted by the abrupt solid activity of the FSIs. In order to get the credible and consistent data on the corporate bond market, the factors (Table 3) were divided into quantitative factors (secondary data is present) and qualitative factors (secondary data is not present). This paper studies the quantitative factors. The Authors identify the following factors as quantitative: country size, size of the sovereign bond market, size of the bond market, stable exchange rate, growth rates, secondary market turnover and transactions, interest rate volatility, global cyclical factors, international debt, stock market development, openness of the economy, investor base, assessment of the legal and regulatory framework. The elements are further measured by one or several factors. While the number of independent variables simultaneously influencing the dependent variable has been detected to be more than one, the need for the econometric method to analyse the influence of multiple variables on the dependent variable has been revealed and multiple regression applied. Multiple regression provides two important results: an estimated linear equation that predicts the dependent variable, as the function of k observed independent variables x_j , where $j=1, \dots, k$; and the marginal change in the dependent variable that is related to the changes in the independent variables estimated by the coefficients b_j 's (Newbold *et al.*, 2007). The equation for k factors in the simplified form is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + e, e \sim N(0, \sigma^2) \quad (1)$$

(Hair *et al.* (2014), Baayen (2013), Pocs (2003))

$$\tilde{x}_0 = a + b_1 x_1 + b_2 x_2 + \dots + b_k x_k \quad (2)$$

(Krstins, 1998)

In one multiple regression equation, one dependent and number of independent variables could be present. The practice of econometrics limits the number of independent variables as related to the number of the observations presented for analysis. Krstins (1998) pointed to the number of independent variables as 2-6 and rarely 8-10, where the bigger number of independent variables requires the bigger dataset, Шмойлова *et al.* (2000) indicated the number of factors should be 5-6 times less than the number of observations. The initial study of the dataset for the corporate bond market in Latvia indicated the presence of consistent historical data for the period 2010-2017. While the availability of 8 observations has been distinguished as insufficient for the multivariate regression analysis with the number of factors exceeding 10, the need for the extended country sample was identified.

The Authors have selected the country sample as made by *Bank for International Settlement*, which characterised 31 country as developed: Australia, Austria, Belgium, Canada, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States. The *Bank for International Settlement* divides all countries into 3 groups: developed, developing and offshore countries, providing quarterly data on the total debt securities, domestic debt securities and international debt securities of a country.

The dataset as prepared by the Authors for the quantitative data analysis contained the debt securities data from the *Bank for International Settlement* database (dependent and independent variables of the regression), where the remaining factors were obtained from *World Bank* data-

base (independent variables of the regression). The relative nature of the indicators was insured by analysing them as related to GDP, moreover, a logarithm of GDP indicator was introduced. Indexes, as included in the group of Worldwide Governance Indicators by the *World Bank*, were selected due to the comparable database for the selected sample: control of corruption (captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests), government effectiveness (captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies), political stability and absence of violence/terrorism (measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism), regulatory quality (captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development) and rule of law (captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence) (World Bank Database, 2018).

First, the dependency analysis was made with the aim to detect the independent variables with high collinearity, which would contribute little to regression (Mardia *et al.* (1982), Everitt and Dunn (2001)). The factors first were analysed for multicollinearity- the correlation matrix was constructed to verify the lack of high correlation between the factors. The factors with exposed high correlation were extracted, the scatter diagram was constructed (STATA and SPSS software were applied). The highest correlation was observed for the Worldwide Governance Indicators thus each indicator was tested by separately adding it to the model. Two independent variables: log of GDP per capita (PPP) and real GDP growth with positive 0.4363 correlation were separately added to the model both proving to be statistically significant with the probability above 99%. The period of the analysis selected was 2010-2016, the number of the observations 118. The parameters for the multiple regression are revealed by the ordinary least squares method, where the following minimization problem is solved:

$$Q_z = \sum_{i=1}^n (x_{0i} - \tilde{x}_{0i})^2 \rightarrow \mathbf{min} \quad (3)$$

(Krastins, 1998)

Q_z - the residual or unexplained sum of the square residuals;

x_{0i} - the actual value of observation i (in the sample);

\tilde{x}_{0i} - the predicted value of the dependent variable of the observation i (in the sample);

n - number of observations (in the sample).

The further steps are to substitute (4) by the right side of the regression equation (3), to provide the relevant partial derivatives for all the parameters a , b_1 , b_2 , ..., b_k , equalize those to zero and unite to the system, where after the simplification of the normal equation system for calculating the parameters a , b_1 , b_2 , ..., b_k of the multifactorial regression is:

$$\begin{cases} a n + b_1 \sum x_1 + b_2 \sum x_2 + \dots + b_k \sum x_k = \sum x_0; \\ a \sum x_1 + b_1 \sum x_1^2 + b_2 \sum x_1 x_2 + \dots + b_k \sum x_1 x_k = \sum x_0 x_1; \\ a \sum x_2 + b_1 \sum x_1 x_2 + b_2 \sum x_2^2 + \dots + b_k \sum x_2 x_k = \sum x_0 x_2; \\ \dots; \\ a \sum x_k + b_1 \sum x_1 x_k + b_2 \sum x_2 x_k + \dots + b_k \sum x_k^2 = \sum x_0 x_k. \end{cases} \quad (4)$$

(Krastins (1998), Rencher (2002)

Results

In order to shift from the normal equation system to the exact task, the values n ; Sx_1 ; Sx_2 ; ...; Sx_0x_k are substituted by the cross-sums. The linear equation system is solved where the unknown values are a , b_1 , b_2 ..., b_k . The solution provides the value of a (constant of the regression model) and the values of the regression coefficients.

In order to identify the factors as affecting the development of the corporate bond market in Latvia this paper first provides the analytical study of the factors as added to the expositive elements framework and not applied to the corporate bond market in Latvia before- in order to justify the relevance of the factors to be further added and analysed for Latvia. Afterwards, the regression analysis of all factors as summarised in Table 3 will be run.

1 market infrastructure (including cross-country electronic connection, information and communication technologies, presence of the credit rating agencies, efficient 'REPO' market, active market makers (dealers)) of the corporate bond market

The corporate bond market infrastructure as represented by the securities exchange, securities depository and securities brokers is present and developed in Latvia. The stock exchange providing securities trading in Latvia was founded in 1993 by four Latvian commercial banks in 1994 selecting the suitable trading model, based on the platform offered by the Paris Stock Exchange and *the Central Depository of France*. The continuous daily trading by the brokers using the remote trading terminals of securities in Latvia is taking place since 1997. The focus on the bond trading segment can be detected to take place since 1999 with the introduction of ACCEPT facility. The primary market deals for the government bond trading segment have been launched since 2005. The further acquisition of the local securities exchange included first *HEX Group* in 2002, followed by the merger with *OM Group* in 2003, and finally joining the world's largest exchange company, *The NASDAQ OMX Group, Inc* in 2008 (Nasdaq Baltic (2017b)).

The securities depository (Latvian Central Depository) was fully acquired by the *Riga Stock Exchange* in 2002 and became part of the group. The depository is the participant of the TARGET2-Securities, which is the legal framework between the *Eurosystem* and each of central depositories who join it, and IT platform for securities settlement that facilitates financial market stability and increases post-trade transparency (Nasdaq Baltic (2017)).

While trading of the securities in Nasdaq Baltic securities exchange is taking place using the same system infrastructure as the rest of the Baltic and Nordic markets in the group and settlement includes TARGET2-Securities infrastructure of the *European Union*, the market infrastructure as including exchange, depository systems and processed can be assessed as developed. There is no credit rating agencies, existing REPO market and market makers for the corporate bonds for the knowledge of Author.

2 stock market development

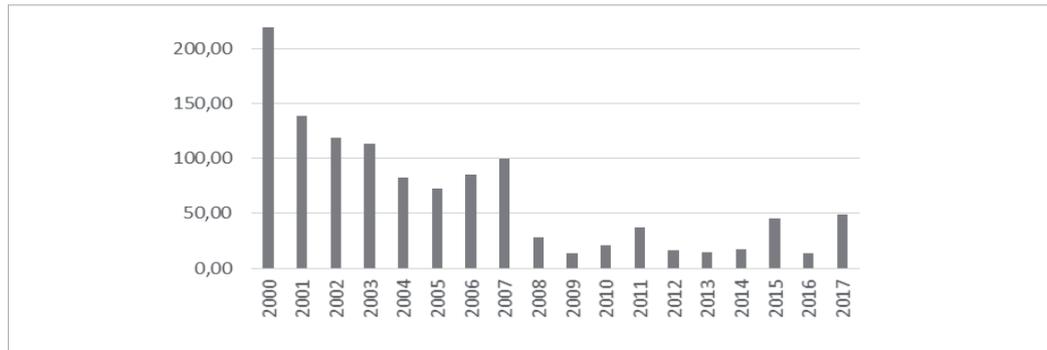
While the trading of stocks in Estonia became popular already in 1994-1995, not until 1997, the stock trading became popular in Latvia (Pelane and Ukenable, 2008). The stock trading has been developing reaching EUR 218.85 million in 2000 gradually decreasing below EUR 50 million in the annual turnover indicator (Figure 1).

Whilst the turnover has been decreasing, the number of the deals as made by investors with shares has been relatively stable- the average level in the period 2010-2017 is 18926 shares (Figure 2). The trend in the decreasing number of shares per deal (10391 shares in 2010 falling to 3172 shares in 2017) could be treated as one of the signs of wider retail segment involvement into the stock trading process.

3 macroeconomic factors: country size, growth rates, global cyclical factors, openness of the economy, stable exchange rate, interest rate volatility

Figure 1

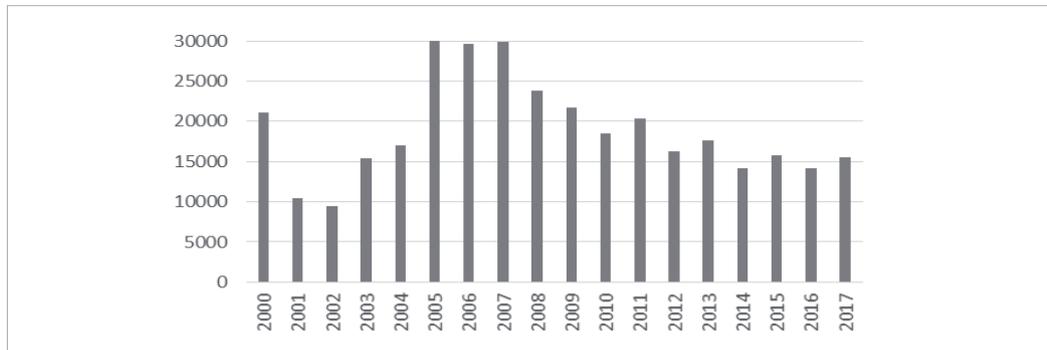
Latvian stock market:
the turnover, 2018
(million EUR)



Source: Author's calculations based on Nasdaq data (2018)

Figure 2

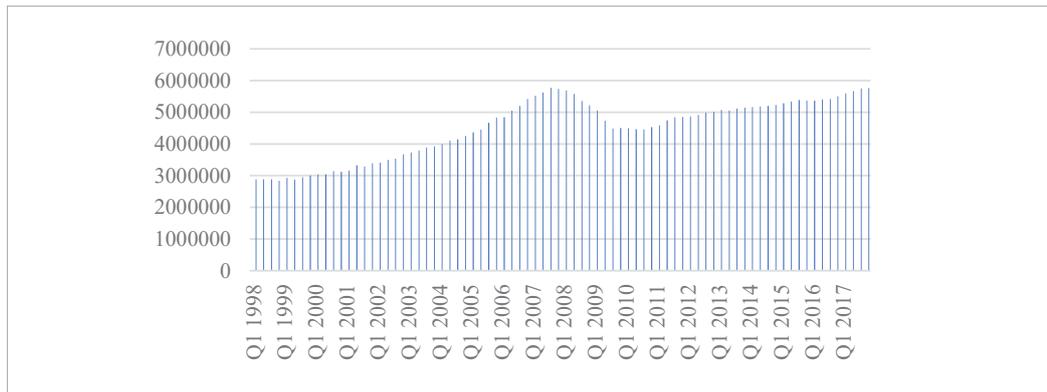
Latvian stock market: the
turnover, 2018
(number of shares)



Source: Author's calculations based on Nasdaq data (2018)

Figure 3

GDP in Latvia, constant
prices, quarterly, 1998-
2017, thousand EUR



Source: Author's constructed based on Central Statistical Bureau of the Republic of Latvia (2018) data.

The dynamics of the GDP (Figure 3, total, constant prices, calendar adjusted) indicates the positive slope of the country size and growth dynamics. The financial crisis 2008-2013 has affected the GDP dynamics of Latvia, where in 2017 the pre-crisis quarterly numbers of growth domestic product have been reached.

4 internationally recognised accounting standards
The accounting information as reported by the company providing economic activity in Latvia is regulated by the Law On Accounting where the Law On the Annual Financial Statements and Consolidated Financial Statements is providing the regulation for preparation of the financial statements. (Law On Accounting, 2018; Law On the Annual Financial Statements and Consolidated Financial Statements, 2018). While the Law On the Annual Financial Statements and Consoli-

dated Financial Statements is not prohibiting to use International Financial Reporting Standards (IFRS) as the basis for financial statement preparation, companies (except the ones mentioned in the Law) should also prepare the financial statements in accordance with Latvian legislation. A State capital company and the parent undertaking of a group of companies may prepare financial statements in accordance with IFRS. Kotowska and Martyniuk (2016) summarized that SMEs in the countries observed by the research (including Latvia) prepared the financial statements in accordance with the national accounting acts.

The study of Strouhal *et al.* (2011) has identified that there are 77% of similarities when comparing Latvian legislation versus IFRS, where the measurement and recognition principles in Latvian accounting practices are based on IFRS and are their simplified summary. Moreover, both Strouhal *et al.* (2011) and PWC (2018) indicated that IFRS regulated the practices, which were not described and regulated by the local legislation thus increasing the influence of IFRS.

The regression was run for the country sample where the independent variable was the amount of the corporate bonds outstanding, while the independent variables were the factors selected by the theoretical analysis and identified to be quantitative for the corporate bond market in Latvia: country size, size of the sovereign bond market, size of the bond market, stable exchange rate, growth rates, secondary market turnover and transactions, interest rate volatility, global cyclical factors, international debt, stock market development, openness of the economy, investor base, assessment of the legal and regulatory framework. The stable exchange rate and interest rate volatility factors were omitted due to Latvia's membership in the EU and thus relatively weak relevance of those factors. In the result of the regression analysis three models were constructed (Table 4).

Variable	Total amount of the corporate bonds outstanding	Total amount of international corporate bonds outstanding	Total amount of corporate bonds outstanding issued by the financial sector issuers
log of GDP per capita (PPP)	8.5247682***	5.4957525***	8.0797004***
real GDP growth, %	-21.035614***	-15.203118***	-20.943664***
inflation, %	-12.918484	-15.088568	-13.51023
stock turnover, % of GDP	-0.69122551	-0.74270908**	-0.73937021
domestic savings, % of GDP	8.916597**	9.0455666***	9.5422962***
government expenditures, % of GDP	-5.7470699	-0.95918583	-5.8211315
government bonds all, % of GDP	-0.94946874**	-0.704655**	-0.91449244*
government bonds international, % of GDP	-0.76713586	-0.92658378	-0.93697292
control of corruption	90.673348	22.244896	79.971498
government effectiveness	-61.210479	-68.838875	-54.630754
political stability and absence of violence/terrorism	-43.699009	-64.386469	-53.086184
regulatory quality	-281.50871***	-124.57375**	-264.52317***
rule of law	-19.315273	39.128813	-17.852156
Constant	-8372.667***	-5496.8125***	-7938.207***
R2	0.7981805	0.81480284	0.79941996
N	118	118	118

Table 4

Results of panel regression analysis of the determinants of the corporate bonds market development

Source: Author's construction based on The World Bank and Bank for International Settlement data (2018).

*** Coefficient is significant at the 0.99 level.

** Coefficient is significant at the 0.95 level.

* Coefficient is significant at the 0.90 level.

Total amount of the corporate bonds outstanding = $-8372.667 + 8.525 \cdot \log$ of GDP per capita (PPP) - $21.06 \cdot \text{real GDP growth, \%} + 8.917 \cdot \text{domestic savings, \% of GDP} - 0.949 \cdot \text{government bonds all, \% of GDP} - 281.50871 \cdot \text{regulatory quality}$.

Total amount of international corporate bonds outstanding = $-5496.813 + 5.496 \cdot \log$ of GDP per capita (PPP) - $15.203 \cdot \text{real GDP growth, \%} - 0.743 \cdot \text{stock turnover, \% of GDP} + 9.046 \cdot \text{domestic savings, \% of GDP} - 0.705 \cdot \text{government bonds all, \% of GDP} - 124.574 \cdot \text{regulatory quality}$.

Total amount of corporate bonds outstanding issued by the financial sector issuers = $-7938.207 + 8.08 \cdot \log$ of GDP per capita (PPP) - $20.944 \cdot \text{real GDP growth, \%} + 9.542 \cdot \text{domestic savings, \% of GDP} - 0.914 \cdot \text{government bonds all, \% of GDP} - 264.523 \cdot \text{regulatory quality}$.

All the models constructed are statistically significant with the probability above 95%.

The determination coefficients for the models constructed are 79.8%, 81.5% and 79.9% respectively. The second model demonstrates the highest level of explanation of the variability of the total amount of international corporate bonds outstanding as related to the factors i.e. 81.5%.

The results of the panel regression indicate that factors affect the issuance of the corporate bonds statistically significantly (with 99% and 95% probability) being GDP per capita, real GDP growth, amount of domestic savings, amount of government bonds outstanding and regulatory quality in the country. The GDP per capita and the amount of domestic savings outstanding positively influence the amount of the corporate bonds outstanding. In contrast, real GDP growth, amount of government bonds outstanding and regulatory quality are found to influence the amount of the corporate bonds outstanding negatively. This negative relation is controversial to the number of the academic studies as covered in the theoretical part- the positive relationship between the presence of the government bonds as the benchmark for the existing of the corporate bond is traditionally established by the academics. The Authors estimate the "overregulation" effect as converting the positive transparency of the market into the heavy burden to the issuers of the securities, still the regulatory influence on the corporate bond market should be further explored by the qualitative factor analysis.

Two additional independent variables were tested for the determinants influencing the amount of the corporate bonds outstanding- the amount of international corporate bonds outstanding and the amount of the corporate bond issues as done by the financial sector issuers. The need for both independent variables is determined by the present situation in the corporate bond market in Latvia: there are no international corporate bonds outstanding while 85% of the domestic corporate debt is issued by the FSI. The determinants of development for both groups are identified: 1) for the FSI segment the same determinants as for the total corporate bonds segment 2) for the international corporate bond segment inverse influence of the stock turnover factor as influencing factor is identified. The latter inverse relationship signals the substitute role of bond and stock market while having limited application for the corporate bond market in Latvia- whilst the stock market is comparatively weak, the international corporate bond market is non-existent. The stock market factor influence should be further analysed as the qualitative factor

Conclusions

— The existing studies analysing the development of the corporate bond market were analysed and grouped by the Authors into two clusters: expositive elements frameworks and comparative elements frameworks. The Authors have further developed the expositive elements frameworks as previously presented by Tocolovska (2016) by adding market infrastructure (including cross-country electronic connection, information and communication technologies, presence of the credit rating agencies, efficient 'REPO' market, active market makers (dealers)) of the corporate bond market, stock market development, macroeconomic factors: coun-

try size, growth rates, global cyclical factors, openness of the economy, stable exchange rate, interest rate volatility, and internationally recognised accounting standards factors.

- The analytical study of the factors as acknowledged by this paper to be part of expositive elements framework indicates that market infrastructure is present and highly developed—as being the member of *Nasdaq Group*, the stock exchange and securities depository share the trading infrastructure present in *Nasdaq Group* (the latter also is the participant of TARGET2-Securities framework). There is no credit rating agencies, existing REPO market and market makers for the corporate bonds for the knowledge of Authors. The stock market development indicates the potential increasing number of the retail investors— while the turnover is declining, the number of deals is remaining comparatively stable. The macroeconomic factors indicate the favourable environment: the GDP growth is present and stable, the exchange rate and interest rate risks have been decreased substantially by Latvia joining the Eurozone. The presence of euro currency and high level of integration into the EU economy shapes the openness of the economy and global cyclical factors in a similar manner to EU countries. The accounting legislation present in Latvia to the major extent replicates IFRS, where State capital companies and the parent undertaking of a group of companies may prepare the financial statements in accordance with IFRS. The rest of the companies need to prepare the financial statements in accordance with the local regulation.
- In the results of the analysis of both expositive and comparative elements frameworks the Authors have detected 27 factors as influencing the corporate bond market development. For the purpose of analysis the factors were divided into quantitative (secondary data is present) and qualitative (secondary data is missing). This paper presents the analysis of the quantitative factors.
- In the result of the regression analysis three models were developed (statistically significant with the probability above 95%, determination coefficients being 79.8%, 81.5%, and 79.9%). The regression analysis of the quantitative factors has demonstrated the influence of the following factors on the amount of the corporate bonds outstanding: GDP per capita, amount of domestic savings, real GDP growth, amount of government bonds as the share of GDP and regulatory quality. The influence of the stock market was not defended in the research. The influence of the government bond market development on the corporate bond market development was found to be inverse. The results are controversial with the results of the academic research outstanding. Taking into account the importance of this issue in the national context, as well as the extensive research potential, the Author recommends the relationship to be further analysed in the academic research.

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