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THE DETERMINANTS OF THE MUNICIPAL BONDS MARKET IN ROMANIA

Adriana TIRON-TUDOR
Cristina Alexandrina ȘTEFĂNESCU
Anamaria DAN

Abstract

Municipal bonds are widely issued by local municipalities as a feasible financial alternative to fund infrastructure projects. On the other side, from the investors' perspective, bonds issued by municipalities have historically been a popular investment option due to often favorable tax treatment for investors as well as the issuer's credibility and generally high credit quality of the market.

The paper explores the factors that influence the size and interest rates of Romanian municipal bonds for a 20 years period starting from 2001, when the first issuance took place, to the present. The data collected were analyzed through multiple linear regressions using ordinary least square estimator. The results revealed that municipalities with large populations, higher levels of income and expenses, and longer maturity tended to issue more municipal bonds. On the other hand, the unemployment and inflation rates increased the interest rates. The regions, fund destinations, and political variables also influenced the levels of bonds issued as well as the interest rates.

These findings illustrated the importance of the context at local and national level, expressed by different social, economic and political variables that local governments should consider when issuing municipal bonds. The study contributes to the development of knowledge in the area of issuer's characteristics and, moreover, the political, economic, and financial setting influences on the municipal bond market in an emergent country from Eastern Europe, Romania.

Keywords: municipal bond, market determinants, public financing, Romania.

Adriana TIRON-TUDOR (corresponding author)
Professor, Department of Accounting and Audit,
Faculty of Economics and Business Administration,
Babeș-Bolyai University, Cluj-Napoca, Romania
Tel.: 0040-726-779.474
E-mail: adriana.tiron.tudor@gmail.com

Cristina Alexandrina ȘTEFĂNESCU
Associate professor, Department of Accounting and Audit,
Faculty of Economics and Business Administration,
Babeș-Bolyai University, Cluj-Napoca, Romania
E-mail: cristina.palfi@econ.ubbcluj.ro

Anamaria DAN
PhD candidate, Doctoral School in Economics
and Business Administration, Faculty of Economics
and Business Administration,
Babeș-Bolyai University, Cluj-Napoca, Romania
E-mail: anamaria.dan@econ.ubbcluj.ro

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1. Introduction

The 2008 financial crisis led to various unfortunate consequences, including bursting the housing bubble, a deep recession, high unemployment rates, and adverse effects on financial stability worldwide. These circumstances made it difficult for local governments to raise funds, so the public sector became increasingly concerned by the problem of local debt. The combination of slow revenue growth and expenditure restrictions intensified the pressure on local governments (Chen *et al.*, 2016) and forced them to find new tools to address this financial scenario (Balaguer-Coll, Prior and Tortosa-Ausina, 2016).

In this context, the issuance of bonds became an alternative means of funding the investment projects proposed by local governments. This form of borrowing is less risky and expensive than other financing methods, such as bank loans, and can lead to economic growth in local communities. Thus, establishing and maintaining a responsible, viable borrowing environment became a widespread policy goal for local governments (Martell and Guess, 2006; Bercu, Tofan and Cigu, 2015). Bonds funded projects deliver essential public services to the communities with long term benefits as schools get built, highways paved, water and sewer systems expanded, bridges and tunnels maintained, and hospitals upgraded. Empirical studies on municipal bonds were carried mostly in the United States, where issuance of bonds by municipalities has a two-hundred-years tradition (Baber and Gore, 2008; Daniels, Diro Ejara and Vijayakumar, 2010; Reck and Wilson, 2014; Li, Tang and Jaggi, 2018). In Europe, the research interest on municipal bond markets increased especially in the post crises periods in developed markets (Padovani, Rescigno and Ceccatelli, 2018).

The primary objective of the paper is to investigate the factors that influence the size and interest rates of Romanian municipal bond issues. This study is addressed to a broad range of readers, including theoreticians interested in public policy and public management contexts, as well as practitioners who are designing strategic plans to reduce debt levels. The study contributes to the development of knowledge by finding answers to the following research questions: (1) what are the factors determining the amount issued by municipal bonds? and (2) what factors influence the interest rates of municipal bonds?

The originality of this paper lies in its theoretical and empirical approach. To our knowledge, it is the first study to empirically analyze the factors influencing the issuance of municipal bonds in an Eastern European country. Moreover, we reviewed economic, social, financial, and political data to assess the relationship between various variables and the issuance of bonds, as well as to explain the influence of these variables on bond interest rates. This provided an overall view of this topic.

The main findings of our study revealed that the Romanian municipal bond market is still underdeveloped. A municipality with a large population situated in a western region with an independent mayor and relatively high levels of revenue and expenditure can be considered the prototype of the Romanian municipal bond issuer.

This paper continues with a second section dedicated to the review of the literature concerning the level of municipal bond issuance and the cost of debt. The third section describes the research design and methodology, whereas the fourth section presents the descriptive and empirical results and is followed by the conclusions, limits and further developments section.

2. Literature review

2.1. Theoretical aspects of the municipal bond market at the international level

Since municipalities are often faced with a lack of resources to finance their investment projects or their ongoing activities, they frequently resort to alternative funding sources. The choice of a financing method is of great importance, so local governments must consider various aspects, such as the necessary amount, the funded activity, cost-effectiveness, flexibility, managerial and technical skills, and economic context (Eltrudis, 2018). Unfortunately, there is no ideal borrowing method, and everything depends on the context. However, the literature recommends a mixture of financing schemes.

Financial markets represent an alternative source of financing. Local governments can attract capital through municipal bonds that are debt instruments issued by a city to raise funds to cover its budget deficit. These bonds require the issuer to pay the investors the principal amount and the interest at intervals established in the issuing prospectus (Bailey, Asenova and Hood, 2009). The municipal bond market's proper functioning is vital for the provision of public goods and services (Cestau *et al.*, 2019). In the majority of cases, the investment projects financed by issuing bonds usually entail construction or rehabilitation of roads and water supply and sewerage systems, building or modernizing schools, repairing or developing tourist attractions, or refinancing bank loans. Such projects are intended primarily to improve the quality of life for citizens, thus leading to economic growth (Medda and Cocconcelli, 2018).

The financial market provides the possibility to attract capital at a lower cost and for an extended period compared to bank loans, thus presenting the advantages of cost-effectiveness and equitability (Martell and Guess, 2006). However, since the issuance of municipal bonds process is quite complex and involves many parties, the differences in using this method of financing are apparent. Thus, while in the United States this method to secure funding is employed frequently by municipalities, in the rest of the world it is used less often because bank loans provide a more consistent means of financing.

2.2. Insights into the Romanian municipal bond market

Thus far, the literature on the Romanian municipal bond market has been scarce; Mosteanu and Lacatus (2009) highlighted the lack of empirical analysis of the municipal bond market. In 2005, Zai, Lazăr and Inceu (2005) opened this research topic

by comparing two financing alternatives, bank loans and municipal bonds. Over the following few years, various studies emerged and aggregated general information on municipal bonds in Romania, such as the number of issues, values, types of issuers, destinations of funds, and interest rates (Curutiu, 2006; Mosteanu and Lacatus, 2009).

The limited development of the municipal bond sector in Romania has mainly existed due to a lack of transparency and an absence of credit ratings (Vasile and Matei, 2010; Pop and Georgescu, 2012; Constantinescu and Tanasescu, 2014). Other factors identified by Pop and Georgescu in studies from 2012 and 2016 were the low volume per offer, the relatively high nominal values, the small numbers of investors, buy-and-hold behavior, the lack of popularity of bonds, the absence of a yield curve, and poor development of credit enhancements.

A more detailed analysis of the municipal bond market was provided by Pop and Georgescu (2016). These authors found a positive association between the outstanding quantity of municipal bonds and the issuer's economic potential as measured by population size, as well as a negative relationship between risk premiums and population size. The bonds' trading values were explained by the turnover ratios and the listing periods, whereas the risk premiums and coupon rates had no influence on these values.

2.3. Factors determining the municipal bond amounts and the cost of debt

The literature revealed a broad range of factors from which we extracted those considered relevant and suitable for the Romanian municipal bonds market. These factors referred to the internal and external conditions that can be more or less controlled by the municipality and are grouped in four main categories financial, economic, issuer characteristics and political.

Financial factors refer to the municipality performance, expressed as revenues and expenditures. The levels of revenues and expenses of a municipality manifest their influence on the bond market. Income represents the source of reimbursement for municipal bonds associated with lower default risks (Reck and Wilson, 2014). This leads to an indirect influence on the cost of debt (Sherrill and Yerkes, 2018) and the level of debt (Galiński, 2015), but other studies have found that revenue directly influences debt levels (Daniels, Diro Ejara and Vijayakumar, 2010; Balaguer-Coll, Prior and Tortosa-Ausina, 2016). In addition, expenditures directly influence debt (Daniels, Diro Ejara and Vijayakumar, 2010; Balaguer-Coll, Prior and Tortosa-Ausina, 2016). However, Galiński (2015) found no association between expenditure and debt.

Economic factors refer to the country macroeconomic indicators as gross domestic product, unemployment rate and inflation. Gross domestic product (GDP) has an indirect impact on borrowing costs (De Mello, 2001; Chen *et al.*, 2016). For instance, Baber and Gore (2008) detected a direct influence of this factor on borrowing cost. However, other studies have found no association between these two elements (Reck and Wilson, 2014). In terms of size, an issuer with a higher GDP will issue more bonds (Chen *et al.*, 2016). The unemployment rate is another economic measure that influ-

ences local government debt. A higher unemployment rate implies both a higher level of debt (Galiński, 2015; Greer and Denison, 2016) and a higher cost of debt (Wilson and Howard, 1984). The inflation rate increases the cost of debt (Park, 1997) but does not influence debt (Daniels, Diro Ejara and Vijayakumar, 2010); as such, the default risk in the municipal bond market can be measured with the help of inflation (Bailey, Asenova and Hood, 2009).

Issuer characteristics are represented by social factors such as population and issuer type. In the literature, the size of an issuer has usually been measured by the number of inhabitants. There has been abundant research on the influence of population size on municipal bonds, and empirical evidence has shown a direct association between population size and debt level (Baber and Gore, 2008). In terms of the debt cost, there is an indirect relationship between these factors; as the population grows, the borrowing cost decreases (Baber *et al.*, 2013; Simonsen, Robbins and Helerson, 2001). Many studies have analyzed the relationship between municipal bonds and issuer types (Daniels, Diro Ejara and Vijayakumar, 2010; Padovani, Rescigno and Ceccatelli, 2018). The results showed that the issuer's size is positively related to the amount issued and negatively associated with the cost of debt.

As political factors, the political ideology can influence debt levels and costs. For example, left-wing governments tend to be more indebted (Balaguer-Coll, Prior and Tortosa-Ausina, 2016; Greer and Denison, 2016). The higher the level of debt is, the higher is its cost.

Other factors mentioned in the literature as years to maturity, fund destinations, and region, are used as control variables in our study. Local governments can take advantage of municipal bonds' longer paths to maturity, allowing issuers to borrow more money. Years until maturity have a positive influence on cost of debt (Li, Tang and Jaggi, 2018; Padovani, Rescigno and Ceccatelli, 2018; Simonsen, Robbins and Helerson, 2001) because a longer maturity implies a higher default risk. In terms of issue size, long-term debt has a considerable issuance (Daniels, Diro Ejara and Vijayakumar, 2010). Depending on its purpose, the bond issue can be intended for general obligation bonds or revenue bonds. In the case of general obligation bonds, the local government guarantees all income; a revenue bond, on the other hand, is secured with payment from a particular project (Li, Tang and Jaggi, 2018). Also, the issuer's location entails advantages and disadvantages over which the issuer has limited control. Cropf and Wendel (1998) demonstrated that some United States areas are more indebted than others but there is no clear pattern suggesting a positive or negative influence of the region on the bond market.

The literature and especially the American literature refer to a broader variety of factors that might influence the municipal bond market, as will be presented below. But, due to the lack of this information at the Romanian municipalities' level, it could not be considered in the present study.

Rigorous accounting and auditing requirements are associated with lower interest costs (Wallace, 1981; Wilson and Howard, 1984). More recent studies have suggested

that financial restatements disclosures (Baber *et al.*, 2013), deficiencies of internal control (Park, Matkin and Marlowe, 2017), and timeliness of reporting (Sherrill and Yerkes, 2018) lead to an increase in municipal debt costs. Another factor is media coverage by local newspapers which plays a crucial role in monitoring the local government by providing information about its activities, project finances, and spending of public funds. Gao, Lee and Murphy (2020) analyzed the effect of newspaper disclosure on municipal bonds yields and revealed that following closure yields rise due to a lack of information. Also, climate changes become analyzed as an influencer of municipal bonds. Painter (2020) found that investors consider climate change risks; these lead to an increase in annualized issuance costs for long-term maturity bonds. State policies for distressed municipalities also influence borrowing costs. Proactive states have lower yields than countries due to their creditworthiness (Gao, Lee and Murphy, 2019). Credit rating agencies and the insurance companies act as information intermediaries that influence the municipal bond market. They bring additional confidence in the issuers and lower risks. In addition, municipal bond yield is negatively related to insurance (Chun *et al.*, 2019), which leads to a lower cost of borrowing. Credit ratings reflect the securities risks and investors rely on this information (Cornaggia, Cornagia and Israelsen, 2017); moreover, higher credit rating levels lead to lower demands for disclosure (Gillette, Samuels and Zhou, 2020).

However, no single factor alone has a major influence. Instead, all of them act together and their synergic effect influences the public sector's financial management.

3. Research design

3.1. Definition of variables and model specification

In this study, two models of municipal bonds and interest rates are estimated to examine the factors that affect them. The dependent variables in our study were the amount issued and the interest rate. The amount released could be measured by the number of bonds issued because all of the financial instruments had a face value of 100 lei (Romanian national currency). Since the coupon rate was variable in most issuances, we calculated it as the annual median between the Romanian interbank interest rate and the fixed margins.

Next, we grouped the independent variables into five categories: financial, economic, issuer characteristics, political, and control variables, as presented in Table 2. The financial variables were the total expenditure and total revenue from the municipal financial statements at the county level.

Since the data covered an extended period, their values were updated using consumer price indices. The economic variables included GDP (actualized), unemployment rate and inflation rate. We analyzed the issuer size, measured as the natural logarithm of the population, and the issuer type. In the model, the number of inhabitants was a logarithm, and the issuer type was transformed into three dummy variables: city, municipality and county councils. In the regression, the data were ana-

lyzed based on the city type issuer. Our analysis also took into consideration political variables, such as ideology; for this purpose, three dummy variables were analyzed as well: left-wing, right-wing and independent. The comparison variable was the party in power.

The control variables included the geographical location of an issuer. The regional variables encompassed seven dummy variables based on Romania's administrative divisions: Northwest, Northeast, West, Central, South, Southeast, and Southwest. The Central region was the reference. Another control variable was the funds' destination, transformed into five dummy variables according to the type of project financed: rehabilitation and street modernization, water and gas distribution and sewerage, entertainment facilities and tourist attractions, multiple purposes, and refinancing bank loans. Issuances for refinancing formed the basis of comparison. In addition, years to maturity were considered. Tables 1 and 2 show the detailed variable definitions and their expected signs.

Table 1: Description of dependent variables

Variable	Symbol	Definition	Sources
Number of bonds issued	No_bonds	Number of bonds issued	Issue prospectuses
Coupon interest rate	Interest_rate	The annual mean of Romanian interbank interest rate + fixed interest rate	Issue prospectuses, National Bank of Romania

Source: The authors

The independent variables are grouped in four main categories financial, economic, issuer characteristics, political, and a separate group for control variables.

3.2. Sample selection and data sources

This study analyzed all 78 municipal bonds issued in Romania during the last 18 years, except those issued by a commune (Aninoasa), due to the small amount released, and the 2015 issuances by the city of Bucharest because of the large amount issued. These omissions made our sample more uniform and homogeneous and rendered the data comparable. The prospectuses containing data about the municipal bonds are available on web sites like Kmarket, VMB Partners, and the Bucharest Stock Exchange.

3.3. The regression models

In order to verify the significance of the independent variables on the municipal bonds level and interest rates, we applied a multiple linear regression model using ordinary least squares (OLS) estimator. Our baseline models estimate the number of bonds issued and the interest rate as a function of financial, economic, issuer characteristics, political, and control factors. The regression models for our analysis are as follows, where i represents the issuer, t stands for the time period, and ε is the

Table 2: Description of independent variables

Variable	Symbol	Definition	Sources	Sign no bonds	Sign interest rate	Literature
Financial variables						
Expenditure	EXP	The total expenditure from the budget execution at the county level	National Institute of Statistics	+	+	Daniels, Diro Ejara and Vijayakumar, 2010; Galiński, 2015; Balaguer-Coll, Prior and Tortosa-Ausina, 2016
Revenue	REV	The total revenue from the budget execution at the county level	National Institute of Statistics	+	-	Daniels, Diro Ejara and Vijayakumar, 2010; Reck and Wilson, 2014; Galiński, 2015; Balaguer-Coll, Prior and Tortosa-Ausina, 2016; Sherrill and Yerkes, 2018
Economic variables						
Gross domestic product	GDP	The gross domestic product of the county (in million lei)	National Institute of Statistics	+	-	De Mello, 2001; Baber and Gore, 2008; Reck and Wilson, 2014; Chen *et al*., 2016
Unemployment rate	UR	The unemployment rate at the county level	National Institute of Statistics; County Agencies for Employment	+	+	Wilson and Howard, 1984; Galiński, 2015; Greer and Denison, 2016
Inflation	IR	The annual inflation rate	National Institute of Statistics	0	+	Park, 1997; Bailey, Asenova and Hood, 2009; Daniels, Diro Ejara and Vijayakumar, 2010
Issuer variables						
Issuer type	3 dummy variables for issuer type	City, municipality council, county council	Issue prospectuses	+	-	Daniels, Diro Ejara and Vijayakumar, 2010; Padovani, Rescigno and Ceccatelli, 2018
Population	Ln_pop	The natural logarithm of the population	National Institute of Statistics; Ministry of Regional Development and Public Administration	+	-	Simonsen, Robbins and Helerson, 2001; Baber and Gore, 2008; Baber *et al*., 2013

Political variables						
Political party	3 dummy variables for political ideology	The political party in power: left-wing, right-wing, independent	Central Electoral Bureau	+	+	Greer and Denison, 2016; Balaguer-Coll, Prior and Tortosa-Ausina, 2016
Control variables						
Maturity	Maturity	Number of years to maturity	Issue prospectuses	+	+	Simonsen, Robbins and Helerson, 2001; Daniels, Diro Ejara and Vijayakumar, 2010; Li, Tang and Jaggi, 2018; Padovani, Rescigno and Ceccatelli, 2018
Destination of funds	5 dummy variables for type of destination	Street rehabilitation and modernization, water and gas distribution and sewerage, entertainment facilities and tourist attractions, refinancing loans	Issue prospectuses	+/-	+/-	Li, Tang and Jaggi, 2018
Development region	7 dummy variables for development region	The region where the issuer is situated. There are seven regions: NW, C, NE, SE, S, SW, W	Ministry of Regional Development and Public Administration	+/-	+/-	Cropf and Wendel, 1998

Source: The authors

error term:

$$No\_bonds_i = \alpha + \beta Financial_{i,t} + \beta Economical_{i,t} + \beta Issuer_{i,t} + \beta Political_{i,t} + \beta Controls_{i,t} + \varepsilon \quad (1)$$

$$Interest\_rate_i = \alpha + \beta Financial_{i,t} + \beta Economical_{i,t} + \beta Issuer_{i,t} + \beta Political_{i,t} + \beta Controls_{i,t} + \varepsilon \quad (2)$$

4. Empirical results

4.1. Descriptive statistics

In Romania, the first issuance of municipal bonds took place in 2001, when two cities, Predeal and Mangalia, issued bonds to finance entertainment facilities and tourist attractions. Since then, there have been 78 issuances, as described in the table below.

Table 3: Romanian municipal bond market's description

	Issuer	Destination	Political ideology
78 issuances	19% (cities)	26% (loan refinancing)	61% (right-wing)
	72% (municipalities)	26% (rehabilitation and street modernization)	30% (left-wing)
	9% (country councils)	24% (multiple purposes)	9% (independent)
		14% (water and gas distribution and sewerage)	
		10% (entertainment facilities and tourist attractions)	

Source: The authors

We observed that issuers have increasingly resorted to municipal bonds to refinance bank loans since the 2008 financial crisis. In terms of maturity, there has been an increase in financing maturity from 1 year to 20 years. Moreover, the extension of maturity has revealed the increasing trust of investors in the issuer debt capacity.

Given the wide range of independent variables, we follow Pinna (2015) and test for multicollinearity by measuring the variance inflation factor (VIF). The equality of the variance (ANOVA) across municipal bonds level and interest rate shows a significant effect of the relationship between the independent variables and the dependent variables. We test the data for autocorrelation using the Durbin Watson test. Like Galiński (2015), our models meet the conditions of a normal distribution of error and homoscedasticity.

The correlation analysis using the Pearson coefficient reveals that the level of municipal bonds issued is strongly correlated with years to maturity, population, incomes, expenses, GDP, and inflation rates. Also, we found the weakest correlation with the destination, issuer type, and region. Similar results we have obtained by using the Spearman coefficient. On the other hand, the Pearson correlation analysis shows that the interest rate is strongly related to maturity, destination, GDP, incomes, expenses,

inflation, and unemployment rates. Also, we found the weakest correlation with the region and political party. The Spearman correlation coefficients have similar results.

4.2. Regression results

The regression results of the determinant factors of municipal bonds issuances and interest rates are displayed in Tables 4 and 5. Our results followed previous studies (Daniels, Diro Ejara and Vijayakumar, 2010; Balaguer-Coll *et al.*, 2016; Chen *et al.*, 2016), revealing that financial, economic, issuer characteristics, and political factors influence the bond level and interest rates. Since we observed high, significant collinearity among the variables, we introduced the independent variables in the model through attempts. Then following Pinna (2014) we select the variables in term of the efficiency and effectiveness of the model and we obtain four statistically significant models that predict the issuances and, respectively, the interest rates.

For the municipal bond issuances, the first model includes years to maturity, issuer type, region, and GDP. The R-squared is relatively high (above 50 percent), and the data are the most fitted as ten variables from twelve have significantly determined the issuance of municipal bonds. The second model contains issuer type, region, inflation rate, and revenues. The model significance is lower than the first one, with an R-squared of 0.389. The third model has an R-squared of 0.378 and includes maturity, population, inflation rate, and expenses. In the fourth model four variables out of twelve are significant with an R-squared of 0.441.

Considering the financial factors, we observed that on the revenues side, there was a direct association with the municipal bonds' levels, leading us to conclude that issuers with higher revenues tend to issue more bonds. Similar results were obtained by Daniels, Diro Ejara and Vijayakumar (2010) and Balaguer-Coll, Prior and Tortosa-Ausina (2016). The municipality revenues represented the sources of debt repayments, lowering the default risk and increasing investor confidence in local government. A municipality's bonds level is also directly influenced by its expenditures, showing that issuers with higher levels of expenditure issue more bonds. The local authority needs efficient financial management in accordance with its financial capacity to be able to efficiently manage its debt level.

From the perspective of economic factors in our study, the GDP coefficient had a positive but insignificant influence on the bond level. The GDP usually measures the fiscal health of a state, and issuers located in more advanced economic development regions with higher GDP levels have more developed bond markets (Chen *et al.*, 2016). In fact, GDP can be viewed as the basis for the calculation of taxes, which is the source of reimbursement. Therefore, higher taxes collected can support a greater level of debt.

We did not find an association between the unemployment rate and the number of bonds issued. However, these factors shared an inverse relationship since the unemployment rate restricted the number of municipal bonds being perceived as having low credit quality (Zedan, Daas and Awwad, 2020). Additionally, the inflation rate did not influence the levels of bonds issued.

Table 4: Number of bonds regression analysis results

No_bonds	Model 1		Model 2		Model 3		Model 4	
	Coefficient	T stat	Coefficient	T stat	Coefficient	T stat	Coefficient	T stat
(Constant)		12.241		9.112		2.756		5.716
Maturity	.478***	4.677			.421***	2.775		
Dest_tourism							-.115	-.836
Dest_mul_porp							-.229	-1.368
Dest_roads							-.261	-1.467
Dest_water_gas							-.341**	-2.104
Municipality	.387***	3.286	.280**	2.195			.314**	2.363
County_coun	.171	1.442	.158	1.209			.121	.904
Right_wing	-.519***	-2.710						
Left_wing	-.385*	-1.929						
Region_NE	.370***	3.186	.208*	1.686			.120	.861
Region_NW	.427***	3.852	.298**	2.559			.266**	2.068
Region_S	.202*	1.889	.135	1.225			.184	1.626
Region_SE	.341***	2.942	.150	1.271			.110	.890
Region_SW	.220**	2.261	.110	1.028			.122	1.140
Region_W	.445***	3.304	.225*	1.677			.262*	1.818
Ln_pop					.274***	2.685		
GDP_act	.081	.723						
UR							-.006	-.034
IR			-.038	-.311	.174	1.233		
REV_act			.430***	3.045			.351*	1.901
EXP_act					.234*	1.840		
R		0.733		0.624		0.615		0.664
R^2		0.537		0.389		0.378		0.441

, **, * indicate p<0.10, p<0.05, and p<0.01, respectively*

Source: The authors

The issuer characteristics included population and issuer type. As expected, the local authority population was a significant demographic factor that contributed to indebtedness. These results were similar to those of Baber and Gore (2008). A larger population requires a greater demand for public debt (Brien and Yan, 2020). Beyond this, a broader community represented a broader tax base, contributing to fulfilling a municipality's debt obligation. In line with Pinna (2015) and Padovani, Rescigno and Ceccatelli (2018) we found that the municipality's coefficient is positive and significant, meaning that municipalities tend to issue more bonds than cities. This fact can be linked with the large population able to support the debt obligation through taxes paid.

As first found by Greer and Denison (2016), our results showed that political ideology influences the Romanian bond market. Right-wing and left-wing issuers released lower numbers of bonds than independent mayors. This result led us to the conclusion that independent mayors do not receive the same support from the government and must borrow to develop the investment projects.

In addition, the control variables impacted the municipal bond market. Our results revealed a direct relationship between maturity and issue size. That is, longer maturity led to a large number of bonds issued; similar results were obtained by Daniels, Diro Ejara and Vijayakumar (2010). Term to maturity is an important issue characteristic set by the municipality, which must be structured in accordance with the budget planning in such a way that the borrower fulfills his obligations on time to maintain creditworthiness. Furthermore, the debt maturity decision is essential for credit risk and information asymmetry (Daniels, Diro Ejara and Vijayakumar, 2010).

Between the types of projects financed we remark some differences as shown in a study by Li, Tang and Jaggi (2018). Our results suggested that projects involving water and gas distribution and sewerage indicate a lower level of bond financing than bank loan refinancing projects. Thus, local authorities should consider investments a priority and avoid unprofitable projects that can decrease citizens' and investors' confidence. To gain trust and make citizens participate in a community's wellbeing, the municipality can submit to the vote the project financed through bonds. In this way, everyone becomes involved and benefits from the project's outcome.

As the regression results revealed, Romania has regional variations in bond financing. The issuers located in the Northwest, Northeast, South, Southeast, Southwest, and West issue more bonds than those located in the Central region. Municipal bonds are a way to improve regional competitiveness growth (Vukovic *et al.*, 2020). These differences between regions result from economic and demographic characteristics, on which an issuer has a slight influence.

Based on these results, we can define the features of the typical Romanian municipal bond issuer: it is a municipality with a large population situated in the Western region, led by a mayor from an independent party and characterized by higher levels of revenues and expenditures.

In Table 5, we present the regression results for municipal bond interest rates. In the first model we introduced the maturity, political, region, and unemployment rate variables. Five out of ten variables have a statistically significant influence on the interest rate. The independent ones explain the variance of the dependent variable in a proportion of 63%. The second model has an R-square of 0.61, and three out of ten variables are significant. In the third model, the interest rate variance is explained by the maturity, destination, political, population, unemployment rate, and revenues in a proportion of 64%. The last model has a higher R-square (0.93) even if only two variables (inflation rate and west region) have a statistically significant impact.

From the perspective of economic factors, the unemployment rate coefficient is positive and significant, meaning that municipalities with higher unemployment

rates are financed at higher costs. This can occur since local authorities have to support their citizens through more public services and goods than they can procure; the same results were obtained by Padovani, Rescigno and Ceccatelli (2018). In addition, the inflation rates affected the fiscal conditions of the issuers and higher level of inflations created instability. As in a study by Park (1997), inflation rates increased the borrowing costs. However, no association was found between interest rate and GDP. Also, the financial factors, represented by revenues and expenditures, did not influence the interest rates. These results differed from those of Sherrill and Yerkes (2018) who found these factors to have a negative influence.

Table 5: Interest rate regression analysis results

Interest_rate	Model 1		Model 2		Model 3		Model 4	
	Coefficient	T stat	Coefficient	T stat	Coefficient	T stat	Coefficient	T stat
(Constant)		7.387		5.627		1.254		1.671
Maturity	-.654***	-7.694	-.409***	-2.918	-.477***	-3.514	.043	.578
Dest_tourism			.348***	2.764	.302**	2.529	.020	.313
Dest_mul_porp			-.116	-1.073	.025	.222	-.054	-1.059
Dest_roads			.074	.527	.147	1.008	.019	.273
Dest_water_gas			.040	.305	.089	.682	-.036	-.563
Municipality			.168	1.646				
County_coun			.004	.037				
Right_wing	-.435***	-2.707	-.323**	-2.115	-.331**	-2.248		
Left_wing	-.366**	-2.156	-.241	-1.615	-.290*	-1.980		
Region_NE	.101	1.013					.028	.567
Region_NW	.073	.703					-.027	-.641
Region_S	-.050	-.552					-.014	-.375
Region_SE	.052	.546					-.039	-.886
Region_SW	-.172**	-2.044					.015	.372
Region_W	.094	.775					-.096*	-1.985
Ln_pop					.113	1.237		
GDP_act			-.101	-1.104				
UR	.327***	3.438			.310**	2.627		
IR							.955***	15.983
REV_act					.015	.111		
EXP_act							.000	.003
R		0.795		0.783		0.801		0.964
R^2		0.632		0.613		0.642		0.930

, **, * indicate p<0.10, p<0.05, and p<0.01, respectively*

Source: The authors

Years to maturity had a significant, negative impact on interest rates. This result was in contrast with the literature (Li, Tang and Jaggi, 2018; Padovani, Rescigno and Ceccatelli, 2018). One possible cause was the descendent trend of Romanian interest rate, considering the higher level of inflation in the post-communist period and that, initially, there were short-term issuances. Funds' destinations also impacted interest rates; for instance, entertainment facilities and tourist attractions had higher interest rates than bank loan refinancing. Additional evidence showed that issuers situated in the Southwest issued municipal bonds at lower interest rates than issuers located in the Central area. As expected, political ideology influenced interest rates, and right-wing and left-wing issuers had lower interest rates than independent parties.

As detailed above, we identified that maturity, fund's destination, region, and political party influence both the level of municipal bonds and the interest rate. On the other hand, issuer type, population, incomes, and expenses influence only municipal bonds' issuance, while unemployment and inflation rates only affect interest rates. As such, local governments should pay closer attention to the funds' destinations and prioritize projects leading to the community's development, providing better lives for citizens. In addition, term to maturity was another essential element in debt management. Local governments must structure repayments according to their financial power, since the issuance of municipal bonds requires effective financial management of income and expenses.

5. Conclusions

In the last few decades, the development of financial systems, including instruments and institutions, have become important as many countries around the world suffer from public budget deficits since they spend more than they collect through taxation or receive from external grants. Thus, borrowing to fund local development has become increasingly important (Noga, Postula and Klepacki, 2018). The main challenge that many municipalities face is the difficulty to access financing sources, mainly due to limited credit history and lack of knowledge regarding financial markets (Pop and Georgescu, 2016).

Under these circumstances, we discovered that the Romanian municipal bonds market is influenced by issuer characteristics, political, economic and financial factors. The Romanian municipal bond market is still underdeveloped, which may be a cause of its absence from credit ratings and the yield curve. Investors rely on this information because it reflects the risk and benefits of an investment. Municipalities in Romania rarely use ratings because obtaining them can be expensive, and they fear receiving low grades (Constantinescu and Tanasescu, 2014). In addition, banks often automatically favor municipal authorities, offering them better financing conditions. Moreover, Romanian municipalities fail to take advantage of the benefits of issuing municipal bonds because they prefer to use bank loans and non-reimbursable funds from the European Union to finance their investment projects.

This study adds value to the literature on municipal bonds by exploring the factors that have an impact on the value of the issuance and debt cost. Moreover, this study has conducted an empirical analysis of a post-communist country based on all issuances that have taken place over a span of more than fifteen years, using a wide range of variables extracted from the existing literature. Beyond this, our analysis of the historical evolution of the bond market can help policymakers make predictions and create valid drivers for the market. From an issuer's perspective, this study provides the aspects to consider in the issuance of municipal bonds. These can contribute to a better understanding of the municipal bond market, leading to the development of this financial instrument.

This study has several limitations. First, due to the fact that Romania's municipal bond market is underdeveloped, there are few possible observations. Second, access to information related to qualitative aspects such as disclosure, public administration management, and level of corruption that can influence the municipal bond market are not available. This study can be extended to an international representative sample that leads to better and more comparable results.

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