Doctoral Thesis

The public sector bond market: drivers of issuance and costs

Supervisor: Prof. Univ. Dr. Adriana Tiron-Tudor

Ph.D. student: Anamaria Dan

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Contents

Thesis summary

The financial crisis and the events of the last period, such as the COVID-19 pandemic, the energy crisis, and the risk generated by climate change, destabilized economies. Governments are faced with the need for a growing financing gap since expenditure exceeds the revenues. This gap can be financed by borrowing from the financial market. Bonds represent a viable way to finance the deficits and represent common method of finance for governments. The issuers have to periodically pay the interest (coupon payments) and at maturity, they will have reimbursed the face value of the bond (Chtourou, 2015). These financial instruments have the advantage of being traded both on the primary markets and on the secondary markets (Chtourou, 2015).

The practice of central, regional and local governments of borrowing money by issuing bonds to fund different projects is not a new issue. Government bonds, also called sovereign bonds, have a long history and were first issued in 1517 to fund wars. Today, a significant part of the bond market is represented by the government bond. According to the latest report of the International Capital Market Association (ICMA, 2020) the global bond market consists of 68% - sovereign, supranational and agency bonds and 32% - corporate bonds.

The financial market can represent a viable source of financing. However, there are disparities between regions around the world regarding the degree of use of the financial market. As an interconnected system, public sector bond market development can be influenced by a myriad of factors from diverse categories. Since a well-functioning bond market led to sustainable economic development (İlgün, 2016) and provides opportunities for financing at lower costs (Ahwireng-Obeng, A. S. & Ahwireng-Obeng, F., 2020), we focus our attention on the issuance and cost determinants.

The public sector bond market is discussed in detail in the three chapters of the current thesis. The first chapter underpins a literature review and identifies the most approached topics in the public sector bond market. Then, in the next two chapters, we performed an empirical analysis of the issuance and cost drivers which were the most debated topic in the literature. In the second chapter, we focus our attention on the local level and explore the municipal bond market in Romania. Then throughout the third chapter, we shift our focus to the central level and explore the EU government bond market.

In *the first chapter*, following Massaro *et al.* (2016) and Dumay *et al.* (2016), we underpin a structured literature review considering that it has a clear protocol with a rigorous method, also it involves the analysis of relevant studies and avoids subjectivity. We start our analysis by searching in two databases Web of Science and Scopus the following keywords "municipal or government bond" and "determinants". A number of 453 articles resulted, and then we grouped them according to the main approached topics. An intensely debated topic is represented by the analysis of the cost of debt, followed by studies that tackle the bond market development. In order to select the papers, we use three criteria such as the focus on the topic, at least one citation and papers available in English. The final sample has 22 studies for issue determinants and 148 studies which refer to cost determinants.

Regarding the issuance determinants, previous literature analyses the public sector bond market in general without division between municipal and government bonds. The first study under analysis was published in 2004, and the most recent article was published in 2021. The majority of studies (46%) conduct an international comparison, followed by studies that have a specific focus on Asian and African countries (27%). We observe that there is a specific focus on emerging and developing economies.

Considering that previous studies analyze various factors from different areas we group them into five categories such as:

- Macroeconomic: the economy size, fiscal balance, capital account openness, trade openness, public debt, inflation rate;
- Financial: interest rates, exchange rate regime, bank concentration, stock market size;
- Political: democracy, legal origin;
- Governance: International Country Risk Guide indicators, Worldwide Governance indicators;
- Accounting system: reporting type, accounting standards.

The majority of studies analyse the economy size, bank concentration, governance, inflation rate, and fiscal balance. Considering the different methodologies, samples and periods under analysis we observe that the indicators have different impacts. A positive impact which leads to more issuance of bonds has economic size, capital account openness, trade openness, democracy and governance. While an indirect impact that hinders the development of the bond market has fiscal balance, inflation rate, and interest rate.

With respect to cost determinants the literature makes a clear distinction between municipal and government bonds. When we refer to cost determinants literature, we can observe that this topic has a long-debated history starting from the ‘70s. The borrowing cost has been a topic of interest for scholars over the years, the proof being the latest articles published in 2022. Regarding the government bond market, we can see that the peak was achieved in 2016 and 2018, as a consequence of the Government Bond Market Development Program launched by the World Bank at the end of 2015. When we refer to the analyzed regions, we observe that municipal bond market studies focus on the US market (83%), due to the fact that the US have a well-developed municipal bond market and this method is frequently used by US municipality. On the other hand, studies that analyse the government bond market have different distributions. Most of the studies (53%) undertake analysis at the international level followed by studies that analyse the European government bond market.

In the literature we identified seven categories of factors that influence the costs of the municipal bonds, presented as follows:

- Municipal bond characteristics: issuer type, maturity, amount issued, purpose, method of sale, bids received, underwriters, financial advisory, call option;
- Economic and financial indicators: debt, revenue, expenses, deficits, GDP, inflation, unemployment;
- Confidence indicators: rating, insurance;
- Accounting and disclosure practices: financial regulation, auditing, financial transparency;
- Political indicators: elections, political concentration, corruption, mafia index;
- Sociodemographic indicators: population, race, religion, education, region, COVID-19;
- Environmental risks: climate risks.

On the other hand, the literature that approached the government cost determinants reveal a myriad of factors from diverse categories such as:

- Macroeconomic: economy size, current account balance, capital openness, fiscal balance, debt, trade openness, unemployment rate, inflation rate, reserves, expenditures, revenues, investment level;
- Financial system: financial market development, interest rate, exchange rate;
- Transparency: open budget index, IMF standards for dissemination, financial data transparency index;
- Sovereign rating;
- ESG indicators;
- Political: legal origin, democracy, political instability, democracy, political ideology;
- Other: crisis period, IMF program, maturity, region.

There are some similarities in the determinants factors analyses both at a local and central level such as rating, indebtedness level, revenues, maturity, political indicators, inflation, and unemployment. However, there are some differences: we observe that in the municipal bond market analysis primes factor refers to bond characteristics such as maturity, amount issued, purposes, and method of sale. Also, at the local level increasing attention is towards accounting and disclosure. While on the government bond market, the interest is towards macroeconomic indicators and financial system development. Another interesting result is the ESG indicators that take shape at the country level.

Following the literature review, for further analysis and empirical research, we focus our attention on the local level. In *the second chapter*, we conduct an empirical analysis at the local level by investigating the municipal bond issuances in Romania. We evaluate the impact factors identified in the literature both on the issue size and the cost of debt. This study's purpose is to find answers to three research questions.

1. What are the factors which determine the Romanian local governments to issue municipal bonds?
2.What are the drivers of municipal bond costs?
3.What were the factors which hindered or blocked the issuing of municipal bonds by local governments?

To answer these questions, we used primary data and secondary data. We apply a questionnaire for the Romanian local government and underpin a regression analysis in SPSS of the whole issuances that have taken place in Romania.

We have two models with two dependent variables. For the issuance model, we used the amount of municipal bonds issued (Smaoui *et al.,* 2017; Bhattacharyay, 2013). For the second model, we used interest rates (Martell & Kravchuk, 2010). We choose to use the interest rates since the trading activity is almost nonexistent due to the buy-and-hold behaviours. Following previous literature which refers to a myriad of factors that impact the municipal bond market, we analyse information for different categories such as economic, financial, political, issuer characteristics, and control variables (region, destination, maturity). For this analysis, we propose for testing eight hypotheses:

1. There is an association between financial factors and the issue size.
2. There is an association between financial factors and the interest rate.
3. There is an association between economic factors and the issue size.
4. There is an association between economic factors and the interest rate.

5. There is a positive association between the type of issuer and issue size.
6. There is a negative association between the type of issuer and interest rate.
7. There is a positive association between left-wing political party and issue size.
8. There is a positive association between left-wing political party and interest rate.

The pioneers of municipal bonds were Mangalia and Predeal, when they issued, in 2001, the first municipal bonds to finance tourist attractions and entertainment facilities. From then until now, 79 issuances took place. Bond issues took place in 55% of the counties. The leading counties in bond issuances are Alba (12 issues) and Timis (10 issues), followed by Bucharest (6 issues), Hunedoara (6 issues), Bacau (6 issues) and Constanta (5 issues). We can see a greater concentration in terms of issuances around Alba, Timis and Hunedoara. There exists the possibility that neighbouring counties to follow the funding model and replicate the best practice examples.

For municipal bond issuances, we analyse four models. All the models have as a common variable: maturity, fund destination, region, political party, unemployment and inflation rate. Then in each model, we include the variables that present multicollinearity problems. Out of the economic factors under analysis, we find that only the GDP has a significant and positive coefficient which means that municipalities issue more bonds (Claessens *et al*., 2007; Eichengreen & Luengnaruemitchai, 2004). Fiscal balance, revenues, and expenditures have a statistically significant and positive impact on the level of municipal bonds which drives the local government to issue more bonds (Balaguer-Coll *et al*., 2016; Daniels *et al*.,2010). In line with Pinna (2015) and Padovani *et al*. (2018) we identified that municipalities issue more bonds than cities. This result is linked with the population since the number of inhabitants is a criterion for determining the issuer type. We remark that between the types of financed projects, there are some differences (Li *et al*., 2018). In Romania, our outputs suggested that municipal bonds are less used for investment projects compared to refinancing projects.

Also, in the case of the cost models due to the multicollinearity problem, we make four models. As expected, economic indicators are positively related to municipal bond interest rates. A significant and positive coefficient has unemployment and inflation, which imply higher borrowing costs for the local government and due to the economic instability, the risks increase (Greer & Denison, 2016; Galiński, 2015; Bailey *et al*., 2009). Regarding the financial factors, only the fiscal balance seems to be statistically significant. Our results reveal that a budget surplus reduces interest rates (Beck *et al*., 2017; Reck & Wilson, 2014).

Our results reveal that issuer characteristics and economic and financial indicators represent important factors which impact the municipal bond market in Romania. Among the eight hypotheses proposed for the analysis of the municipal bond market, five of them are accepted while for three of them, our results do not reveal a statistically significant influence. The municipal bond market is influenced by financial and economic factors. In addition, the issuer type has an influence only on the issue size. When we refer to political variables our results do not reveal a significant association.

As previously presented, there are municipalities such as Timisoara, Alba Iulia, and Bucharest which have used this method several times, while other municipalities did not use this financing method at all. Taking into account that there are differences between Romanian local governments regarding the use of municipal bonds, we want to make an in-depth analysis in order to identify the reasons for these discrepancies. Also, this analysis allows us to examine the internal condition of municipal bond financing. The questionnaire allows us to collect information from the parties that are directly involved and to identify their opinions, preferences and attitudes. Moreover, this analysis allows us to identify what are the principal barriers that local governments faced regarding financing through municipal bonds. This will help us make some recommendations for the development of the Romanian municipal bond market.

The questionnaire has three purposes. First, to identify which are the alternative financing methods. Second, to identify the obstacles in the issuance of municipal bonds. Third, to identify if issuing municipal bonds can be a viable financing method for local governments.

Our questionnaires include different types of questions such as single or multiple-answer questions, open-answer questions, and Likert scale questions. The first part includes questions about respondents. We want to identify the level of the respondents' expertise regarding municipal bonds. In this vein, questions about the size of the economic department, the level of education and specialization were asked. The second part includes questions about the knowledge in the field, the factors that impede the issuance of municipal bonds and the willingness to issue bonds in the future. The questionnaire's overall response rate was 36%. We received 18 responses from the issuers of municipal bonds, and 108 responses from non-issuers.

The results of the first part of the questions reveal that issuers are characterized by a great percentage of finance specialization while non-issuers have a great percentage of public administration specialization. The question about the number of employees in the economic department was asked to find if there is a correlation between the size of the economic department and the issuance of bonds. Since more employees can be involved in the preparation of the issuance process (Simonsen *et al.*, 2001; Bourdeau-Brien & Kryzanowski, 2019). The results reveal the typical issuer has a higher headcount in the economic department, with over 50 employees, while non-issuers have smaller economic departments. Since the adherence to the EU, local governments can benefit from grants to finance their investment projects. The grants represent the principal method that local governments used for their projects. In some cases, a co-financing is needed, and it is financed from its own sources or bank loans. In a smaller proportion, local governments also use financial leasing, supplier credits and local warranties.

From the issuer's perspective, the principal barriers to the issuance of municipal bonds are represented by the fact that the issuance process is complex and rigid, there are higher interest rates and strict rules for accessing the capital market. When we refer to non-issuers, we observe that the obstacles differ and among the main reasons behind non-issuance, we identified the lack of information about this financial instrument, lack of investors and difficulties in attracting investors, unfavourable financial context, lack of consultants and availability for large-scale projects. Regarding the question of the willingness to issue municipal bonds, a small part (25%) of local governments wants to issue bonds in the future. When we compare issuer and non-issuer responses, we observe that issuers have a greater incentive to issue bonds (39%) vs non-issuers (23%).

Considering the main barriers identified, we propose some recommendations in order to help local governments to use the financial market for their investment projects. First of all, media coverage is necessary to present municipal bonds as an alternative method of financing and to highlight their benefits. The issuance process should be structured such that citizens can buy bonds and be directly involved in the well-being of the community. Thus, the investor base widens and everyone gets involved in the development of the local community. Also, training and financial consultants are needed in order to assist municipalities in preparing and implementing the issuance process. Moreover, is necessary to establish a working methodology that includes the steps to be followed so that the working method is clear and easy to follow.

In *the third chapter*, we extend our study at the central level by underpinning an international comparison of the issuance and the cost determinants in the EU government bond market. Our study focuses on the presentation of financial information and also on the integration of non-financial information. We move our attention from traditional factors to softer aspects such as ESG factors. Considering the climate change risk, the recent pandemic situation and the conflicts near our country's borders, integrating ESG elements in the analysis has important implications.

Considering that sustainability increases a country's creditworthiness and its commitment to long-term orientation (Margaretic & Pouget, 2018; Capelle-Blancard *et al*., 2016) we proposed to test two hypotheses:

1. There is an association between the country's ESG score and the level of government bonds issued.
2. There is an association between the country's ESG score and government bond costs.

This analysis is in accordance with legitimacy theory since the government will disclose sustainability information. In this vein, the ESG score helps governments to legitimize their action and commitment towards sustainability. Also, according to legitimacy theory, investors and creditors are interested in financial and non-financial information to evaluate the ability to repay and respect sustainability parameters (Girella *et al*., 2019).

We focus our attention on EU countries since its market is recognized by its increasing liquidity and its large size (Nguyen, 2020). Furthermore, Capelle-Blancard *et al*. (2016) reveal that the impact of ESG on government bond spreads is higher in eurozone countries than in other regions. The analysis covers seventeen years, from 2005 to 2021.

Following previous studies, we measure the government bond market development as outstanding government bonds, as a share of GDP (i.e., Smaoui *et al*., 2017; Huong, 2018; Esser *et al*., 2016; Mu *et al.*, 2013). The second dependent variable, which measures the borrowing costs is represented by the 10-year government bond yield (Boitan & Marchewka-Bartkowiak, 2022; Pappas & Kostakis, 2020). As independent variables, we integrated into our analysis widely used factors, that cover macroeconomic and financial indicators, but in addition, we also focus our attention on softer elements and qualitative criteria such as ESG indicators. Following Mu *et al*. (2013), Bhattacharayay, (2013) and Huong (2018) we employ three-panel models such as ordinary least squares (OLS), fixed effects (FE), and random effects (RE). First, we performed panel regression analysis using the ESG global score, then we divided it into separate regressions with the subcomponents environment (EPI), social (HDI) and governance (WGI). The robustness was tested by introducing several control variables from the macroeconomic and financial perspectives.

Small changes can be observed during the analyzed period. A positive trend is observed during the financial crisis, which supports the idea that the capital market represents a viable opportunity for finance in a crisis period and helps countries to be resilient in turbulent times (Aman *et al*., 2020). After that, we observe a slight downward trend till 2020, the beginning of the covid-19 pandemic when positive trend is observed, as countries faced new challenges and greater expenses to combat the negative pandemic effects.

If we compare 2005 with 2021, we can observe that the top issuers in both periods are France and Italy, and at the bottom, we found Eastern European countries. When we refer to yields Germany and Luxembourg have the lower yields, being perceived as lower risks and as a benchmark. On the other hand, we find that Eastern European countries have higher yields such as Romania, Poland and Hungary.

The significant influence of the ESG score on the government bond market size confirms our expectation that qualitative criteria and softer elements matter. The ESG score also gains ground in the government bond market even if these financial instruments are considered to be safer both for the issuers and investors. This relationship provides support for the fact that ESG scores improve government creditworthiness and provide additional information for investors about credit risk (PRI, 2013). When we refer to each ESG subcomponent, the social subcomponent exhibits a strong link with the government bond size. Countries characterized by a higher level of HDI issue fewer bonds. As a country development indicator, the negative sign of HDI confirms that countries have a developed economy that provides the necessary resources and governments no longer need to borrow. Also, governance indicators are essential in the government bond market considering investor protection. In our analysis, voice and accountability and regulatory quality have a negative and significant influence. The government's ability to effectively formulate and implement sound policies (Kaufmann *et al*., 2011) in EU countries can be translated into efficiency in resource collection and allocation and lower demand for external resources. Our results are in line with previous studies that analyse the indebtedness level (Tarek & Ahmed, 2017; Abbas *et al*., 2021) and reveal that high governance performance reduces debt level, as countries are characterized by efficient debt management and good use of public resources. Governments are characterized by better policy formulation, borrowing for productive projects and responsibly using funds (Butkus & Seputiene, 2018).

Our results reveal that GDP growth has a negative impact (Mu *et al*., 2013; Baek & Kim, 2014). A larger and growing economy provides a greater funding option for governments and becomes less reliant on financial markets. Also, our results reveal that fiscal balance surpluses reduce the need for government bonds (Mu *et al*., 2013; Esser *et al*., 2016; Smaoui *et al*., 2016). This result confirms the fact that governments issue bonds to cover deficits. The positive and significant coefficient of the bank concentration reveals a complementarity between government bonds and the banking system. A developed banking sector led to an increase in government bond size since bank represents one of the major investors (Smaoui *et al*., 2016; Boukhatem, 2021).

Also, in the models that approach the cost determinants, ESG score is statistically significant (Capelle-Blancard *et al*., 2016; Crifo *et al*., 2017). Considering that our ESG score variable measures the risk, we observed that a higher ESG risk is penalized by higher yields. These results have two practical implications. First, it helps investors to have an overall picture of the risks, which facilitates the investment decision. Second, attention towards ESG scores and improvements of ESG scores will help governments to access capital at lower costs. If we compare the coefficient of the ESG score (0.23) with the sovereign rating (-0.61) we observed that the impact of the sovereign rating is higher. This suggests that ESG scores can be used to supplement the sovereign ratings. Moreover, the ESG subcomponents have a significant influence on borrowing costs. Countries which are socially developed have lower borrowing costs as it reflects poverty reduction and increases the welfare of the countries (Noja *et al*., 2019; Capelle-Blancard *et al*., 2016). In addition, EPI plays an important role in borrowing cost reduction. This can be a consequence of the EU Commission's commitment to becoming a climate-neutral economy (Margaretic & Pouget, 2018; Capelle-Blancard *et al*., 2016), our results expose that governance indicators (regulatory quality) have a significant and negative coefficient. Investors' confidence increases in countries characterized by increasing levels of regulatory quality and requests for lower premiums. In addition, macroeconomic indicators have a significant impact on the government bond yields such as fiscal balance, debt, trade, and inflation.

Our results reveal that ESG has a two-fold impact, both on the size of government bonds and on the government borrowing cost. Closer attention toward softer factors is needed in order to have a more developed bond market and to obtain funds at lower costs. These results reveal the complexity of the economic impact of ESG scores on the government bond market since it measures the willingness and ability of governments to honour their financial obligation.

Regarding the impact of each ESG subcomponent, our results reveal that the size of a government bond is impacted by social and governance components, while the environmental subcomponent does not have a significant impact. However, when we refer to costs, all subcomponents have a significant impact. Countries with good governance scores tend to have sound monetary and fiscal policies and thus, governments manage their debt effectively and efficiently (Abbas *et al*., 2021). Moreover, governance reduces the level of government bonds considering that countries have a better ability to manage the resources and use the funds for productive projects in a responsible way (Butkus & Seputiene, 2018). Also, socially developed countries issue fewer bonds because they can generate the necessary resources. Good governance scores and a higher level of human development index help governments to borrow at lower costs as this involves lower risks and investors' confidence increases. In addition, environmental performance is important for lowering borrowing costs.

The thesis contributes to enriching the knowledge in the field of the public sector bond market. Firstly, by undertaking a structured literature review to identify what was done and what are the drawbacks in this field. Secondly, by conducting an empirical analysis of the issuance and cost drivers both at the local and central levels. Moreover, this thesis aligns with the current trend to identify the determinants of issuance and cost.

In addition, our study brings important insights for local governments by presenting the factors that they can use in order to obtain cost-effective financing. Also, this study can help policymakers to develop valid drivers for bond market development.

The novelty of this thesis is given by the in-depth investigation of the municipal bond market of a post-communist country such as Romania. Previous literature is focused mostly on US municipal bond market since it is the most developed market. We show that there are similar factors that impact the size of the bond market in both developed and developing countries.

Another element of novelty is given by the integration of ESG factors in the analysis of government bond issuance. ESG factors were previously used only as cost determinants. We provide empirical evidence of the significant impact of the ESG score both on issuance and costs at the EU level.

The thesis brings various implications through the obtained results of the empirical analysis for practice, society and regulators. For issuers, the results bring valuable insight in order to obtain financing at lower costs. Moreover, regulators can use this information to help governments to access the financial market. Society can benefit in two ways. First of all, they are the receiver of services or projects financed through the issuance of bonds. Also, they can be an important investor by buying municipal or government bonds.

In the elaboration of this thesis, we have identified some limitations. First, at the Romanian municipal level, we face limited information availability and databases which led us to narrow the analyzed variables. Second, the response rate of the questionnaires was 36%. In addition, the methods used to collect the data were manual and time-consuming.

This thesis can be developed in several directions. The first would be an extension of the sample for international comparison. The second would be including additional factors which can have an impact on the bond market. The identification at the local level of qualitative factors such as ESG, and the analysis of their impact. In addition, the study of the government bond market can be developed in several ways. The first way would be dividing the sample according to income level so that we can identify if there are differences between high- and low-income countries. Also, an analysis of subperiods (pre-crisis, pos crisis and pandemic period) can be done to observe if there are changes between the influencing factors over the years.

Keywords: municipal bonds, government bonds, ESG, public financing determinants, cost of debt

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