POLITECNICO DI MILANO

School of Industrial and Information Engineering

Master of Science in Management Engineering



A revised model for Italian SMEs' mini-bond market yield spread

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Academic Year 2018 – 2019

Acknowledgement

Our first special thank is for our Professor Giancarlo Giudici, for his support during last year, and in particular, these last months. He helped us during the research work conducted for his observatory of mini-bond and gave a fundamental assistance for the writing of this dissertation. We want to thank him also for the trust granted us during this cooperation for all the task assigned and for the opportunity of taking part in important events organized by the observatory.

We would also like to thank our families, our friends and all those people supporting us in the best possible way during these years. This last year has been difficult and particularly tough in its last months: without the closeness of our beloved ones, it would be impossible to end this journey.

This dissertation and this graduation would not have been possible without all of you.

Thank you very much.

Fabrizio e Lorenzo

"Noi saremo come la musica, improvviseremo, saremo agili, aperti al dibattito, umili, ma impavidi e non ci sarà mai posto per la mediocrità" Sergio Marchionne

Abstract

2007 financial crisis and Sovereign Debt Crisis, and the consequential changes in the regulatory framework, in terms of new constraints for banks, provoked credit crunch, creating several problems to Italian SMEs. Their main financial resource was bank lending and credit crunch cut this channel in a very important way.

In this problematic scenario, in 2012, the Italian Legislator introduced a new regulatory framework, providing SMEs with an alternative financing channel, creating the market of mini-bonds. The aim of this dissertation is to contribute with novelty to the limited literature on the topic of mini-bonds issued by Italian SMEs, trying to understand if corporate bond yield spread, expressed as difference between the yield to maturity and risk-free rate, is influenced by some variables and how much this influence is relevant.

In order to perform these analyzes, it has been necessary to build a sample of mini-bonds, starting from the total amount of issues from 2012 to 2018 collected by Osservatorio of Minibond of Politecnico di Milano; then, an evaluation of spread for all remained securities has been performed. As final step, a series of regression models has been carried out, six to be precise, considering three different set of variables: bonds' features variables, issuers' characteristics ones and macroeconomic ones. Finally, in order to verify the fairness of the results, some robustness test have been made.

From the research, it's possible to observe that what it's very important in determining cost of debt are the features of the company issuer of the security, both financial and not financial ones: it's very important to highlight that listed companies are not able to present lower cost of debt if compared to unlisted ones, probably because the low level of liquidity in some Italian stock markets. Moreover, just some mini-bonds' features change in an important way the level of spread: among them, it's possible to mention maturity and the fact of being secured. It's interesting to notice that listing is not seen as a positive event for investors, probably considering this fact a way to hidden other problems. Lastly, SMEs financing is influenced by some macroeconomic variable, but not so much: just the level of confidence in the economic scenario seems to have effect on yield spread determination.

Abstract – Italian version

La crisi finanziaria del 2007 e la crisi del debito sovrano, con i conseguenti cambiamenti nell'ambito della regolamentazione, in particolare relativamente a nuove costrizioni finanziarie per le banche, hanno provocato il fenomeno del credit crunch, il quale ha avuto gravi conseguenze per le PMI italiane. Prima della crisi, la loro principale fonte di finanziamento era il prestito bancario: il credit crunch ha tagliato in modo molto importante questo canale finanziario.

In questo scenario piuttosto problematico, nel 2012 il Governo italiano ha introdotto un nuovo quadro di regolamentazione, garantendo alle PMI un nuovo metodo di finanziamento: il mercato dei mini-bond. L'obiettivo di questo elaborato è contribuire con innovazione alla limitata letteratura esistente per quanto riguarda il tema dei mini-bond emessi dalle PMI italiane, cercando di capire se lo spread nel rendimento, espresso nella sua forma classica come differenza tra rendimento a scadenza del titolo e curva dei tassi risk-free europei, è influenzato da alcune variabili e, in caso positivo, quanto queste lo influenzano.

In modo da poter svolgere questa analisi, è stato necessario costruire un campione di emissioni, a partire dal totale di emissioni di mini-bond dal 2012 a fine 2018, dato raccolto dall' Osservatorio Mini-bond del Politecnico di Milano; in seguito, è stato calcolato, nella sua forma tradizionale, lo spread nel rendimento per tutte le emissioni rimanenti nel campione. Come passaggio finale, sono state implementate una serie di regressioni, sei modelli per esattezza, considerando le tre diverse tipologie di variabili presenti nel modello: caratteristiche del bond, caratteristiche (finanziarie e non) dell'impresa emittente, e indicatori macroeconomici. In conclusione, in modo da verificare la bontà del lavoro svolto, sono stati svolti alcuni test di robustezza.

Abstract – Italian version

Dalla ricerca empirica, risulta evidente come le caratteristiche finanziarie e non dell'aziende emittente siano i principali determinanti del costo del debito. Un risultato rilevante è dato dal fatto che aziende quotate su mercati finanziari non siano in grado di presentare un livello di spread più basso rispetto alle non quotate: probabilmente questo problema si lega all'alta illiquidità di alcuni mercati italiani. Risulta evidente che quasi tutte le caratteristiche che un mini-bond può presentare influenzano in maniera poco significativa il differenziale rispetto ai risk-free: gli unici aspetti di rilievo riguardano la durata e la presenza di una garanzia sullo strumento. Anche in questo caso, è interessante osservare come la quotazione dello strumento su un listino, come l'ExtraMOT PRO (si veda la sezione 2.6), non influisca positivamente sulla percezione dello strumento stesso. Infine, risulta chiaro come lo scenario macroeconomico italiano non abbia un impatto specifico sulla determinazione del differenziale, a parte per il livello di fiducia espresso dai vari attori.

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Introduction

Small and Medium sized Enterprises (SMEs) can be considered the most important actors inside European and Italian economies. At European level, they represent 99.8% of total companies, 66.4% of total European employment and 56.8% of value added generated by the entire not financial business sector. At Italian level, SMEs (PMI in Italian) are even more important: they are 99.9% of total firms, 78.5% of employees work in this segment and they generate 67.1% of total Italian value added. A very interesting data is their dependence on bank debt: in Italy, 62% of total SMEs' liabilities is covered by bank loans (at European level, this value decreases to 48%, however significant). Since 2007, with the outbreak of the Great Financial Crisis and the following Sovereign Debt crisis, the Italian banking system started to have great pressures, and this caused credit crunch. It resulted in two main consequences:

- Reduction of credit available to households and firms;
- A strong flight to quality phenomenon (see section 1.2).

Due to its higher dependence on bank loans respect to other countries, Italian economy suffered a lot credit crunch: to solve this issue, new market players entered in the market offering innovative financing solutions, like crowdfunding, and the Legislator simplified access to capital markets for SMEs. In 2012, regulators introduced, through the Competitiveness Decree (see section 2.2.3), a new financial security called mini-bonds: they are either commercial papers or bonds (with a limit value) issued by Italian firms and subscribed by either professional or institutional investors. Other important actions made by Italian Governments are the introduction of PIRs (see section 1.3.1) to direct investment on listed SMEs and the introduction of a relevant tax shield for firms undertaking an IPO.

This dissertation will focus on Italian mini-bonds issued by SMEs that are neither supervised by banking authorities nor a Special Purpose Vehicle (SPV). Since 2012, the SMEs' mini-

bond market increased a lot: in 2018, Osservatorio Mini-bond accounted for 390 emissions (in 2017 they were "just" 276), for an overall amount of € 4.7 billion.

The scope of this dissertation is to extend the limited literature available on mini-bonds and, in particular, the relationship between mini-bonds and SMEs. To pursue this target, an econometric model has been built, following what already done by the only existent previous research on this topic, in order to understand which are the most important variables in determining mini-bond yield spread. To provide an original contribution to this topic, it has been necessary to review the literature on SMEs financing, bond pricing and the possible factors impacting debt securities.

The first chapter addresses the important role played by SMEs at European and Italian level, in terms of percentage of SMEs out of all firms, value added and employment, highlighting their importance, above all in the Mediterranean economies. Then, a critical review of the literature related to SMEs' access to capital markets and SMEs' financing structure is done, to better understand which are the main determinants. In the second part, an analyzes of the current financing situation in Europe and in Italy is made up, emerging that Italian SMEs are more dependent on bank loans. Finally, following the research results summarized in Rapporto Cerved PMI 2018, the focus shifts to Italian SMEs' performances, to understand if operations like PIR introduction or quantitative easing by ECB have had good impact on Italian economy.

The second chapter analyzes in deep mini-bond world, addressing the regulatory framework which facilitates its spread into SMEs market and providing data and statistics on Italian and foreign mini-bond market. Considering the entire research period (2012-2018), 746 mini-bonds have been issued by 498 companies, mainly manufacturing entities, for a total value of about \notin 25 billion. Focusing on SMEs, 52.3% of issues are from this sector, showing a great diversification and a high concentration in the Northern regions (especially Lombardy and Veneto). Looking at some particular features of mini-bonds, the average maturity for SMEs is 5 years, lower than large firms' one, while the average coupon is 5.02%, 17 basis point lower than large firms' one; furthermore, rating continues to be not so used, especially for SMEs, while covenants and options are integrated in, respectively, 45% and 81% of total sample. Lastly, the focus shifts to comparable markets created in other European countries, such as United Kingdom, Germany, France, Spain and Norway.

The third chapter is divided into three main sections. In the first one, there is a literature review about the determinants of corporate bond yield spread, finding that they can be divided into three main categories: bond specific features (like options, repayment scheme, etc.), issuer characteristics (rating, financial ratios, etc.) and macroeconomic variables (GDP, unemployment rate, etc.). The two different ways through which spread is computed are then explained: the traditional and most used difference between YTM and risk-free rates, that is the way chosen for this dissertation, and the z-spread. In the second section, there is the exposition of the main research questions of this dissertation:

- 1) Is it possible to observe differences in the yield spread provided by mini-bonds with different features?
- 2) What are the variables better explaining mini-bonds yield spread?

Finally, in the third section, the steps through which it has been possible to obtain the final sample used to perform the analyses are explained. Moreover, it's explained how spread is calculated for each security and which are the variables included in the regression models, with hypothesis about their correlation effects.

The fourth chapter is dedicated to the empirical research. First of all, a univariate analysis is performed on the sample, considering several bond's features, using three different non-parametric tests: Kolmogorov-Smirnov, Mann-Whitney U test and Kruskal-Wallis test. In the second part, a multi-variate analysis has been performed, in order to answer the second research question. Considering the presence of collinearity among a couple of variables (maturity and repayment scheme), and the different set of variables, six different models have been generated, in order to understand if there are changes among the main determinants of corporate bond yield spread if considering different set of variables. To analyze results' validity, two robustness tests have been carried out, varying samples dimension through bootstrapping technique and eliminating outliers influence through windsorization.

Finally, the fifth chapter is the Conclusion chapter: it summarizes dissertation's main results and tries to understand how the existing literature about mini-bonds has been enriched by this work. Moreover, it underlines the limitations this work has and which could be possible solutions and proposals for future models.

CHAPTER 1

SMEs in Europe

The definition of **Small-Medium Enterprise** (SME) is given by the European Commission through the Commission Recommendation of 6 May 2003.

"The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million." ¹

Inside the general category, it's possible to find two other subgroups:

- a small enterprise is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million;
- a microenterprise is defined as an enterprise which employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million.

At EU-28 level, looking just at the non-financial business sector, SMEs represents the 99.8% of the total amount of enterprises, the 66.4% of the total EU-28 employment and the 56.8 % of the total value added generated by the non-financial business sector. Considering the subdivision inside the great family of SME enterprises, it's possible to notice that the majority

¹ Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (Text with EEA relevance) (notified under document number C(2003) 1422)

of SMEs are Micro SMEs (93.1% of the total amount), but they haven't the same weight considering the value added and the employment rate: in these aspects, large enterprises are the most important. Table 1.1 explains these data in more details:

	Micro SMEs	Small SMEs	Medium-sized SMEs	All SMEs	Large enterprises	All enterprises
Enterprises						
Number	22,830,944	1,420,693	231,857	24,483,496	46,547	24,530,050
%	93.1%	5.8%	0.9%	99.8%	0.2%	100.0%
Value added						
Value in € (trillion)	1,525.6	1,292.1	1,343.0	4,160.7	3,167.9	7,328.1
%	20.8%	17.6%	18.3%	56.8%	43.2%	100.0%
Employment						
Number (in 000)	41,980,528	28,582,254	24,201,840	94,764,624	47,933,208	142,697,824
%	29.4%	20.0%	17.0%	66.4%	33.6%	100.0%

Table 1.1: Number of SME and Large Enterprises in the EU-28 not financial business sector in 2017Source: Eurostat, National Statistical Offices, DIW Econ

Looking at the different contributions given by SMEs in the different EU-28 countries, it's interesting to look at figures 1.1, 1.2 and 1.3: if the percentage of SMEs is more or less the same for all countries (always higher than 99.5% of the total number), the situation changes a lot looking at the other features. For the Value Added generated, there is a strong gap between the two opposite situations of Ireland, with just 41.7%, and Malta, with 81%, and the same can be observed for what concerns employment rate: from the 54% of United Kingdom to the 85.2% of Greece. In Italy, the 99.9% of the total amount of companies is composed by SMEs. They generate the 67.1% of the total Value Added of the country, 10.3% more than the EU-28 average and the 78.5% of Italian workers operates in this sector, 12.1% more than the EU-28 average.

SMEs in Europe



Figure 1.1: Number of SMEs as percentage of total enterprises

Source: Eurostat, National Statistical Offices, DIW Econ



Figure 1.2: Percentage of SMEs' employment on total employment Source: Eurostat, National Statistical Offices, DIW Econ



Figure 1.3: Percentage of Value Added generated by SMEs on total Value Added Source: Eurostat, National Statistical Offices, DIW Econ

These data are very important to figure out the crucial importance of SMEs in Europe: the European economy is totally dependent on SMEs and their growth becomes a fundamental

topic for all the countries, especially for those, like the Mediterranean ones, where the economic boost given by SMEs is more relevant than in the rest of EU-28.

1.1 SMEs Financing Literature

As it's said before, SMEs play a crucial role in the European economic game, so it's necessary to understand how these companies work and, in particular, how they obtain their finances: in this section, there will be presented the most important analysis made on SMEs' financing way and the financial structures.

Bongini et al. (2017) provide an analysis about the SMEs' access to the capital markets, both equity and debt, looking at the possible factors that can influence the likelihood of access to capital markets, and creating also an indicator, called market suitability, in order to understand which are the SMEs potentially fit for market based finance.

"The results highlight that few Eurozone countries seem to have already deployed their "potential" for capital market financing while there exists a large percentage of un-exploited potential of firms fit for market-based finance."²

Following this paper, the most important factors considered to obtain capital markets are size, listed status and growth opportunity. It's interesting to observe also the fact that there are strong differences among the countries: states like Spain, Italy and Portugal present a lower use of market-based instruments if compared with the Northern countries, probably due to economic distress. But if the analysis is concentrated just on medium sized SMEs the situation is quite different, with Southern European SMEs better positioned about capital market suitability.

Shifting the focus to bank lending, Beck, Demirguc-Kunt and Martinez Peria (2008) observed as banks perceive SME segment as very profitable but, at the same time, very unstable in developing countries, and competitive in developed countries. Due to this aspect, they prove that the fundamental feature observed by banks in financing decisions is the lender environment, so in this case the SME segment. ³

² BONGINI, FERRANDO, ROSSI and ROSSOLINI, "Suitable or non-suitable? An investigation of Eurozone SMEs access to market-based finance", 2017

³ BECK, DEMIRGUC-KUNT and MARTINEZ PERIA, "Bank Financing for SMEs Around the World: Drivers, Obstacles, Business Models, and Lending Practices", 2008

The paper of Ozturk and Mrkaic (2014) focuses on the comprehension of other factors influencing SMEs access to bank lending system. They observed that:

- an increase in bank funding costs is negatively associated with firms' access to finance, though only in stressed economies;
- those firms that reported an increase in their debt to assets ratios are significantly more likely to report deterioration in their access to finance;
- use of subsidies is significantly and positively related to access to finance of all firms except for the large ones;
- firm size and age are significantly and positively associated with improved access to finance of firms.⁴

Looking at the second aspect of this chapter, the financial structure, it's necessary to report what Berger and Udell (1998) described in their paper, in which they explain like there are different optimal financial structure for different phase in firm's life, passing from equity capital, provided by business angels and venture capitalists, to short term loans and, only at later stage, to bonds, long term loans and other forms of financing. So, to understand the financial structure of a firm, it's necessary to understand the age and the phase where the firm life cycle is in.

⁴ OZTURK and MRKAIC, "SMEs' Access to Finance in the Euro Area: What Helps or Hampers?", 2014

1.1 SMEs Financing Literature



Figure 1.4: Financing sources at different life cycle phases

Following this argument, Lucey and Mac an Baird (2006) highlight a higher reliance on retained earnings as companies' age increases, but they said more: they observed a higher presence of external equity financing in high growth companies and a negative relation between firms' fixed assets and personal collaterals demanded to entrepreneurs ⁵. So, age is not enough to explain the reason of a financial structure.

Another very important aspect to be considered is the leverage. Daskalakis and Psillaki (2008) investigate the capital structure determinants of small and medium sized enterprises (SMEs) using a sample of Greek and French firms. They concluded that asset structure and profitability have a negative relationship with leverage, while firm size has a positive one.⁶

Source: Berger and Udell (1998)

⁵ LUCEY and MAC AN BAIRD, "Capital Structure and the Financing of Smes: Empirical Evidence from an Irish Survey", 2006

⁶ DASKALAKIS and PSILLAKI, "Do country or firm factors explain capital structure? Evidence from SMEs in France and Greece", 2008

About growth, there is a confirmation of Lucey and Mac and Baird work, demonstrating that it's positively correlated to debt level, and so to leverage.

Finally, it's obvious to consider the fact that the industrial and economic situation of countries can influence the specific leverage of SMEs inside the specific country.

Looking at the composition of financial liabilities, Mantovani (2015) demonstrates that more transparent and better performers companies tend to have longer maturities inside their balance sheet⁷. The theme of transparency was already mentioned by Benoit Coeurè in 2013: he explained that SMEs have less informative financial statements, credit histories usually shorter and higher fixed costs in external monitoring. All these factors create less confidence in SMEs and so the difficulty to obtain funds from banks.⁸ Another interesting result coming from Mantovani's paper is that high growth companies rely more on longer maturities, while high profitability companies on shorter maturities: so, banks consider more important the possible growth of a firm than the current status.

So, it's clear that trustworthiness is crucial to obtain funds, but how it's possible to gain it? Nowadays banks don't look just at economic drivers, but also at some aspects like ethics, managers integrity and trustworthiness (Howorth and Moro, 2012). They demonstrate that longer relationships between companies and banks create trust, and trust is fundamental to reduce agency problems, and consequently the cost of debt⁹. Vander Bauwhede et al. (2015) analyzed the financial statements of Belgian SMEs over the 1997-2010 period, finding another important driver affecting accessibility to debt: the financial reporting quality.¹⁰ They proved that there is a negative correlation between cost of debt and the accuracy of a firm's financial report.

⁷MANTOVANI, "The Maturity Drivers of Corporate Capital Structure of Private/Unlisted Companies", 2015

⁸ SME financing, market innovation and regulation, Eurofi High Level Seminar organized in association with the Irish Presidency of the Council of the EU, Contribution to plenary Session 11: Challenges and feasibility of diversifying the financing of EU corporates and SMEs, Dublin, 11 April 2013

⁹ HOWORTH and MORO, "Trust within Entrepreneur Bank Relationships: Insights from Italy", 2012

¹⁰ VANDER BAUWHEDE, DE MEYERE and VAN CAUWENBERGE, "Financial reporting quality and the cost of debt of SMEs", 2015

The world of financing met a dramatic change after the Credit Crunch due to the financial crisis of 2008: several new forms of financing spread out, completely changing the structure of the firms. Considering these new aspects, some researchers started to analyze how much these new financing forms are important for SMEs, their uses and impacts.

At first, Chludek (2011) explains the importance of trade credit as an alternative source of financing: in opposition to common literature, that sees trade credit as very expensive, he demonstrated the opposite, showing the importance of it as a substantial part of the optimal financing mix of SMEs.¹¹ As said before, other studies disagree with this idea, but finally a point accepted by everyone is the following: there is a clear distinction between constrained and unconstrained firms' financing of investment, with the former looking at alternatives like trade credit, while the latter more focused on bank loans.

A great number of researchers finds very interesting the introduction of mini-bond market in several European countries. Looking, for example, at the German case, Schweizer et al. (2015) made a study to understand the high level (20%) of default experienced by German minibonds¹². They compare the default probability according to a mini-bond's initial rating with that implied by credit risk models, like Altman Z score for example, and show that rating agencies can create ratings inflation by issuing overly favorable ratings. This creates a "window of opportunity" for lower-quality firms to compete for funding, causing risk shifting from shareholders to bondholders. In this environment, high-quality firms have an incentive to use mini-bond underpricing to signal their quality.

¹¹CHLUDEK, "A note on the price of trade credit", 2011

¹² SCHWEIZER, PROELSS and MIETZNER, "Hidden Champions or Black Sheep? Evidence from German Mini-Bonds", 2015

1.2 SMEs financing context in Europe and Italy

While the previous section reviews the literature related to SME financing alternatives and structures, this section aims at providing an overview of the current financial context of SMEs, with emphasis on the Italian situation in the second part.

Even though higher equity share within a SME could reduce the risk of an investment and provide a firm wider access to external finance, the majority of European SMEs depends strongly on debt financing (bank loans above all). In fact, the availability of equity to SMEs varies among European countries, as it's possible to observe in Figure 1.5: some countries such as Sweden, France and Denmark present SMEs very financed by own capital, while in Romania, Malta, Portugal, and other countries, including Italy, the share of equity in the total balance sheet is much lower. These differences can be attributed to differences in taxation, financial systems and legal frameworks.¹³



Figure 1.5: Financial liabilities of not financial corporations in Europe

Source: Eurostat

Looking at the debt side, traditionally European enterprises use loans, above all bank loans,

¹³ European Commission, 2001

more than other financial instruments, and this is, for example, completely different from USA¹⁴.

It's also interesting to observe how much Italy, differently from other countries, uses bank debt over all the other possible typologies, like for example bonds, as expressed in Figure 1.6.



Figure 1.6: Bank debt on total financial liabilities

Source: Banca D'Italia 2016

This aspect is fundamental to understand the impact of credit crunch on Italian enterprises: due to the fact that the majority of Italian firms, above all the smaller ones, relies on bank debt, once the crisis exploded and banks started to cut financing channels (first of all to SMEs, the great majority of Italian companies), the situation became more dramatic than in other EU-28 countries.

However, current year's annual report of Bank of Italy (Banca of Italy, 2019) states that the Italian level of bank lending continues to increase, like in the 2017, even if there are strong differences between small and large firms conditions, like financing costs.¹⁵ Probably, this difference, as said before, is due to the fact that SMEs are seen as more vulnerable by banks because of information asymmetries and the sectors where they operate in.

The topic of credit reduction to some firms in case of economic downturn is studied also in literature. Bernanke, Gertler and Gilchrist (1994) depicted this phenomenon as flight to quality¹⁶. According to them, in case of economic crisis, credit is at first reduced to those

¹⁴ European Central Bank, 2016

¹⁵ BANCA D'ITALIA, "Relazione Annuale", 2019

¹⁶ BERNANKE, GERTLER and GILCHRIST, "The Financial Accelerator and the Flight to Quality", 1994

entities more characterized by agency costs and information asymmetries, like SMEs, and it's shifted toward large companies, perceived more secured.

In Europe, before the crisis, the general idea was to finance itself using bank loans more than capital market funds, but, after 2008, it became difficult to obtain these loans, above all in those countries, like Italy, as said before, more hit by the economic downturn. And the problem was not just linked to the number of loans rejected, but also to the less favorable conditions and rates. In order to contain this problem, European Central Bank decided to introduce a series of unconventional instruments, like LTROs (Long Term Refinancing Operation), Quantitative Easing, etc. The aim was to provide liquidity to the financial system, reducing banks' stressed conditions, easing lending approach. Figure 1.7 makes understandable the reasons of ECB interventions: considering 6 countries, Ireland, Netherlands, Portugal, France, Italy and Spain, new bank lending to SMEs (using loans of less than €1 million as a proxy) has declined, on average, by 47% since the pre-crisis peaks.



Figure 1.7: Volumes of new loans to not financial corporations in 6 European countries

Source: Bain & Company, IIF 2016

Thanks to ECB decisions, European banks have increased, in the last period, the volume of new loans and their confidence. The Survey on the Access to Finance of Enterprises in the Euro area (2019), conducted by European Commission, explained that since 2016, banks' willingness to provide credit continued to improve, though in a decreasing way, considering the improvement from 2018 to 2019.¹⁷ Looking at the largest European countries and their

¹⁷ EUROPEAN CENTRAL BANK, "Survey on the Access to Finance of Enterprises in the euro area", 2019

perception about credit availability, it's possible to see that this perception is decreasing in some states like France and Italy, while in Germany the positive perception increases. Generally, looking also at other countries, the sentiment is that banks' willingness is increased in the last year, but not as in the previous ones.

Taking into examination the Italian situation, Rapporto Cerved PMI 2018 explains that in 2017 SMEs continued to obtain benefits from expansionary monetary policies of ECB, with strong reduction of the cost of debt from 3.9% to 3.5%. Moreover, credit crunch, the reason of the impossibility for most companies to obtain new loans and funds, ended in 2015 for medium enterprises (for small enterprises in the 2016) and so SMEs re-started to increase their level of debt, with an important acceleration from 2016 (+0.6%) to 2017 (+1.7%).¹⁸

As reported before, Italian companies suffered a lot for credit crunch: the reason is probably because of new European regulations about capital requirements, above all linked to liquidity aspects, and a general deterioration in credit quality that reduced banks' ability to grant new loans. Considering this environment, Italian Legislator decided to introduce new ways to help companies in managing these new requirements and push them to try new ways of financing, like bond issuing. This last topic was the most delicate, because of opposition by Italian firms, too much "fond" of bank loans. In fact, according to Accornero et al. (2015), the firm's decision to enter the bond market for the first time is just related to a need of financial growth, especially where internal resources are limited, and maturity mismatches between assets and liabilities of rebalancing.¹⁹ Finally, considering the access to finance in Europe, in 2018 Italy continued to be the second last, with Ireland, and followed only by Greece. As said before, the situation in Italy improved a lot in the last years, but many SMEs still face difficulties in accessing capital for some reasons:

- scarce availability of private risk capital;
- the restriction in bank lending caused by the large amount of Non-Performing Loans (NPL) present in many Italian banks' portfolio;
- the small size of the Italian venture capital market.

¹⁸ Rapporto Cerved PMI 2018

¹⁹ ACCORNERO, RUSSO, GUAZZAROTTI and NIGRO, "First-Time Corporate Bond Issuers in Italy", 2015

But the improvements and the efforts made by Italy in this sector were important and have been well evaluated by European Commission in its report. Several governments tried to mitigate the finance access problem for SMEs with innovative instruments, like PIRs, that permits private investors to give money to SMEs, benefiting of an exemption on capital income taxation. (see section 1.3.1).

1.3 Italian SMEs performances

In Italy, credit crunch had a strong impact on the number of SMEs, but Rapporto Cerved 2018 shows as, finally, the hemorrhage of SMEs (-10%), registered in the period from 2007 to 2014, is over. 2017 has been the third consecutive year in which the number of SMEs increases (+2.9%), even if the increase was not so evident like in 2016 (+5.8%), as showed in Figure 1.8.



Figure 1.8: Number of SMEs in Italy and percentages of increase/decrease

In 2017, the number of SMEs reached 152 thousand, higher than the pre-crisis level. This increase is due to 2 main factors:

- a great number of micro-firms becomes SMEs;
- a reduction of SMEs' defaults.

Another important aspect to understand why the number of SMEs increases so much is the introduction of light-limited liabilities companies (S.r.l. semplificate).

Source: Rapporto Cerved PMI

The improvements related to the Balance Sheets of SMEs have become more important in the last years. In 2017 there was a strong acceleration of SMEs: revenues increase at more than double rates to those of the previous year (+5.3%), with exceptional results for industrial and "energy" SMEs (Figure 1.10). The results (as reported in Figure 1.9) are confirmed also by large enterprises, where the increase is even higher (+7.3% in one year).



Figure 1.9: Revenues growth for firm dimension in 2015, 2016 and 2017

Source: Rapporto Cerved PMI



Figure 1.10: Revenues growth for SME operating sector in 2015, 2016 and 2017

Source: Rapporto Cerved PMI

The Value Added registered an incredible result for SMEs, increasing by 4.5% from 2016 to 2017, with important dynamics in some sectors like energy and industry (Figure 1.11). The

same can't be said for large enterprises: in this segment, the Value-Added increase passes from +4.1% of 2016 to +3.4% of 2017, attesting the overtaking of SMEs, as showed in Figure 1.12.



Figure 1.11: Value Added increase for SME operating sector in 2015, 2016 and 2017



Source: Rapporto Cerved PMI

Figure 1.12: Value Added increase for dimension in 2015, 2016 and 2017

Source: Rapporto Cerved PMI

Thanks to a very positive dynamic of turnover, the ability to generate revenues using own resources, increased for the fifth consecutive year, SMEs increase the level of ROA (return on assets) by 4.9% in one year, an increase of 0.7 points higher than that of large enterprises (Figure 1.13).





Figure 1.13: ROA for dimension in 2015, 2016 and 2017

Source: Rapporto Cerved PMI

About ROA, it's interesting to observe that, as Cerved report illustrates, different levels of this indicator are achieved in different ways, considering the ratio bank debt on total liabilities. Considering this feature, it's possible to divide companies into 3 segments:

- Free-from-debts firms, where bank loans account for just 10% of total liabilities (57% of total SMEs);
- Moderately dependent firms, where bank loans account for between 10% to 50% of total liabilities (39% of total SMEs);
- Heavily dependent firms, where bank loans represent more than 50% of total liabilities (4% of total SMEs).

For the first case, ROA is quite stable, about 5.4/5.5%, higher than moderately dependent firms (4.7% for 2016 and 2017); the situation is different for heavily dependent firms, passing from 1.9% of 2015 to 3.2% of 2017, as shown in Figure 1.14.





Figure 1.14: ROA for different types of firms in terms of bank dependence

Also in terms of turnover, a convergence of the results is recorded, but, in this case, due to the decrease of free-from-debts firms: they passed from 3.3% in 2016 to 2.4% in 2017, while the others classes remain stable, at lower levels (1.9% moderately dependent and 1.3% heavily dependent), as showed in Figure 1.15.



Figure 1.15: Turnover for different types of firms in terms of bank dependence

Source: Rapporto Cerved PMI

All these improvements are obviously linked to the improvements of the Italian economy, but also to the expansionary monetary policy of ECB in terms of cost of debt: due to this,

Source: Rapporto Cerved PMI

ROE increase from 10.9% of 2016 to 11.2% in 2017, while large enterprise registered a reduction of 0.1% in 2017, attesting on 8% (Figure 1.16).



Figure 1.16: ROE for dimension in 2007, 2015, 2016 and 2017

Another interesting indicator is the level of investments made by SMEs: after the collapse until 2013, from 2014 their level started to increase and in 2017, also thanks to incentives introduced by Piano Industria 4.0, the ratio between current and non-current assets shift from 6.3% to 7.8%. This was possible with the end of the credit crunch in 2015/2016. From that period, the level of financial debts started to increase and in 2017 it's registered a +1.7%.

Looking at the ratio between interest and financial debt, a very important indicator in terms of financial stability, there was a strong improvement: from 13.2% of 2016 to 12.1% of 2017, very far from the 22.9% observed during the crisis. Margins increase, decrease of cost of debt and contained dynamics of financial debts allowed this result.

1.3.1 Individual Savings Plan – "PIR"

One of the measures the Italian Government has taken in order to facilitate the access for SMEs to financial resources different from bank loans is the introduction, with Law no. 232/2016, of the so-called PIR ("Piani Individuali di Risparmio"), a new (for Italy) class of retail investment to help SMEs leveraging private investors savings, in exchange of tax incentives (besides obvious interests). With the introduction of PIR, the Italian Government

Source: Rapporto Cerved PMI

wishes – on the one hand – to favorite the flow of financial resources from small private savers towards the real economy and – on the other hand – to increase the number of SMEs willing to access capital markets.

The requirements in order to benefit from tax exemption on capital gain and inheritance tax, are the following ones:²⁰

- the investment is held for at least five years;
- the investment is composed by, at least, 70% of securities of Italian enterprises or with prevalent business activity in Italy;
- at least the 30% of the previous 70% should consist of securities not listed in the FTSE MIB index.

The maximum amount that can be invested into PIR can't be larger than $30,000 \notin$ per year with a limit of $150,000 \notin$.

According to data provided by Assogestioni²¹, specialized funds have collected more than $18.5 \notin$ billion to 2019 through more than 72 PIR-compliant products; those resources are very useful to help companies that want to enter listing segments such as AIM Italia, whose index – the FTSE AIM Italia – registered incredible results in the first years of PIR introduction (+23% from 2016 to 2017). Unfortunately, this boost disappeared in the last 2 years, with the index quite stable in his values. Mini-bonds, which are the main topic of this dissertation, will be introduced in chapter 2 on the following page.

But PIR and Mini-bonds can create synergies to help SMEs and in general Italian Economy?²² Theoretically speaking, yes. PIR are born to let people invest in shares and bonds, so this should be a beautiful hopes wedding. But these expectations have not yet translated into facts: the majority of PIR investments are concentrated on shares.

²⁰ Gazzetta Ufficiale della Repubblica Italiana, 2016

²¹ ASSOGESTIONI, "Mappa Trimestrale del Risparmio Gestito, 2° trimestre 2019", 2019

²² https://www.adviseonly.com/brand-corner/minibond-e-pir-un-rapporto-ancora-da-costruire/,

²⁷ Marzo 2018
CHAPTER 2

Mini-bond

The Great Financial Crisis, the European Sovereign Debt crisis and the subsequent credit crunch strongly affected Italian SMEs financing possibilities, making difficult to obtain loans from banks, the common financial channel for Italian SMEs (as already said in chapter 1). Credit crunch was the result of the combination of several factors: the decline in firm's creditworthiness, new regulations about liquidity levels and the need of strengthening balance sheets in the perspective of ECB's Asset Quality Review (Forestieri, 2014)²³.

Bonds were not considered as an attractive financial instrument by SMEs because of their limitations (see section 2.4): to solve this problem, the Italian Legislator has intervened with a series of measures, permitting the growth of this market. At the same time, the new European regulatory framework forced SMEs to become more transparent, and this reduced information asymmetry problems, allowing investors to see Italian SMEs as possible investment targets. Lastly, the introduction of PIRs by Italian Government in 2017 – already discussed in section 1.3.1 – has increased the amount of funds directed towards Italian SMEs.

Since mini-bonds are a relatively new financial instrument, literature is still limited. The following chapter will be mainly based on the research activity conducted by the Osservatorio Mini-bond of Politecnico di Milano, extending it whenever possible.

²³ FORESTIERI, "Loan securitization and mini-bonds, new channels for SMEs financing", 2014

2.1 Definition

This research is based on the definition of mini-bond adopted by the Osservatorio Mini-bond of Politecnico di Milano's school of management (Osservatorio Mini-bond, 2019). Following this definition, a mini-bond is a debt security, either a bond (of any maturity) or a commercial paper (with maturity up to 36 months), issued by Italian companies – especially by small and medium enterprises, i.e. SMEs, and subscribed by professional and qualified investors. These instruments, in exchange for raising capital – that is reimbursed through a pre-defined schema, i.e. bullet or amortizing, - offers a remuneration, established in a reciprocal binding agreement, through the coupon payment. The issuance regulation that establishes the legal perimeter in which mini-bonds are treated is the art. 2410 – 2420 c.c. (i.e., Italian Civil Code), for which concern joint-stock companies (S.p.A. in Italian) and the art. 2483 c.c., for limited liability companies (S.r.I. in Italian), where the subscription of those instruments is limited only to supervised investors. In light of historical tendency of Italian firms to finance their need mainly through banks channels, especially among SMEs, until 2013 it was not common among unlisted companies to use mini-bonds to raise capital, even though these instruments can be perfectly compared with a well-known traditional fixed income security.

As far as the technicalities of the instrument are concerned, almost no differences lay between traditional corporate bonds and mini-bonds. However,

- being the latter's amount issued lower,
- given that the liquidity on such instruments is lower than traditional bonds and lastly,
- considering the smaller size of companies issuing them, with the subsequent lower amount of information available (in terms of historical data, results, etc.),

a more in-depth description of some of their features is required.

In order to facilitate the possibilities of access to capital market by SMEs and unlisted companies, the Italian Government introduced different legislative changes between 2012 and 2013. In the next section, these changes will be analysed in detail.

As above mentioned, this paper considers the debt security definition proposed by Osservatorio Mini-bonds and considering this, we are considered only bond placements a commercial paper that accomplish all the following requirements:

- 1. The issuer is an Italian company (or with operations carried out mainly in Italy), which is not interested by bankruptcy events or arrangements with creditors;
- 2. The issuer is neither a bank nor an insurance company, it is not an SGR or SIM, and it is not part of a banking group subject to the supervision by the Bank of Italy;
- 3. The issuer is not an SPV formed with the only purpose to perform an acquisition, a securitization or a similar financial operation;
- The placement is characterized by an outstanding amount lower or equal to e 500 million (considering it aggregate for issues which occurs in the same period);
- 5. The security is not listed on a regulated stock market open to retail investors and it is not associated to complex mechanisms of conversion in stocks (i.e., options/warrants).

It is important to notice that these limits do not refer in any way to dimensional variables of the issuer, like revenues or total assets. However, given that the focus of Osservatorio Minibonds is on the role that these instruments have as alternative channel to financing for SMEs, a comparison between mini-bonds issued by these last and by large companies will be provided in next sections.

2.2 The regulatory framework

Following the Global Financial Crisis (GFC) of 2008 and the successive credit crunch, in Italy it was introduced a package of Legislative Decree with the purpose to facilitate the access to debt capital markets for SMEs and thus for increasing their possibility to raise funds. The aim of the following sections is to introduce briefly the main legislation changes for what concerned mini-bonds regulatory framework: Development Decree and Development Decree bis, Destinazione Italia Decree and Competitiveness Decree.

2.2.1 The Development Decree and the Development Decree bis

The Development Decree of June 26nd 2012, – subsequently modified by the so-called Development Decree-bis – has introduce two important changes in mini-bonds legislation. First, it has removed the limit – established by art. 23412 c.c. – for unlisted companies to issue instruments whose outstanding value was higher than the double of their shareholders' equity. However, this first change has been referred only to those instruments listed on regulated markets or on MTFs.

Secondly, it has made more favourable the fiscal regime applicable to bonds of unlisted companies, bringing on the same fiscal plan both bonds issued by banks or listed companies and bonds issued by unlisted ones. Specifically, unlisted firms can deduct interest expenses up to 30% of gross profit for IRES purposes.

This is a relevant modification considering that before the introduction of that decree, legislation established that deductibility of interest expenses was feasible only for a quota lower or equal to:

- a) Twice the "official reference rate" established by the Italian Government for debt securities traded on regulated market in the EU countries belonging to the so-called White List;
- b) The above-mentioned "official reference rate", multiplied by $\frac{5}{3}$ for securities not included in the White List.

On the other hand, when mini-bonds are not traded on regulated markets or are exchanged in multilateral trading facility (MTF), the interest expense is deductible up to the limit only if:

- a) Securities are subscribed by professional and qualified investors such as banks, insurances companies, investment funds – which do not own more than the 2% of issuer's stock;
- b) The income beneficiary is resident in Italy or in another country of the White List.

Adding to this, the Development Decree has introduced other main two tax advantages:

- Firstly, it extended the fiscal regime on interests collected by investors as regulated by Decree Law 239/19967 – also to joint stock companies traded on Multilateral Trading Facilities (MTFs) and to unlisted companies;
- 2. Secondly, the decrees state that all the fees linked to issuing e.g. advisory fees, rating fees, placement fees, etc. have become deductible in the year they are incurred according to a cash-base principle.

2.2.2. The Destinazione Italia Decree

The provision introduced by the Development Decree, as subsequently amended by the Destinazione Italia Decree of December 23rd, 2013, regarding the issuance of mini-bonds, represents a significant step towards creating a new method of financing for Italian unlisted companies, moving away from the traditional bank debt approach, with an instrument which is attractive also to non – resident professional investors (Messina, 2014).

Specifically, the provisions introduced by Destinazione Italia Decree comprise:

- a) Introduction of a substitutive tax regime for security package created to secure minibonds. It is equal to only 0.25% of the aggregate principal amount of the mini-bonds;
- b) The application of "Privilegio Speciale", a particular warrant for those mini-bonds with maturity higher than 18 months and directed to institutional investors.

Going into details, the Destinazione Italia Decree extended Law 130/1999, which deals with the securitization process to bonds, with the task of promoting the emergence of funds investing in mini-bonds, in order to support a further growth in the demand for these instruments.

Secondly, the decree allows insurance companies to consider mini-bonds – jointly with bonds, securitized instruments or mini-bond funds quotas – as assets to cover technical reserves.

Thirdly, it has removed the withholding tax of 20% on interest expenses and incomes deriving from mini-bonds subscribed by funds, whose shares are held by professional investors and which capital is dedicated only to investments in mini-bonds, thus enhancing the growth of Private Debt funds specialized in these instruments. Additionally, the decree has extended the Central Guarantee Fund to those SMEs issuing mini-bonds which are then subscribed by

qualified investors, dedicating its 40% to single issuances and the 60% to mini-bonds portfolios meeting the following requirements:

- 1. The capital raised through the issuance must be used to finance the business activity and not to renegotiate or reimburse existing credit lines;
- 2. The securities must be subscribed after the board's decision to approve the guarantee;
- 3. The maturity must be in the range from 36 to 120 months (i.e., from 3 to 10 years);
- 4. The Central Guarantee Fund must be the only guarantor covering the issuance's outstanding value.

As far as single issuances are concerned, the guarantee can cover – as maximum – the 50% (for amortized bonds) and the 30% (for bullet bonds) of the bond's face value, up to a value not exceeding \notin 1.5 million. As far as portfolios are concerned, the guarantee can cover between \notin 50 and 300 million, made up of single subscription of up to 3% of the whole portfolio. Lastly, the Destinazione Italia Decree has enabled SMEs, whose properties usually have not high values, to obtain financing through their assets without any prevention to use them, thus allowing to lower the cost of capital and providing greater protection to subscribers.

2.2.3 The Competitiveness Decree

With the Law Decree no. 91/201410 – known as Competitiveness Decree – Italian Government introduced several measures aimed both at improving the competitiveness of Italian firms at European level and at attracting foreign investors. Notably, as far as credit financing is concerned, it established that investment funds, securitization companies and insurance companies might grant direct financing to firms.

Moreover, in order to further increase the palatability of Italian firms – especially SMEs – for foreign investors, it eliminated the withholding tax on medium-long term loans granted by foreign insurance companies, securitization companies and investment funds.

Thirdly, the decree introduced two other measures which are linked with the mini-bonds market, i.e. the removal of the 26% withholding tax on interest expenses and incomes of bonds for those securities not listed on Multilateral Trading Facilities – such as ExtraMOT PRO (which peculiarities will be further explained in section 2.6) – as long as they are placed

by institutional investors, and the extension of the substitute tax to the transfer of guaranteed receivables.

2.3 Italian Mini-bond market

2.3.1 Issuers' characteristics

Following the results of Osservatorio Mini-bond (2019) and the database on which is base this research, the total numbers of companies, compatible with the definition that has been provided in section 2.1, that, between 2012 and December 31st, 2018, issued mini-bonds, are 498 Italian firms, of which 260 SMEs. The overall outstanding amount has reached € 32 718 million.



Figure 2.1: Number of issuances considering issuer ATECO

Source: Osservatorio Mini-bond (2019)

As preliminary analysis, it is possible to see the composition of the issuer's distribution based on their ATECO group ²⁴. The figure 2.1 highlights that almost 41% of firms belongs to the C – manufacturing activity class, a portion that has decreased in 2018 respect to year before.

²⁴ The ATECO (see Appendix A) is the firm economic activities classification



Figure 2.2: Amount issued considering issuer ATECO

Source: Osservatorio Mini-bond (2019)

Figure 2.3 displays issuers' sample according to firm size, measured as consolidated turnover in the last available financial statements before the issuance. It is possible to notice that the 21% has a turnover included in the range \notin 100-500 million, and that almost the 11% has a turnover lower than \notin 2 million, which seems contradictory with the definition of micro-enterprise given by European Union.



Figure 2.3: Italian mini-bond issuers by consolidated turnover

Source: Osservatorio Mini-bond (2019)

However, it should be noticed that - in order to be classified as micro-enterprise - the firm should meet two other criteria (Muller et al., 2017), i.e. the total number of employee and the balance sheet's assets threshold.²⁵

In addition, it seems that mini-bonds are becoming, year-over-year, more attractive for companies with turnover between & 2 and 25 million (29% of the total, equally divided between the & 2-10 and the & 10-25 range). If we focus on the distinction between SMEs and large firms, there is almost an equal distribution between the two classes, with SMEs accounting for the 52.2% of the issuers. Despite this, it is important to highlight that there are many differences if we take into consideration also the activity sector which each company operates in (figure 2.4). As it is evident from the figure, the large companies are concentrated mostly into the manufacturing activity group, albeit there is a discrete number of SMEs active also in other sectors, such as: D - energy supply (6.92%), F - constructions (8.84%) and K - professional activities (7.69%).



Figure 2.4: Issuer by ATECO Group and size

Source: Osservatorio Mini-bond (2019)

Segmenting the sample of issuers by geographical area, (see Figure 2.5) as likely to expect, it has been found that Lombardy is the leading region, with 144 issuers, representing the 28.9% of the overall amount, followed by Veneto, Emilia-Romagna and Trentino-Alto Adige.

²⁵ MULLER, JULIUS, HERR, KOCH, PEYCHEVA, MCKIERNAN, "Annual Report on European SMEs: 2016/2017", 2017

Consequently, the 72.1% of issuers are based in the North of Italy, while the Centre and the South accounts for the 17.5% and 9.8%, respectively. The residual 0.6% of issuers are based in foreign countries.



Figure 2.5: Mini-bond issuers by regional location

Source: Osservatorio Mini-bond (2019)

Another consideration that it is important to notice is that only the 8.6% of firms issuing mini-bonds were already listed on the Italian Stock Exchange or on Foreign Stock Exchanges, while most of the issuers are not listed companies.

Finally, it's important to point out that the 498 companies of which is composed the total database, 404 (81.1%) are joint stock companies, 83 (16.7%) are limited liabilities companies, 9 (1.8%) are cooperative companies and 2 (0.4%) are foreign vehicles.

2.3.2 Mini-bond issuances' characteristics

Looking now at the issuances' characteristics, the Figure 2.6 describes the cumulated number of emissions, from November 2012 to December 31st, 2018.



Figure 2.6: time flow of mini-bond issue, from 2014 to 2018

Source: Osservatorio Mini-bond (2019)

As it is possible to notice, after the slight drop of the market during the first semester of 2017, the number of issues has back to increase in the second half of 2017 and in the entire 2018. Interesting aspect in the mini-bond market dynamic is the cyclicality that it is possible to see at the end of each year, particularly in the month of December, even though at the end of 2018 a decrease has been registered. Comparing the 2018 with the year before – the number of emissions is increased at 198 (only 10 more than in 2017), while (Figure 2.7) the amount issued is decreased at € 4.315 million (34% lower than 2017 values). Of this last overall amount, € 668 million was issued by SMEs (108 emissions).

If the focus is shifted on only emission with a value lower or equal to \notin 50 million – as the intentions of this paper and the major interest of practitioners – the total outstanding value reach \notin 4.895 million, made of 647 emissions.



2.3.2 Mini-bond issuances' characteristics

Figure 2.7: time flow of cumulated issue amount from 2012 to 2018

Source: Osservatorio Mini-bond (2019)

Figure 2.8 represents the evolution over the years of issuances' size, showing how the average emission extent has growth in 2016 (\notin 38.25 million) and in the first semester 2017 (\notin 45.72 million), while there was decrease in the second semester 2017 and in 2018 (\notin 22.4 million) and a contemporaneous tendency towards polarization, highlighted by an increase in the percentage of emissions with amount lower than \notin 2 million (36% of total 2018 emissions).



Figure 2.8: average mini-bond size by semester (values in € million)

Source: Osservatorio Mini-bond (2019)

2.3.2.1 Reasons for issuing mini-bonds

One of the main interesting aspects analyse it is the reason why a company issued a minibond. Essentially, it is possible to identify four main goals (Osservatorio Mini-bond, 2019):

- 1. Financing internal growth, namely collecting financial resources to sustain investments in R&D, in new products or in new markets;
- 2. Financing external growth, namely raising financial resources to sustain mergers and acquisitions (M&A) of other enterprises or divisions;
- 3. Debt restructuring, namely collecting financial resources to modify the financial leverage (e.g., by reimbursing previous debt);
- 4. working capital financing; in this case the minibond will allow the company to raise cash in the short run to finance current operations (inventories and receivables).

As is it possible to notice from the Figure 2.9, considering the major reasons why the companies issue mini-bonds, a slight difference exists between SMEs and large firms. The most frequent reason is the internal growth, both for SMEs and large firms (on average, 60% for SMEs and 52% for large companies).



Figure 2.9: mini-bond issue's objectives declared by companies

Source: Osservatorio Mini-bond (2019)

The second most frequent aim is represented by debt restructuring, with 22.7% for larger companies and 15% for SMEs. Lastly, working capital financing seems to be a relevant reason

only for companies belonging to the ATECO group K - Financial activities, while it is almost irrelevant for all the others.

2.3.2.2 Maturity, reimbursement scheme and coupon

Let's now to analyze the maturity of the 746 mini-bonds in the total sample. At the time of the issue it shows an average time-to-maturity of 5.3 years, with the higher concentration - equal to 26% - between 5 and 6 years (see Figure 2.10). However, it is important to highlight that 105 emissions have a maturity lower than one year. This can be explained referring to the specialization that some operators have developed for the so-called short-term mini-bond (Osservatorio Mini-bonds, 2019). Specifically, looking always at figure 2.10, it is possible to notice that short-term instruments seem to be more preferred by SMEs – 77 issues with a maturity lower than one year, the 19.74% of the sample – rather than by large firms, that show only 28 emission with the same maturity. In fact, as it could be expected, the preferences of large firms are for longer time horizons, with an average time-to-maturity of 5.6 years if compared with 5 years for SMEs.



Figure 2.10: mini-bond maturity, comparison between large companies and SMEs

Source: Osservatorio Mini-bond (2019)

Looking at the mini-bonds reimbursement schema, 50.5% of companies of the sample choses a bullet reimbursement – i.e. the principal amount is reimbursed in a unique solution at maturity – while the remaining 46.1% prefer the amortized scheme over the life of mini-bond (the missing 3.4% is related to lack of data about the reimbursement). Analyzing more in deep the data, it's possible to observe that the first option (bullet) is preferred by the issuers whose mini-bonds have an issued amount above € 50 million (71.7%) and/or a duration lower than five years, and by large or financial companies.

As a third aspect, considering the coupon (see Figure 2.11), approximatively the 85% of minibonds in the database pay a fixed coupon²⁶ with a rate of 5.1% on average, increasing over years from 4.83% of 2017 to 5% of 2018. It is important to notice that mini-bonds have a low level of liquidity, compared with more traditional bonds, and for this reason the coupons rate has to incorporate a liquidity premium, which – at least in theory – would be inversely proportional to the size of the issuance and larger if the mini-bond is not listed on a multilateral trading facility (MTF) such as ExtraMOT PRO (or equivalent).



Figure 2.11: coupon distribution, comparison between large companies and SMEs

Source: Osservatorio Mini-bond (2019)

If the spread between the coupon rate paid by SMEs and the coupon rate paid by large firms is compared, the former pays a coupon which is, on average, 17 basis points lower than large enterprises. Even if at a glance, this fact could be strange, it should be considered the fact that SMEs usually issue mini-bonds on shorter maturities than large enterprises.

²⁶ The remaining part of the sample pays a variable coupon indexed usually on Euribor plus a spread or sometimes linked to firm's financial performance

	SMEs	Large Firms	Delta (in bps)
Whole Sample	5,02%	5,19%	-17
Per Issuance size:			
$\leq \in 50$ million	5,03%	5,10%	-7
> € 50 million	4,59%	5,53%	-94
Per maturity:			
Short term	4,05%	4,16%	-11
1 to 5 years	5,48%	5,56%	-8
Over 5 years	5,10%	5,17%	-7

2.3.2.3 Rating, covenants, guarantees and options

Table 2.1 provides an inside-view of the coupon paid by mini-bonds.

Table 2.1: Comparison of coupon between large firms and SMEs

Source: Own elaboration

2.3.2.3 Rating, covenants, guarantees and options

One of the most important characteristics that an investor considers when evaluates a bond is the rating that this bond expresses, even more important in the case of mini-bond, mostly issued by little-known SMEs. Looking at the rating of instruments in our sample, 70% do not have any rating, while 13% provides a rating which is undisclosed. Considering the remaining mini-bonds, 8% has an investment grade rating (equal to at least BBB- in the Standard and Poor's scale, or equivalent, as seen in Table 2.2), while 9% has a speculative grade rating.

Cerved	S&P's	Moody's	Fitch	
A1.1	AAA	Aaa	AAA	
A1.2	AA+ / AA	Aa1 / Aa2	AA+ / AA	
A1.3	AA-	Aa3	AA-	
A2.1	A+	A1	A+	Investment
A2.2	А	A2	А	Grade
A3.1	A-	A3	A-	
B1.1	BBB+ / BBB	Baa1 / Baa2	BBB+ / BBB	
B1.2	BBB-	Baa3	BBB-	
B2.1	BB+/BB	Ba1 / Ba2	BB+/BB	
B2.2	BB-	Ba3	BB-	
C1.1	B+ / B	B1 / B2	B+ / B	Speculative
C1.2	В-	В3	В-	Grute
C2.1	ccc/c	Caaa /Ca /C	ccc/c	

Table 2.2: Rating equivalents for main rating agencies

Source: Cerved Rating Agency

As shown by Figures 2.12 and 2.13, the presence of rating assumes a relevant presence in the case of large companies and emission larger than € 50 million. This could be explained with the fact that the smallest SMEs' issues are usually negotiated directly with investors.



Figure 2.12: Rating breakdown for firm's size

Source: Own elaboration



Figure 2.13: Rating breakdown for mini-bond's size

It is interesting to notice that at the issuance, if we compare the rating of SMEs firms with the one of large companies, the former has a better credit rating.

Another important factor to consider for providing a protection to investors is the possible presence of guarantees. Analyzing total sample, it is possible to highlight that only 29% of instruments are secured, i.e. the issuer has provided a collateral in case of insolvency. This

Source: Own elaboration

small number of guarantees can be explained with the fact that given the average small size of companies issuing mini-bonds, for these firms could be difficult to pledge one of their assets as collateral.

Another factor that can impact on the bond yield is the presence of possible options. As more traditional bonds, a mini-bond can have an embedded call option – i.e. the issuer has the right, but not the obligation, to call back the amount and reimburse investors prior to maturity at a pre-determined price, established at the issue time (this amount is typically greater than the bond's principal) –, or an embedded put option – i.e. the investor has the right, but not the obligation, to sell the bond back to the issuer before the maturity, at a predetermined price, fixed at the moment of the issue. Considering total sample, the 81% of instruments own an embedded option. More in detail, it has been found that: 25% own a call option, 19% own a put option and 37% own both call and put option.

A third aspect that can influence mini-bonds' yield is the presence of covenant (45% of total emissions present them). In fact, one of the problems that mini-bonds investors must address is the risk linked to the possibility of opportunistic behaviors and conflicts of interest. In general, it is in the interest of those who invest in mini-bonds to constantly monitor the financial and asset situation of the company. In this sense, covenants – that are financials constraints declared explicitly by the issuer in the moment of emission and that the issuer undertakes to respect for the life of the bond – fulfil the function of protection for investors. In general, the violation of such clauses will trigger a series of mechanism aiming at protecting investors' interests. According to some reports about mini-bonds (Calugi et al., 2014)²⁷, covenants requested more frequently by investors are:

- Negative pledge clauses, through which the issuer guarantees not to grant pledges or liens on company's assets – both tangibles and intangibles –, on credits and on participations for the whole duration of the debt;
- Use of proceeds: the amount collected through the emission must be used for established goals;
- Change of control: in case of change in the ownership structure, the investor has the right to ask the reimbursement in advance;

²⁷ CALUGI, PAGLIETTI, "I Mini-bond: istruzioni per l'uso", 2014

- Limitations on dividends that can be paid to shareholders;
- Financial statements should be audited annually and a mid-year (unaudited) report should be released until the ninth month of the year;
- Limitation on indebtedness: clauses which force the issuer to keep below a certain threshold ratios such as $\frac{Net \ Debt}{EBITDA}$, $\frac{Gross \ Debt}{EBITDA}$ and the Interest Cover Ratio.

2.4 Mini-bonds advantages and disadvantages

As already said before, Italian firms use bank loans as principal source of financing. Minibonds allow companies, especially SMEs, to diversify the portfolio, reducing risk and offering several advantages to issuer.

First, given the average medium-to-long term duration of mini-bonds, they help also firms to increase the average duration of liabilities side of balance sheet, creating a balance with the average maturity of investments on the asset side. This aspect is fundamental to increase firm's financial stability and so to obtain good results in analysis measuring coherence between investments and liquidity: in turn, this can contribute to increase firm's creditworthiness and consequently to reduce cost of debt.

Second, the potential capital that can be collected through a mini-bond is, ceteris paribus, larger than the debt a bank can provide: this extra amount can be used to make more investments than before. Moreover, sometimes banks are not able to grant a loan to a firm and so mini-bonds become the only feasible solution.

Third, mini-bonds emission ensures numerous tax benefits, as already stated in section 2.2.

Lastly, it's possible to list other advantages coming out from some interviews made by the research group of Osservatorio Mini-bond:

- Acquisition of complementary competences about securities finance and how to deal with capital markets;
- Marketing effect, due to the spread of information about the firm, its products and services;
- A good "training" considering possible future more complex operations like private equity and Stock Exchange listing.

Looking at the possible disadvantages companies must face when issuing mini-bonds, it's necessary to start saying that, although ExtraMOT PRO's listing fees are irrelevant, issuing costs are larger than bank loans cost, both considering the requirements the issuer have to comply, the fees for arrangers and other actors involved in the process, and the coupons, generally larger than interests required by banks.

Second, the market of mini-bond is characterized by illiquidity and this can push potential investors to run proper due diligence, analyzing every aspect of the issuer that can influence the ability of the firm to respect the payments and the reimbursement written in the contract. Moreover, the presence of covenants can be a sort of constant monitoring of the performances of the issuer performed by investors.

Third, mini-bond issuance forces issuers to be more transparent, disclosing information not only related to financial situation, but also about goals, future investments and projects. This transparency creates two problems: an increase in the costs for the company and the risk of spill-over of relevant knowledge by competitors.

Four, time required to issue a mini-bond ranges between three to four months, larger than the time required, generally, to obtain a bank loan.

Lastly, there is a big problem concerning the size of mini-bonds: to attract institutional investors, the issued amount should be higher than the usual financial needs of a SME. In order to solve this problem, a process of securitization of multiple mini-bonds issued by different firms in a large pool can be an effective solution. An example of this solution can be the so-called ELITE Basket Bond, involving ten firms participating to ELITE program of Borsa Italiana: each company issues a bond with equal coupon and maturity, but different value; then, the entire amount was subscribed by an SPV as a single cumulative bond, reaching a total value interesting for the institutional investors.

2.5 Actors Involved

During the mini-bond issuing process, several actors are involved, because, in general, both investors and issuers need for assistance and advisors to have success in the raising capital. According to Borsa Italiana, the listing process can involve financial advisors, arrangers, rating

agencies, legal consultants, investors, depositary and agency banks and Stock Exchange such as Borsa Italiana.

2.5.1 Financial Advisor

Generally, SMEs haven't the specific competences to "build" a mini-bond. As in other circumstances like other securities placement, it can be useful to contact a financial advisor, in order to guide the firm in the choose of the strategy (like issue timing, maturity, etc.) and help it in the relationships with other actors, in particular for regulatory compliance and, in some cases, the listing on a stock exchange. Sometimes, this analysis is made up by the investors or by the arranger.

First, a cost-benefit analysis about the operation is necessary, considering also other possible financial alternatives and considering firm's needs. In this phase, the business plan redaction is useful, in order to clarify future investments' goals. Through the creation of a prospective financial statement, it's necessary to verify the financial sustainability of the operation, comparing incoming and outcoming cash flows. Advisor helps the firm also to create a structure necessary to collect, process and transmit information required by the market, using an internal control system. The entire process can be initiated by the firm or by the advisor himself, looking for companies interesting for the investors. In the latter case, public financial statements analysis is fundamental to find potential candidates, looking at past growth rate, financial structure, etc. Issue timing is variable, but, according to experience, 2-6 months can be considered as standard.

Looking at mini-bonds below 50 € million in 2018, according to data collected by Osservatorio Mini-bond of Politecnico di Milano, the following have been the most active financial advisers: ADB Corporate Advisory (7 assisted firms), Borghesi & Associati, CDS Associati, Deloitte Financial Advisory, Eidos Partners, Envent Capital Markets, Eukleia Group, Falcio & Associati, Financial Innovation Team, Fiordiliso & Associati, Linklaters, Pwc, SBA Business Advisory, Studio Mazzei Commercialisti e Revisori, TCO Innovation and Vitale & Co.

2.5.2 Legal Advisor

Legal advisors' role is fundamental and delicate, because they must verify the compliance with current regulation, the procedures fairness and the contracts' implementation. Furthermore, they are required to find the proper methods to provide legal protection to each actor and to protect firm against any possible dispute. Law firms can also work under request of the investor interested in legal due diligence to verify the issuer state. Looking at mini-bonds below 50 € million in 2018, according to Osservatorio Mini-bond of Politecnico di Milano, the most active legal advisors have been the following ones: Orrick and Chiomenti (about 10 operations each), Ashurst, CMS, DWF, NCTM, R&P Legal, Segre, Simmons & Simmons and Studio Rinaldi.

2.5.3 Arranger

Arranger is the actor in charge of the placement structuring, interfacing with potential investors. Leveraging information coming from the firm and the advisors, arranger enters in contact with potential investors, introducing the investment opportunity, through an Information memorandum, and observing the acceptance of the operation. Looking at this information, arranger and firm can work together to structure the mini-bond in the appropriate way. Figure 2.14 shows arranger activity in 2018 for mini-bonds below 50 \notin million: on the left hand we find the number of emissions each arranger advised, while on the right hand we find the overall value of supported issuances.

Looking at the number of operations, according to Osservatorio Mini-bond of Politecnico di Milano, in 2018 podium it's possible to find Frigiolini & Partners Merchant (20 operations), followed by Unicredit (14 operations) and Sella Corporate & Investment Banking (12 operations). On the other side, looking at the overall value of supported issuances, Unicredit is first, followed by Mediobanca and Banca Finint. Unicredit role is very important: it's a big banking group that in 2018 decided to use mini-bonds as a financial instrument offered to customer firms in the "catalogue"; moreover, Unicredit is also 100% investor of those mini-bonds, a peculiarity compared to other players. Looking at cumulated value of supported issuances from 2012, Frigiolini & Partners Merchant stays first with 66 issues, while Banca

Finint is first considering overall value. Looking at mini-bonds higher than 50€ million in 2018, most important arrangers were BNP Paribas, Goldman Sachs and Banca IMI.



Figure 2.14: Arranger ranking, for number of issues (on the left) and for total value (on the right) Source: Osservatorio Mini-bond (2019)

2.5.4 Rating Agencies

Rating assignment is not fundamental but can be a strong message to the overall market. Private debt funds often require an indipendent rating before investment final decision, or sometimes create themselves internal rating procedures. In UE, only recognized by ESMA (European Securities and Markets Authority) rating agencies can issue a rating. Given the importance they play in steering investment decisions, rating's importance has been recognized at European level through the establishment – by the European Commission – of a regulatory framework (Regulation EC no. 1060/2209) to ensure transparency and avoid conflict of interests.

Sometimes, an individual mini-bond can receive a rating because required by a potential investor: the so-called rating unsolicited. Rating reviews can be public (disclosed) or private (undisclosed). In case of big issues, the three most important rating agencies are Moody's, Standard & Poor's and Fitch.

For mini-bonds, there are more local and specialized actors. In Italy, in 2018, there were 3 active rating agencies: Cerved Rating Agency (34 new ratings and 6 reviews), CRIF Ratings

(8 new ratings and 2 reviews) and Modefinance (12 new ratings). The big three international rating agencies operated only for emissions higher than $50 \notin$ million (8 in 2018).

2.5.4.1 Rating process

The rating process normally lasts 5-8 weeks, and according to Cerved Rating Agency, it complies with the following steps:²⁸

- 1. the rating process is started after the request by the rated entity or a third party;
- the analyst in charge of rating assignment examines the available information, in terms
 of completeness and timeliness, and verifies the value of the automatic score and the
 individual grading;
- the analyst collects further data in case the informative set is deemed incomplete and
 / or not sufficiently up to date;
- the analyst expresses the evaluation about the rated entity, with regards to the income profile and financial structure, economic / financial trend and regularity of the payments;
- 5. the appraisal expressed by the analyst is combined with the integrated score through a matrix compatibility system attributing a preliminary rating;
- 6. the subsequent final rating judgement is submitted to the screening by a supervisor or Rating Committee for the approval;
- the approved rating and the main elements on which the rating relies on are communicated to the rated company at least 24 working hours in advance with respect to the rating publication in order to draw the attention of the rating agency on possible typos;
- 8. all the public credit ratings issued by Cerved Rating Agency, regardless of the type of the requiring subject, are subjected to continuous monitoring and review at least on an annual basis.

²⁸ CERVED RATING AGENCY, "Rating methodology for Italian nonfinancial companies", 2019

2.5.5 Investors

Now, in Italy, the investment in mini-bonds is reserved to professional investors, because retail ones are not considered capable of understanding the risks that stand behind this security. The Italian regulatory framework identifies two different requirements for investors, depending on whether the issuers is a joint stock company (S.p.A.) or a limited liability company (S.r.l.). Indeed, investors need to be monitored to invest in the latter type of company, while individual professional investors may buy debt securities issued by S.p.A without any monitoring. Banks, credit funds, insurance companies, SIMs, asset management companies, foundations are the typical mini-bond underwriter. Once Legge di Bilancio 2019 will be approved, and new Regolamento Consob refined, placing minibonds (only among professional investors) through crowdfunding platform will be allowed.

Figure 2.15 describes the market share of different types of investors in Italian mini-bonds below \notin 50 million, according to the data collected by the Osservatorio Mini-bond of Politecnico di Milano (coverage of the total sample 82%). Italian private debt funds (or with a stable organization in Italy) and foreign funds are the most active investors (respectively: 26% and 25% of the investment flow), followed by Italian banks (21% thanks to Unicredit role). Asset management companies hold 11% of the market. Insurance companies (9%) are exclusively foreign entities and invest in the largest issues. Interestingly, in 2018, it's registered a growing interest of public entities (regional financial companies) and local credit consortia (Confidi). Unfortunately, the contribution of pension funds and social security funds is insignificant.



Figure 2.15: Investors' market share in 2018 (issues up to \notin 50 million)

Source: Osservatorio Mini-bond (2019)

2.5.5.1 Private Debt Funds

The advent of the mini-bond market in Italy saw the rise of investors specialized in this particular asset class: private debt funds. Like private equity funds, they follow a buy-and-hold strategy, investing in bonds issued by SMEs (and in direct lending), that are either listed but illiquid, or even unlisted. Usually, for the reasons above, they are closed-end funds. According to AIFI, the Italian Association of Private Equity, Venture Capital and Private Debt, in 2018 private debt funds raised \notin 297 million (mainly from banks and pension funds) and invested more than \notin 1 billion in 116 companies (49% in minibonds, 46% in direct lending and the remaining amount in hybrid deals).²⁹

One of the anchor investors in Italian private debt funds is Fondo Italiano d'Investimento SGR, that manages a specific fund of credit funds. Private debt funds may request the public guarantee from the national "Fondo di Garanzia", to partially cover losses on investments. At the EU level, the European Investment Fund (EIF) offers the "InnovFin SME GuaranteeFacility" to enhance credit towards SMEs; this warranty has been provided in several minibonds in Italy.

According to Osservatorio Mini-bond of Politecnico di Milano, the active private debt funds in 2018 were: Antares AZ I (Azimut Libera Impresa SGR), Anthilia BIT Bond Impresa e Territorio, Anthilia BIT Parallel Fund and Athilia BIT 3 (Anthilia Capital Partners SGR), Equita Private Debt Fund (Equita Private Debt Fund SICAV-FIS), Fondo Impresa Italia

²⁹ www.aifi.it

(Riello Investimenti Partners SGR), Fondo Rilancio e Sviluppo (SICI SGR), Fondo per le Imprese 2.0 (Mediobanca SGR), Fondo Strategico Trentino-Alto Adige (Finint Investments SGR), Fondo Sviluppo Export (Amundi SGR), Fondo Veneto Minibond (FVS SGR), Foresight Italian Green Bond Fund (Foresight Group LLP), Green Arrow Private Debt (Green Arrow Capital SGR), HI Crescitalia PMI Fund (Hedge Invest SGR), Muzinich Italian Private Debt Fund (Muzinich & Co Ltd), Progetto Minibond Italia (Zenit SGR), Tikehau Fondo per l'Economica Reale Italiana and Tikehau Special Opportunities (Tikehau Capital), Tenax Italian Credit Fund and Italian Credit Fund I (Tenax Capital Ltd).

2.5.6 Registrar Agents and Depositary Banks

The issuance of minibonds requires the assistance from servicers managing the payment of the money flows to investors, and - eventually - the dematerialization of the security with the assignment of the ISIN code. These processes are generally standardized, but SMEs prefer to assign them in outsourcing to minimize costs and time to market. According to Osservatorio Mini-bond of Politecnico di Milano, the main players in Italy are BNP Paribas Securities Services, Deutsche Bank, Bank of New York Mellon, Securitisation Services (Gruppo Banca Finint) and, in lower emissions, Banca di Credito Cooperativo di Cherasco. Another important role is played by paying banks, that accredit coupons to investors, holding Monte Titoli as counterpart. Finally, depositor banks supervise the securities when dematerialized (it is mandatory to de-materialize a mini-bond if it is listed on the stock exchange). Like in 2017, BNP Paribas Securities Services, SGSS e State Street have been the most active depositors in 2018.

2.5.7 Web Portals

Mini-bond dedicated Web portals play a fundamental role in the growth of this market. Their job is to spread in a timely manner information about mini-bond issuances and about the most important player in Italy. According to Osservatorio Mini-bond of Politecnico di Milano, the most active websites specialized in mini-bonds are BeBeez.it and MinibondItaly.it.

2.6 ExtraMOT PRO

Italian ExtraMOT PRO market of Italian Stock Exchange, born in February 2013 as the professional segment of ExtraMOT market. Inside this market, it's possible to issue project bonds, bonds, financial bills, asset backed securities, and other instruments: so, it's the ideal segment for mini-bonds. Technically, ExtraMOT PRO is not a market regulated by MIFID directive, but it's a multilateral trading facility, with an electronic platform for negotiations, automatic settlement procedures and opened just to professional investors. The presence of listing partners or liquidity provider is not mandatory. ExtraMOT Ones, opened also to retail investors. This means that listing fees are lower, and the procedures are quicker. This stock exchange promoted also an internet platform, ExtraMOT PROLinK to help investors and firms to meet themselves.

Considering the interests on ESG (Environmental, Social, Governance) themes, in March 2017 Italian Stock Exchange decided to offer investors the possibility to invest in green bonds and social bonds. To date, on ExtraMOT PRO there are nine bonds of this type and in 2019 the first infrastructural green bond issue happened.

2.6.1 Listing Requirements and Process

ExtraMOT PRO provides companies with a lean procedure to have access to the market and presents some specific requirements:

 Admission Document: issuer must provide a Prospectus, compliant with the Commission regulation (EC) no. 809/2004, or an Admission Document, compliant with ExtraMOT PRO market rules. Generally, the first is preferred for the large firms. These documents must include people involved in the admission document/prospectus redaction, firm's and bond's risk factors, information about the issuer, the organizational structure and share structure, asset and liabilities and other financial information, bond's features and negotiation rules. It's necessary also to furnish details about the deployment of capital raised;

- Financial Statements: issuer must provide the publication of the last two financial statements, including consolidated ones, and the last one needs to be audited;
- ISIN Code: issuer must obtain the title dematerialization (by an entity like Monte Titoli) and ask ISIN code attribution to Bank of Italy;
- Admission Request: legal representatives need to sign a document (structured following Italian Stock Exchange regulation) which includes instrument's details and the admission document or prospectus. The nomination of market maker to guarantee liquidity is optional. Furthermore, bonds must be settled by Monte Titoli, Clearstream or Euroclear in order to be admitted. Finally, the admission notice is published, and negotiations start.

After issue, the issuer must commit to publish on his website annual financial statements legally revised, rating updates, price sensitive information, bond features' modifications and technical information such as interest evaluations and reimbursement.

So, summarizing, listing process can be represented by the following four steps:

- 1. First contact: the issuer gets in touch with Italian Stock Exchange;
- 2. Informal pre-filing: the issuer sends Italian Stock Exchange the admission document draft and the necessary financial statements;
- 3. Formal filing: the issuer submits admission application and final admission documents with all bond's features;
- 4. Formal admission: once all the documents are approved, security's negotiations can start.

2.6.2 ExtraMOT PRO performances

As of December 31, 2018, as reported by Borsa Italiana, ExtraMOT PRO accounted for 207 securities (Figure 2.16) issued by 153 firms, for a nominal value of € 13.8 billion.



Figure 2.16: Admissions flow and total number of listed instruments

Source: Borsa Italiana

Among the listed instruments, 160 had a nominal countervalue lower than \notin 30 million. It's important to underline that these statistics don't consider ABS and instruments admitted to negotiations for Italian Stock Exchange initiative. In 2018, 54 new instruments were listed (75 in 2017), while delistings were 48, generally due to expiry of the title or callable bonds early repayment. The 44 new instruments issuer collected more than \notin 8.4 billion.³⁰ Up to December 2018, the average instruments' maturity was 6.9 years and the average coupon was 4.66%.

³⁰ Borsa Italiana

2.7 International Bond Market for SMEs

As said before, in chapter 1, the impact of the financial crisis of 2007-08 had an impact on Italian market, but also on the whole world economy and financial sector. Consequently, legislators and governments of other countries, especially in Europe, decided to make interventions, like the introduction of specialized markets and platforms for mini-bonds.

2.7.1 United Kingdom

In United Kingdom, London Stock Exchange manages a negotiating platform, called ORB (Order book for Retail Bonds) containing bonds for retail investors. As the name suggests, it's a platform regulated, by MIFID Directive, and open also to small investors, conversely ExtraMOT PRO segment in Italy. Listing requirements are the same of the main bond market, but the investment size is much smaller, even 100 \pounds , and it cannot be bigger than 10.000 \pounds : for this reason, it's generally seen as mini-bond benchmark. Moreover, it's mandatory the presence of a market maker to guarantee stock liquidity. ORB experts estimate that, following their analysis, this market could be efficient for issuers looking for more than $\pounds 20$ million. In 2018, ORB accounted 115 on its listing, 5 happened during last year.³¹

In UK, mini-bond issuing through Internet platforms is very common. According to Entrenching Innovation: The 4th UK Alternative Finance Industry Report, published last year by the University of Cambridge, in 2017 more than \pounds 72 million were collected through crowdfunding platforms, a number smaller than 2016 one. The average value of each operation passed from \pounds 880 thousand to \pounds 1,3 million. In 2018, BrewDog has been an interesting case. BrewDog, a craft brewery founded in 2007, now is owner of 50 bars all over the world, with over \pounds 70 million revenues. The campaign for the mini-bond published on the platform Crowdcube was financed by 2699 investors and \pounds 10 million were collected. Another interesting case of 2018 is Chilango one. Mexican restaurant chain Chilango proposed a new emission of "burrito bond" with an 8% coupon matched with meals free gifts and discounts. The campaign was launched through the Chilango website and collected adhesions for almost \pounds 3 million.

³¹ London Stock Exchange

2.7.2 Germany

In Germany, there are markets dedicated to SME (called Mittelstand) debt instruments in several financial marketplaces: Entry Standard in Frankfurt, Primarmarkt in Dusseldorf (subdivided into three segments according to reference spread), Mittelstandesborse Deutschland in Hamburg and Hannover and M: access bond in Munch. In Stuttgart there is a not official, regulated market composed by different segments: one of them is dedicated to mini-bonds, Bondm. This market, born in 2010, allows SMEs' debt instruments negotiation, not considering if they are for retail or institutional investors. Direct subscription on the primary market is permitted even without the presence of an institutional underwriter, also through an electronic channel (Bondm subscription box) that must cover at least 50% of the issue, so that retail investors can have the same subscription opportunities of professional ones. Listed bonds on Bondm have a minimum note size of 1000€ and can be subordinated to the other financial liabilities of the issuer, if there is a public rating for the issue. Bondm presents some requirements:

- the firm must publish a prospectus approved by market authorities;
- each issuer needs to be advised by a coach throughout the emission process;
- financial statements need to be certified and presented in their extended form.

Bondm has a market making system to guarantee liquidity to mini-bonds.

In 2018, mini-bonds issuance in Germany accounted for \in 1.1 billion, increasing the level of previous year; emissions were 35^{32} . Much more developed in Germany is the Schuldscheindarlehen market: it is an alternative form of financing which can be classified between bonds and bank loans. The security is based on a bilateral agreement between the issuer and the creditor, who received the amount he lent in two or three tranches with fixed or flexible maturities. In Germany, these instruments are generally used by medium size firms, but also large firms like BMW and Siemens experienced them. In Italy, in 2018, Pirelli adopted this instrument to obtain a senior loan of 525 million \in .

³² Finance-Magazin.de

2.7.3 France

In France, there are three financial marketplaces dedicated to SMEs' bonds: segments B and C of regulated market Euronext and Euronext Growth, a multilateral negotiation system previously called Alternext. These markets are for both private and institutional investors and provide an issuing method launched for the first time in November 2012 called Initial Bond Offering. Listed bonds must have a minimum note size of 100€ and maturity between 5 and 10 years. The value must be at least \in 5 million on Euronext Growth and \notin 10 million on Euronext.

French markets present some requirements:

- Issuers are required to publish a prospectus certified by a qualified regulator and last three years' financial statements;
- A public rating is required, unless the issuer is already listed, or market cap is lower than € 100 million.

For Euronext Growth listing, it's necessary the presence of a sponsor during pre-listing phase, in order to guarantee the respect of informative requirements after the placement by the firm. Other two actors are required: an advisor and an avocat. The first one supports the company in document preparation and operation structuring; finally, the avocat assists the issuer with the legal aspects. Retail investors can subscribe bonds through banks and brokers during a subscription window of three/five weeks. Once this period is over, securities are listed.

Up to December 2018, Euronext accounted for 203 listings like mini-bonds³³.

2.7.4 Spain

In Spain, in 2013 a new not regulated market for SMEs' bonds has been introduced: the Mercado Alternativo de Renta Fija (Marf), managed by Bolsa y Mercados Espanoles. In Marf it's possible to find both financial bills and bonds. Bonds are dedicated only to professional

³³ NYSE Euronext

investors; their minimum note size is 100,000 € and can be issued by joint stock companies or limited liability companies. Marf presents some requirements, in fact issuers must:

- Be registered in the business register;
- provide their article of incorporation;
- provide emission's approval;
- publish last two years' certified financial statements and informative document on their solvency risk drafted by an authorized authority.

After listing, it's also mandatory to publish price sensitive information. During listing process, the figure of an advisor is mandatory, to help the issuer in respecting the norms until bond deadline. Rating is not required, like the intervention of a liquidity provider.

Up to December 2018, Marf accounted for 164 mini-bonds (largely financial bills), issued by 50 firms. ³⁴

2.7.5 Norway

In Norway, in 2005 a not regulated market has been introduced: Nordic ABM, dedicated to listing and bond and commercial paper exchange with a maturity of maximum one year. The market is divided into 2 segments (one open to institutional investors, the other one also for retail investors) considering the nominal value of the emission (respectively larger and lower of 500,000 Norwegian Crowns, about 55,000 €). The minimum note size must be at least 2 million Norwegian Crowns (about 220,000 €). Listing process is very similar to ExtraMOT PRO one. At the end of 2018, Nordic ABM accounted for 1344 mini-bonds (only 105 issued by industrial or commercial entities). ³⁵

³⁴ Bolsas y Mercados Espanoles

³⁵ Oslo Bors

CHAPTER 3

Research Introduction and Data description

In order to support the fairness and the logic of the research made through this dissertation, which is to understand which are the most important variables in determining the yield spread offered by mini-bonds issued by Italian SMEs, it was necessary to review the existing literature related to this topic, in order to understand also if similar researches have been already made. Chapter 3 is divided in three parts: firstly, there is a review and an analyzes of the literature related to this topic; secondly, there is the exposition of the main questions targeted by this dissertation; lastly, there is the description of how it has been possible to obtain the final sample used for this dissertation and the variables involved.

3.1 Literature Review

Considering the current state to date, it's quite impossible to find any research related to the topic of yield spreads relative to illiquid, and often not listed instruments like Italian minibonds. The only interesting research present in literature has been performed by Osservatorio Minibond of Politecnico di Milano in 2018. A part for this, in literature, it's possible to find just some articles trying to figure out the possible drivers influencing corporate bond rate spreads, but generally focused on high value, listed on liquid markets securities, issued by large firms, totally in contraposition to the specific situation of Italian minibond market. Moreover, those studies, as for example did Collin-Dufresne, Goldstein and Martin (2001), use so-called panel data, not allowing to use their variables outside their model. Indeed, they explained that the regression reliability of their model changes in an incredible way if

considering different samples, including different type of securities ³⁶: this is a strong limitation.

3.1.1 Corporate debt pricing and yield spread determinants

Looking at available literature, one of the first economist talking about the topic of corporate debt pricing has been Merton (1974). According to him, cost of debt is mainly related to three factors:

"(1) the required rate of return on riskless (in terms of default) debt (e.g. government bonds or very high grade corporate bonds); (2) the various provisions and restrictions contained in the indenture (e.g., maturity date, coupon rate, call terms, seniority in the event of default, sinking fund, etc.); (3) the probability that the firm will be unable to satisfy some or all of the indenture requirements."37

As Reneby (1998) pointed out³⁸, Merton's work has been the base for a large number of empirical researches on risky debt pricing, like Jones, Mason and Rosenfeld (1984) and Mella-Barral and Perraudin (1996), but, as said before for Collin-Drufesne et al. model, only few results can be taken into consideration, due to involved limitations. In 1998, Elton et al published the results of their studies, explaining the spread between spot rates on corporate and government bonds³⁹. They found that the spread can be explained in terms of three elements:

- compensation for expected default of corporate bonds;
- compensation for state taxes since holders of corporate bonds pay state taxes while holders of government bonds do not;
- compensation for the additional systematic risk in corporate bond returns relative to government bond returns.

In 2001, they refined their theory about last point, explaining that corporate bonds move like the other asset classes in the market, while government bonds do not. This last assumption

³⁶ COLLIN-DUFRESNE, GOLDSTEIN and MARTIN, "The determinants of Credit Spread Changes", 2001

 ³⁷ MERTON, "On the pricing of Corporate Debt: the risk structure of interest rates", 1974
 ³⁸ RENEBY, "Pricing Corporate Debt", 1998

³⁹ ELTON, GRUBER, AGRAWAL and MANN, "Explaining the Rate Spread on Corporate Bonds", 1998
was confirmed also by other studies, like Van Landshoot's one in 2004: he demonstrated the strong relationship between European stocks' returns and corporate bonds' ones ⁴⁰.

All the most important researches made during years on the corporate bond spread and pricing (Reneby 1998, Elton et al., 2001, just to quote two of them) follow the original approach used by Merton, concentrating the focus on both bond features and issuer's financial statements while building their models.

Focusing on accounting-related variables, one of the most important models used is Altman's Z score model, created in 1968 (see section 3.3.1.1).

Other interesting study about accounting variables has been performed by Klein and Stellner. They focused on the spread changes considering firms coming from developed countries and from raising economies (a differentiation already studied also by Altman and Hotchkiss in 2006): they demonstrated that, for the first ones, spread relies more on profitability indicators while, for the latter ones, it relies more on solvency and liquidity variables⁴¹.

With reference to this point, and considering all the variables that, in some ways, are included into Z score model, the choice of the set of variables to be used in this dissertation – and the discussion of the reasons underlying the specific choice – will be outlined in section 3.3.

Many other studies to understand the relationship between corporate bonds yield spread and issuer's financial statements were done. It's necessary to mention Flannery et al. (2012), which used variables associated with the post-issuance expected future leverage, finding that it has high significance in explaining rate spreads⁴².

Furthermore, always regarding company's specific variables, Stellner et al. (2015) understood that also some not accounting values, related, for example, to Corporate Governance aspects or Corporate Social Responsibility (CSR), can be useful to explain yield spreads⁴³. Oikonomou et al. (2011) demonstrated that professional investors, during the investment decision, take into consideration aspects related to CSR, like employment concerns,

⁴⁰ VAN LANDSHOOT, "Determinants of Euro Term Structure of Credit Spreads", 2004

⁴¹ KLEIN and STELLNER, "Does sovereign risk matter? New evidence from Eurozone corporate bond ratings and zero-volatility spreads", 2014

⁴² FLANNERY and WATSON-HANKINS, "Estimating Dynamic Panel Models in Corporate Finance", 2012

⁴³ STELLNER, KLEIN and ZWERGEL, "Corporate social responsibility and Eurozone corporate bonds: The moderating role of country Sustainability", 2015

3.1.1 Corporate debt pricing and yield spread determinants

environment consideration, quality, etc. From a theoretical point of view, the presence of positive CSR elements should decrease corporate yield spread, but not all the subsequent researches obtained the same evidence, leaving the discussion open on the real impact of these variables: this is the reason of their exclusion from the model used in this dissertation.

Many authors investigated also on the possible impact of macroeconomic variables on corporate bond yield spreads. Firstly, as noticed by several authors, companies operating in the same country are influenced by the same macroeconomic conditions: following this reasoning, Dailami (2010) found that securities issued by companies operating in countries with positive economic conditions have lower spreads compared to comparable securities issued by companies in emerging countries or operating in countries with financial problems⁴⁴. A very important aspect to be considered to understand a country's economy current situation is the interest rate term structure. Estrella (2005) tried to demonstrate the fact that the slope of the interest rate curve is a good predictor of inflation and real economy activity, finding that a decrease in the slope means future recession, or at least a weakening of the economy, while an increase in the slope means improving conditions. These results can be translated into a negative correlation between corporate yield spread and government spot rates. Other authors, like Castagnetti and Rossi in 2006, developed Estrella's work, finding out that changes in the slope are good proxies of the economic cycles and can be used to predict also flight to quality phenomenon (see section 1.2)⁴⁵. Moreover, they included in their corporate bond yield spread model also the convexity of the government yield curve either as a squared term or as derivative of the curve at a given maturity, but they didn't obtain great results. Longstaff and Schwartz (1995) developed a simple approach to valuing risky corporate debt considering default and interest rate risk ⁴⁶. They found that:

"the correlation between default risk and the interest rate has a significant effect on the properties of the credit spread. Using Moody's corporate bond yield data, we find that credit spreads are negatively related to interest rates and that durations of risky bonds depend on the correlation with interest rates"

⁴⁴ DAILAMI, "Sovereign debt distress and corporate spillover impacts", 2010

⁴⁵ CASTAGNETTI and ROSSI, "Euro Corporate Bonds Risk Factors", 2006

⁴⁶ LONGSTAFF and SCHWARTZ, "A Simple Approach to Valuing Risky Fixed and Floating Rate Debt", 1995

Finally, Elton et al. (2001), Klein and Stellner (2014) and many other authors tried to create a model including other macroeconomic variable, such as return of equity markets, in their regression model, using S&P500 or Euro Stoxx 50, obtaining, more or less, the same level of adjusted R^2 (one of the determination coefficients in a regression model, useful to understand the fairness of the model).

In a nutshell, almost all the developed models reach adjusted R^2 between 15% to 30%, some using only macroeconomics variables (Castagnetti and Rossi 2006), other both accounting and macroeconomic variables (Flannery et al. 2012). Looking at these results, it's clear that only some variables have a good explanatory power on credit spread, leaving a large portion (75% according to Christensen in 2008) unexplained. He used the expression "credit spread puzzle"⁴⁷ to explain the issue that only about 25% of credit spread is explained by variables taken into consideration by existing models, while the remaining 75% is related to other factors (for example taxation, liquidity, etc.). Longstaff et al. (2006) suggested that bonds' market illiquidity and the liquidity levels differences could be drivers for explaining yield spreads ⁴⁸, but they remained quite isolated from the existing literature. Just few authors tried to develop this idea. Among them, Chen et al. (2007) and their model reached adjusted R^2 between 10% to 40% according to the used set of variables: the highest value was reached when liquidity proxies in the form of quarterly bid-ask spread were introduced. This result suggests that the theory developed by Longstaff et al. can be not so wrong. The importance of liquidity is highlighted also by Van Landschoot (2004), who pointed out the importance of liquidity risk as determinant of credit spread, especially for low rated bonds.

3.1.1.1 Altman's Z Score Model

To build the model, Altman took in account 66 listed, medium-large size, manufacturing companies, operating in USA; half of them were failed companies and each of those had a comparable not failed firm. Altman analyzed the financial statements of the before failure five years for the failed companies and the same for the not failed ones. Then, through the combination of traditional balance sheet analyzes and the new, for the period, multivariate discriminant analyzes, 5 financial indicators, linked to different aspects of a firm's financial

⁴⁷ CHRISTENSEN, "The Corporate Bond Credit Spread Puzzle", 2008

⁴⁸ LONGSTAFF, MITHAL and NEIS, "Corporate Yield Spreads: Default Risk or Liquidity? New Evidence from the Credit Default Swap Market", 2006

state, were found, considering their potentiality in explaining possible defaults. Finally, performing some statistics analyzes, Altman defined the weights for these variables and obtained the original Z score model⁴⁹:

$$Z = 0,012 * X1 + 0,014 * X2 + 0,033 * X3 + 0,006 * X4 + 0,999 * X5$$
(3.1)

Where,

- X1 = Working Capital / Total Assets
- X2 = Retained Earnings / Total Assets
- X3 = EBIT / Total Assets
- X4 = Market Value of Equity / Total Liabilities
- X5 = Sales / Total Assets

X1 measures liquid assets in relation to the size of the company: it's a flexibility indicator. X2 measures profitability that reflects the company's age and earning power, while X3 measures operating efficiency apart from tax and leveraging factors. It recognizes operating earnings as being important to long-term viability. Finally, X4 measures the fluctuations of share price, while X5 is a standard measure of total asset turnover.⁵⁰

Analyzing the results and the potential error, Altman found some important values. 2.65 was found to be the cut-off value: companies with Z-score higher than 2.65 can be considered safe, while the others are potentially insolvent firms. Moreover, after more studies, other 2 values were defined (Figure 3.1): companies with Z score between 1.81 and 2.99 are considered uncertain, requiring other analyzes; companies with Z score lower than 1.81 are intended to fail while companies with Z score higher than 2.99 can be considered default risk free.

⁴⁹ ALTMAN, "Financial ratios, discriminant analyses and the prediction of corporate bankruptcy", 1968

⁵⁰ www.wikipedia.it

Distress area	Grey area	Safe area
Z < 1,81	1,81 < Z < 2,99	Z > 2,99

2,675 cut-off

Figure 3.1: Original Z score model fundamental values

Source: Danovi and Quagli (2008)

As said before, the first version came out in 1968, but, during years, several different versions were presented, in order to better adapt the model to the sample to analyze (obviously, for all the reviews, threshold values change). A first example of revision was made by the same Altman in 1983, with the development of Z' score model, available also for private companies ⁵¹. For this model, the variables remained the same, a part for X4, where Market value of Equity was substituted by Book value of Equity, while the weights of each variable change:

$$Z' = 0,717 * X1 + 0,847 * X2 + 3,107 * X3 + 0,42 * X4 + 0,998 * X5$$
(3.2)

In 1995 another development was made, to create a model that can be used also for financial companies, or, in general, not manufacturing ones (and even for companies operating in emerging countries, with an adjustment): Z" score model⁵². The variables are the same of the traditional model, with the exclusion of sales/total assets, activity ratio (X5), in order to filter the function from the possible distortion related to the sector and country. ⁵³ Then, the weighted coefficients assume different values:

$$Z'' = 6,56 * X1 + 3,26 * X2 + 6,72 * X3 + 1,05 * X4$$

(3.3)

Source: Altman, Harzell and Peck (1995)

⁵¹ ALTMAN, "Corporate Financial Distress. A Complete Guide to Predicting, Avoiding, and Dealing with Bankruptcy", 1983

⁵² ALTMAN, HARTZELL and PECK, "Emerging market corporate bonds – a scoring system", 1995

⁵³ ALTMAN, DANOVI and FALINI, "Z-score models' application to Italian firms subject to extraordinary administration", 2015

3.1.2 Yield Spread and Benchmark rate

The power of this model is due to the fact that it's possible to map a correspondence between the score and the rating assigned by Standard and Poor's, one of the most important international rating agencies, as shown in Figure 3.2 (note that in this case Z values were increased by 3.25, an adaptation of the Z" score model for emerging countries). It's important to add that several studies, like Chen et al. (2007), demonstrates the importance of credit rating and its possible changes over time on the corporate bonds yield spread⁵⁴.

		-			
	Rating	Z"-Score Threshold	Rating	Z"-Score Threshold	
	AAA	>8.15	BB+	5.65	9
	AA+	8.15	BB	5.25	8
	AA	7.60	BB-	4.95	Z
e	AA-	7.30	B+	4.75	je.
201	A+	7.00	В	4.50)
E.	А	6.85	B-	4.15	
Sa	A-	6.65	CCC+	3.75	me
	BBB+	6.40	CCC	3.20	Z
	BBB	6.25	CCC-	2.50	css
	BBB-	5.83	D	<1.75	Str
					D

Figure 3.2: Correspondence between Z" score model and S&P's rating

Source: Altman and Hotchkiss (2006)

3.1.2 Yield Spread and Benchmark rate

Lastly, it's necessary to analyze the differences in literature about the yay through which yield spread is evaluated and the role of risk-free rate as benchmark. Considering firstly the latter aspect, most researchers consider risk-free rate the government spot rate, at the various maturities, of high-rated bond in the same currency area (in a nutshell, in Europe, risk-free rate is assumed to be the German Government bond rate). However, it must be noticed that models, such as Klein and Stellner one and Flannery et al. one, used other factors, like swap rates, as benchmark.

⁵⁴ CHEN, LESMOND and WEI, "Corporate Yield Spreads and Bond Liquidity", 2007

3.1.2 Yield Spread and Benchmark rate

Considering the evaluation of corporate yield spread, almost all the authors follow the same reasoning, seeing it as the difference between bond's Yield to Maturity and risk-free government bond spot rate at the same maturity (Elton et al., 2001; Van Landschoot, 2004; Chen et al., 2007; Flannery et al., 2012). On the contrary, Klein and Stellner (2014) explained that this is a wrong way to evaluate the spread, because it's based on the assumption of a flat interest rate term structure. Indeed, this approach discounts all future cash flows generated by the security applying the rate present at the issue date: the result is an "average" spread over the risk-free curve. They (and other authors like Cavallo and Valenzuela, 2010) decided to use another computation for yield spread, the so-called zero- volatility spread (z spread). Z-spread is defined as the constant spread (φ) that makes the price of a security equal to the present value of its cash flows when added to the yield at each point on the spot rate Treasury curve where cash flow is received⁵⁵. In other words, it's the spread that satisfies this equation:

$$P_{t} = \sum_{t=t_{0}}^{T} \frac{CF_{t}}{(1+r_{t}+\varphi)^{t}}$$
(3.4)

where Pt is the price at the issue period, t are the different time periods which a cash flow is paid in, T is the maturity of the bond, CFt are the various cash flows and rt is the benchmark risk-free rate at each maturity.

Klein and Stellner noticed that there are several advantages in using this model: firstly, it can be used to estimate spread considering the presence of a not flat interest rate term structure, as generally in reality; secondly, through this model, it's possible to compare different securities discounting each cash flow with the correct risk-free rate increased by the spread. In literature it's possible to find different versions of this model: sometimes the natural logarithm of z-spread is used in the formula, to consider how possible events or financial results can influence the yield spread (Klein and Stellner, 2014), sometimes the absolute variation between two consecutive time periods is considered (Elton et al., 2001).

⁵⁵ www.investopedia.com

3.2 Research Questions

Literature review regarding SME's access to finance, cost of debt and the analysis of the general financial context in Europe and Italy carried out in chapter 1 and 2, explained that, after the recession caused by the financial crisis of 2008 and the consequent credit crunch, SMEs have started to recover acceptable levels of performance, thanks to a general recovery of the economic and financial environment, but also to changes in regulation introduced by the Legislator (see section 2.2 for Italian context) in order to increase the possibility of raising funds for companies, and to the politics followed by European Central Bank (see section ...) in order to increase liquidity in the European financial market. As described in Chapter 2, mini-bonds are one of the most important instruments introduced by the Italian Legislator, increasing the possibilities of Italian SMEs to find funds alternative to traditional bank loans. Since their introduction, the data collected about mini-bonds market shows an increasing interest from SMEs on these securities, even if 2018 data display that the number of issues in the last two years stayed quite constant, with a reduction of the overall amount issued, to the spread of low value bonds.

Despite the importance of SMEs in Italian market and the great role played by mini-bonds in this market, considering the difficulties in raising money using the traditional instrument of bank loan, in literature is very difficult to find researches. In particular, looking at corporate bond yield spread and its most important determinants, the only existing research it's possible to find is one made by Osservatorio of Mini-Bond of Politecnico di Milano.

In section 3.1, it has been analyzed literature about corporate debt pricing and corporate yield spread, highlighting the fact that most research has been made considering issues made by large firms and listed on liquid markets, a very restricted sample if applied on Italian context. A part for the exception mentioned before, there are no studies related to the relationship between Italian SMEs and mini-bonds, whose investors mainly follow a buy-and-hold logic, hence keeping the security in the portfolio until maturity date.

Following the path introduced by the previous research made by Osservatorio of Mini-Bond of Politecnico di Milano, the main purpose of this dissertation is to understand, considering a larger sample (see section 3.2) and including data coming from 2018, which are the most

important variables in term of corporate bond yield spread definition in the Italian SMEs mini-bond market. The analysis, as displayed in sections 4.1 and 4.2, is performed through the implementation of different set of econometric models.

Firstly, a series of univariate analysis has been carried out, in order to understand the differences in spread between mini-bonds with different features (presence of call/put option, covenants, etc.). This first part of research is performed in order to answer the first research question of this dissertation:

Is it possible to observe differences in the yield spread provided by mini-bonds with different features?

In the second part of the research, a multi-variate regression analyses have been carried out. It has been subdivided into three steps, considering the set of variables involved:

- 1) Bonds' features;
- 2) Bonds' features + issuers' characteristics;
- 3) Bonds' features + issuers' characteristics + macroeconomic variables.

This model has been introduced to answer the second research question:

What are the variables better explaining mini-bonds yield spread?

Looking at the results of the models implemented, it will be possible to understand if the main determinants of mini-bond spread are variables associated to bonds' features, to issuers' characteristics or to macroeconomic outlook present at the issue date. Moreover, results will allow to estimate the impact of different choices in terms of bonds' features on the cost of debt. As said at the beginning of this section, there is a difference between the work carried out through this dissertation and academic papers in literature. Due to the fact that mini-bonds present in the sample are not always listed, the spread, object of this work, is the one in place at the mini-bond issue date, so the one agreed between issuer and investors (either in the case of private placements or auctions with institutional investors). The approach commonly followed in literature supposes the usage of panel-data determining the drivers of weekly variations in the spread offered by a given security, but, due to the fact that not all mini-bonds are listed, this way is not suitable.

3.3 Sample overview and Data description

In order to perform the analyzes described previously, it has been necessary to cut the total amount of issuances, extracting a sample of mini-bonds, all characterized by some particular features.

Firstly, it has been necessary to remove all those issues higher than € 50 million because larger emissions are considered not so important in the SMEs world. After the exclusion of issues larger than € 50 million, the database is downsized from 746 to 648.

Secondly, since the target of this dissertation is to understand which are the most important variables in determining the yield spread offered by mini-bonds issued by Italian SMEs, it has been obvious to cut all the emissions made by large firms, reducing the sample from 648 to 367 issues.

Thirdly, as it is of common practice in literature, mini-bonds issued by firms operating in the financial sector (ATECO code K) and in the Real Estate sector (ATECO code L) have been dropped from the sample. There are two different reasons behind this decision: the first ones includes also companies supervised by authorities like ECB or Bank of Italy and present financial statements that it's difficult to compare with the others' ones; the second ones present a series of peculiarities on the way through which their value is estimated. After this exclusion, the sample is reduced from 367 to 335.

Fourthly, only fixed coupon mini-bonds have been considered because it was impossible to make estimations about spread and YTM considering a floating rate. Indeed, as far as mini-bonds are concerned, floating coupons are often indexed not only on Euribor (the Interbank rate for \notin area), but generally present cap and/or floor in the remuneration offered and, sometimes, some provisions related to financial results of the firm during the maturity of the instrument. Excluding floating rate mini-bonds, the sample passed from 335 to 298.

Fifthly, due to the extremely rarity and so the insignificance, the only zero-coupon bond present in the remaining sample has been removed, bringing the number of mini-bonds in the sample to 297.

In the sixth step, commercial papers have been excluded. They are not completely comparable to mini-bonds and their features (for example, they require a sponsor if the issuer is a SME) and so, to guarantee fairness in the analyses, they are cancelled. Through this action, the size of the sample dropped from 297 to 274.

The seventh step necessary to build the final sample has been the elimination of those minibonds for which it was impossible to find data about coupons, reimbursement scheme or presence of options, covenant or warranty. This has led the sample to reduce to 259.

Finally, it has been necessary to remove 4 other issues: this action was related to the availability of issuers' financial statements, fundamental to the evaluation of Z-score. When impossible to find on issuer web sites, those data have been gathered from Italian company register Telemaco. However, in case of startup or companies undergoing extraordinary operations, like spin-off during the issue year, it was impossible to find available financial statements. Moreover, some financial statements were incomplete if considering data necessary to evaluate Z-score. For all these cases (fortunately, just 4 in the sample), the only solution has been the elimination of the issue. Through this last cut, it's possible to observe the final sample used by this dissertation: 255 mini-bonds issued from June 2013 to December 2018. Table 3.1 shows a very brief analyzes of the final sample, considering geographical location, activity sector and issuance year.

By region	By industry (ATECO)			By issuing year				
	#	%		#	%		#	%
Lombardia	61	24%	С	106	42%	2013	4	2%
Emilia Romagna	30	12%	D	12	5%	2014	25	10%
Trentino Alto Adige	20	8%	F	27	11%	2015	21	8%
Veneto	36	14%	G	16	6%	2016	54	21%
Other North	37	15%	J	35	14%	2017	75	29%
Centre	40	16%	Other	59	23%	2018	76	30%
South	31	12%						
Total	255	100%	Total	255	100%	Total	255	100%

Table 3.1: Subdivision of final sample for location, ATECO and issuing year

As it's possible to see, the final sample represents in a perfect way, but with lower numbers, the situation described in section 2.3 for the overall market. The most represented region continues to be Lombardia (24% of total sample), followed by Veneto; looking at operating

sector subdivision, manufacturing companies are the more frequent ones, covering the 42% of total sample; finally the most important years in terms of total emissions are 2017 and 2018 (about the 59% of total sample). Following most authors in past literature, like Chen et al., 2007, (see section 3.1), but also more modern studies like Gilchrist and Mojon in 2018, the evaluation of spread has been performed using this formula (where *i* represents the bond index):

$$Spread_i = YTM_i - risk free rate_{i,t_0}$$

For what concern the evaluation of YTM for each bond, it has been necessary to collect more information respect to those generally collected by Osservatorio of mini-bond of Politecnico di Milano. In fact, besides issue amount and date, maturity, issue price, coupon value, for all the 255 mini-bonds present inside final sample it has been necessary to find data about coupons' payment dates, the repayment scheme (for amortizing schemes) and the presence (and, in that case, the amount) of early repayments or default cases. Once defined the list of cash flows and relative dates, the Excel formula TIR.X has been used to evaluate the Yield to Maturity (expressed in basis point throughout the whole dissertation) for each mini-bond. For what concern risk-free rate evaluation, it has been decided to take, as suggested by literature, the spot rate of AAA-rated Euro area central government bond as provided by the ECB 56 (considered to be a good proxy of the risk-free interest rate term structure), looking at the maturity of the bond i and taking as t_0 the issue date of bond i. To guarantee the correct comparison between the two elements of equation 3.5, also risk-free rates have been expressed in basis point. In order to perform the empirical analysis at the core of this dissertation, as previous authors made, it was necessary to collect data about the variables to put inside the regression model. They can be divided into three main categories: bond features, issuer characteristics (either financial or non-financial) and macroeconomic variables.

(3.5)

⁵⁶ www.ecb.europa.eu/stats/financial_markets_and_interest_rates/euro_area_yield_curves

3.3 Sample overview and Data description

Starting with variables related to bond characteristics (see Table 3.2), almost all are related to provisions or other peculiarities included in each mini-bond contract.

Variable	Description	Unit	Source	Exp. effect
Dependent variable				
Spread	Mini-bond spread over AAA-rated	Bps		
	Euro area spot rate yield curve			
Bond characteristics				
Maturity	Time-to-maturity	Years	OMB	(+/-)
		D T	0100	
Secured	Dummy variable taking the value of "1" if the bond is secured	None	OMB	(-)
Covenants	Dummy variable taking the value of	None	OMB	(-)
	"1" if some covenants are present in			
	the contract			
Call Option	Dummy variable taking the value of	None	OMB	(+)
	"1" if the bond is callable			
Put Option	Dummy variable taking the value of	None	OMB	(-)
	"1" if the bond is putable			
Reimbursement	Dummy variable taking the value of	None	OMB	(+)
	"1" if the reimbursement happens			~ /
	just at the maturity (bullet)			
Listed Bond	Dummy variable taking the value of	None	OMB	(+/-)
	"1" if the bond is listed			· · ·

Note: OMB means Osservatorio Mini-Bond

Table 3.2: Sum up of variables related to Bond features

Firstly, for what concern maturity, literature presents several demonstrations about its theoretical importance in determining corporate bond yield spread. Klein and Stellner (2014), Cavallo and Valenzuela (2009), explained that maturity has a positive correlation with spread, since, in theory, long-term bonds should provide higher returns if compared to short-term ones ⁵⁷, following the classical approach of risk-return trade-off. On the contrary, Chen et al. (2007), just to mention one author, supported the theory of "credit quality"⁵⁸ introduced by Dennis et al. (2000), according to which only well-rated firms can issue long-term bonds: following this idea, there is a negative correlation between maturity and spread, since low-quality companies are excluded by long-term securities market.

⁵⁷ CAVALLO AND VALENZUELA, "The determinants of corporate risk in emerging markets: an option-adjusted spread analysis", 2009

⁵⁸ DENNIS, NANDY and SHARPE, "The Determinants of Contract Terms in Bank Revolving Credit Agreements", 2000

Secondly, looking at the possible specific agreements between investor and issuer:

- Secured bonds should pay a lower spread compared to the unsecured ones, because the investor must be paid for the risk of default he assumes;
- Covenants presence should reduce spread because they guarantee investor a higher level of control on the issuer, above all on his financial situation;
- The presence of call option should increase spread, because investor must be protected by this "power" given to the issuer;
- On the contrary, the presence of put option should decrease spread, because this time more power is given to the investor.

Thirdly, it's important to consider the effect of reimbursement scheme on spread: theoretically, amortized bonds should be perceived as less risky since part of the lent capital is reimbursed in advance, not waiting for maturity date, and so this should provide a decrease of spread; on the contrary, bonds presenting a bullet reimbursement should present an higher spread, because of a longer time to wait to obtain money back.

Fourthly, bond listing (in this dissertation the choose of the specific market for listing is not taken into account) can have different effects: on one side, liquidity premium should reduce because the security is traded on a market, and this suggests a negative correlation between listing and spread, but, on the other hand, in literature, it's explained as mini-bonds, to be attractive in the market, should follow some "market logic", thus increasing YTM and so spread. So, also in theory, which are the real effects of listing is an open question.

Finally, the level of seniority is not considered since almost the entire sample present senior mini-bonds.

The second group of variables is related to issuer's characteristics, both financial and not financial, as reported in Table 3.3:

Variable	Description	Unit	Source	Exp. effect
<i>Issuer Financi</i> Total Assets	<i>al Characteristics</i> Natural logarithm of Total Assets	k€*	OMB	(-)
CATA Ratio	Current Assets/Total Assets	None	OMB, Telemaco	(+/-)
Z Score	(see section 3.3)	None	OMB, Telemaco	(-)
Issuer Not Fin	ancial Characteristics			
Rating	Dummy variable taking the value of "1" if the company present a rating issued by a rating agency	None	OMB	(-)
Manufacturing Sector	Dummy variable taking the value of "1" if the company operates in the manufacturing sector	None	OMB	(+/-)
Listed Firm	Dummy variable taking the value of "1" if the issuer is listed	None	OMB	(-)

* in natural logs

Table 3.3: Sum up of variables related to Issuer's characteristics

Firstly, the existence of a rating issued by a rating agency on either the issuer or the emission should help to reduce information asymmetry at investors' eyes, with a consequential spread reduction (in theory).

Secondly, total Asset is considered by a large part of literature (Klein and Stellner, 2014; Flannery et al., 2012) a good proxy of firm's size. From a theoretical point of view, larger firms, generally perceived by banks and investors as less risky, should pay lower spread if compared to smaller entities: this can be translated into a negative correlation between spread and total Assets. Another variable related to asset side of issuer's balance sheet is the CATA ratio, the Current Assets to Total Assets ratio: it indicates the extent of total funds invested for the purpose of forming working capital and increasing the level of liquidity inside the firm ⁵⁹. According to this explanation, higher is the ratio, lower is the spread, because it will be easier to find money for investors in case of default. But this is not the only way to consider

⁵⁹ BANERJEE, "Efficiency of Liquidity Management in Indian Tyre Industry: A Study of Selected Companies during the Post-Liberalisation Era", 2014

this indicator. Another part of literature explains that high level of current assets (so cash and other easy to liquidate instruments) sends the market a message of inability of the firm to manage assets and to make investments in the correct way: following this approach, there should be a positive correlation between CATA ratio and spread. In a nutshell, the expected effect of this variable is not clear.

Thirdly, it has been decided to introduce another variable for the model, that can be useful to understand the financial situation of the issuers, summing up several other financial indicators: Z score. In order to evaluate Z score for all the mini-bonds present in the sample, it has been decided to use another "version" of traditional Z score model: the Z Score model for Italian SMEs, introduced to adapt the original model to the specific situation of Italian SMEs market ⁶⁰. Even in this case (like for previous reviews), the weighted coefficients assume different values:

$$Z = 1,981 * X1 + 9,841 * X2 + 1,951 * X3 + 3,206 * X4 + 4,037 * X5$$
(3.6)

Source: Bottani, Cipriani, Serao (2004)

The only specific definition related to this model is that regarding X2: in this case, at the numerator, there is the sum of Legal Reserve, Extraordinary Reserve and Retained Earnings. Following the classical Altman literature, there is a negative correlation between spread and Z score, because high levels of Z score mean stability and financial welfare for the firm, thus reducing the risk of investing in it.

Lastly, it has been decided to add another dummy variable explaining if the issuer is listed on a stock exchange (independently on which is): theoretically, there should be a negative correlation between it and spread, since listed firms, more disclosed and transparent than other companies, are perceived as less risky ⁶¹.

Another variable that has been introduced into the model is a simple dummy variable showing if the company operates in the manufacturing sector or not. Considering the importance of

⁶⁰ BOTTANI, CIPRIANI and SERAO, "Analisi del rischio d'insolvenza di una PMI tramite l'utilizzo del modello dello Z- Score", 2004

⁶¹ BANCEL AND MITTOO, "Why do European firms go public?", 2009

3.3 Sample overview and Data description

this sector for the Italian SMEs market (and for the sample of this dissertation, since more than 41% of companies operate in this sector) and the fact that most practitioners are interested in the manufacturing sectors for further analyses, it should be interesting to understand if there is correlation between belonging to this sector and corporate spread; to date, there is no literature about this topic.

The last group of variables considered for the regression model of this dissertation is related with the macroeconomic conditions in place at the issue date (see table 3.4). The impact of these variables on spread evaluation has been widely analyzed in literature (see section 3.1).

Variable	Description	Unit	Source	Exp. effect
Macroeconomic Variables				
Nominal GDP Growth	Nominal GDP growth compared to the same quarter of the previous year	%	Istat	(-)
Unemployment rate	Ratio between unemployed population and total labour force (considering the same age class)	%	Istat	(+)
Italy ESI	Italian Economic Sentiment Index, showing how current and potential economic situation is perceived by several economic actors	None	Eurostat	(-)

Table 3.4: Sum up of variables related to macroeconomic conditions

Following what literature explains (Cavallo and Valenzuela, 2010), the relationship between nominal GDP growth and corporate bond yield spread is negative: the higher the GDP growth, the better the macroeconomic and financial environment which companies operate in. The consequence of this is a reduction of corporate defaults, an increase of credit trustworthiness and, finally, a decrease in corporate bond spreads. It has been chosen to use nominal GDP instead of real GDP in order to include also price variations (inflation).

The second macroeconomic variable included in the set is unemployment rate. It's defined as the percentage of unemployed workers in the total labor force. Workers are considered unemployed if they currently do not work, despite the fact that they are able and willing to do so. The total labor force consists of all employed and unemployed people within an economy. There are different types of unemployment:

- Frictional unemployment refers to temporary unemployment during the period when people are searching for a job.
- Structural unemployment is a mismatch between workers' skills or locations and job requirements.
- Seasonal unemployment is caused by seasonal patterns in economic activity, such as harvesting or tourism.

The unemployment rate provides insights into the economy's spare capacity and unused resources. Unemployment tends to be cyclical and decreases when the economy expands as companies contract more workers to meet growing demand. Unemployment usually increases as economic activity slows. When this happens, the external financial premium (Bernanke et al., 1994) increases: this means that all the possible firm financial alternative sources of funds (reserves, bonds and equity, following the Arbitrage Pricing Theory) costs increase. Following this theory, a positive correlation between unemployment rate and corporate yield spread is expected.

Finally, it has been introduced another indicator, the Italian Economic Sentiment Index (ESI). This indicator is very used by governments to understand how current and potential economic and financial conditions are perceived by consumers, companies, retailers and multi-national entities.

ESI is a comprehensive indicator, composed by 5 several components:

- Industrial Confidence Indicator, based on monthly surveys done to main European companies' managers about their expectations for the future; it accounts for 40% of total value;
- Services Confidence Indicator, based on surveys done to important managers about forecast on demand for services trend; it accounts for 30% of total value;
- Consumers Confidence Indicator, based on surveys done to consumers about their perceptions about unemployment rate, inflation and general economic conditions; it accounts for 20% of total value;

- Retail Trade Confidence Indicator, based on surveys done to dealers about the perception on stock of good sold at retail; it accounts for 5% of total value;
- Construction Confidence Indicator, based on surveys among the economy trustworthiness in the construction sector; it accounts for the remaining 5%.

Following this theory, there should be a negative correlation between the ESI and spread, since, as said before, economic distressed situations increase costs of debt and so corporate yield spread. The introduction of this indicator has been made in order to understand, for example, if (and, in case of positive answer, how much) Italian political election of 2018 and the consequent economy slowdown have had an impact on the model of this dissertation.

Next chapter will be dedicated to the analyses of the variables introduced, through the implementation of univariate and multi-variate regression models.

CHAPTER 4

Empirical Analysis

4.1 Univariate analysis

In order to answer the questions introduced in section 3.2, it has been necessary to perform some univariate test on the sample used by this dissertation, to have a first analysis about the impact of variables described in section 3.3 on the corporate bond yield spread in the multivariate model.

4.1.1 Methodology

The analysis performed in this section relies on three non-parametric tests: Kolmogorov-Smirnov test, Mann-Whitney U test and Kruskal-Wallis test. The combination of two of these tests is used to reinforce conclusions of this dissertation. The first two tests can be used to compare at maximum two samples, in order to verify if they come from the same distribution, while the latter has the same utility, but it can analyze more than two samples.

Non-parametric tests are not so strict, in terms of assumptions, as parametric ones (which require, for example, distribution function of total sample, homoskedasticity, etc.), but, on the other hand, they lose a part of sensitivity.

4.1.1.1 Kolmogorov-Smirnov test

The Kolmogorov–Smirnov test quantifies a distance between the empirical distribution function of the sample and the cumulative distribution function of the reference distribution, or between the empirical distribution functions of two samples (that is the case of this analysis). The null distribution of this statistic is calculated under the null hypothesis (H_0) that the sample is drawn from the reference distribution (in the one-sample case) or that the samples are drawn from the same distribution (in the two-sample case) ⁶². Looking the case of two samples, the Kolmogorov–Smirnov statistic is:

$$D_{n,m} = Sup |F_{1,n}(x) - F_{2,m}(x)|$$
(4.1)

 $F_{1,n}$ and $F_{2,m}$ are the empirical distribution functions of the two samples, Sup is the supremum function and n and m are the size of the two samples. For relatively large samples, test's null hypothesis is defined as:

$$D_{n,m} = c(\alpha) * \sqrt{\frac{n+m}{n*m}}$$
(4.2)

 $C(\alpha)$ is defined as follows:

$$c(\alpha) = \sqrt{-\frac{1}{2} * \ln(\alpha)}$$
(4.3)

 α is the first type error and, for the most common adopted value, it's possible to use this simple table to evaluate $c(\alpha)$:

α	0,1	0,05	0,025	0,01	0,005	0,001
C(α)	1,073	1,224	1,358	1,517	1,628	1,858

Table 4.1: Correspondence between most common values of α and C(α)

Despite this test is widely used in literature, a frequent critic to the Kolmogorov–Smirnov test is that it is not very powerful because it is devised to be sensitive against all possible types of differences between two distribution functions ⁶³.

⁶² KOLMOGOROV, "Sulla determinazione empirica di una legge di distribuzione", 1933; SMIRNOV, "Estimate of deviation between empirical distribution functions in two independent samples", 1933

⁶³ MAROZZI, "Some Notes on the Location-Scale Cucconi Test", 2009

4.1.1.2 Mann-Whitney U test – Wilcoxon rank-sum

The Mann-Whitney U test (known also as Wilcoxon rank-sum) is a non-parametric method for testing the origin of two samples. Its null hypothesis stipulates that two samples come from the same population, or, better, than two indipendent samples are homogeneous and have the same distribution ⁶⁴ (Nachar, 2008). To perform this test, three conditions must be respected:

- The two investigated samples must be randomly drawn from the total population; the concept of random implies the absence of measurement and sampling errors⁶⁵ (Robert et al., 1988);
- Each measurement or observation must correspond to a different element: in statistical terms, there must be independence within samples and mutual independence between samples;
- The data measurement scale is of ordinal or continuous type.

The test requires the calculation of the U-statistic for each sample, defined, by the followings:

$$U_{x} = n_{x}n_{y} + \left(\frac{\left(n_{x}*(n_{x}+1)\right)}{2}\right) - R_{x}$$

$$U_{y} = n_{x}n_{y} + \left(\frac{\left(n_{y}*(n_{y}+1)\right)}{2}\right) - R_{y}$$
(4.4)

Where n_x is the number of observations in the first sample, n_y is the number of observations in the second sample, R_x is the sum of ranks assigned to the first sample and R_y is the sum of ranks assigned to the second one.

(4.5)

⁶⁴ NACHAR, "The Mann-Whitney U: A Test for Assessing Whether Two Indipendent Samples Come from the Same Distribution", 2008

⁶⁵ ROBERT et AL., "Fondements et étapes de la recherche scientifique en psychologie", 1988

These two last elements are obtained through two steps:

- Once combined the two samples, the test assigns a rank to each observation, starting from the lowest value one. If two observations have same value, a midpoint rank is assigned to each one;
- The test sums up the ranks assigned to each sample.

To verify the null hypothesis, after having chosen an appropriate statistical threshold (α), the following test is carried out:

$$P(\min(U_x, U_y) < \alpha$$
(4.6)

P is derived from the Mann and Whitney tables (Mann and Whitney, 1947). According to literature, Mann and Whitney U test is a very powerful test, not depending, for example, on the distribution of the samples, but sometimes it's better to use t-test, due to the presence of the three assumptions.

4.1.1.3 Kruskal-Wallis test

The Kruskal and Wallis test is a non-parametric method for testing if different samples come from the same distribution. It is used for comparing two or more independent samples of equal or different sizes. It can be considered an extension of the Mann–Whitney U test (see section 4.1.1.2). It tries to verify the null hypothesis that different populations have the same median ⁶⁶. To perform this analysis, it's necessary to build H-statistics in the following way, after having ranked each data from all samples from 1 to N:

$$H = \frac{12}{N(N+1)} * \sum_{i=1}^{G} n_i * \bar{r}_i^2 - 3 * (N+1)$$
(4.7)

Where:

- N is the total number of observations across all samples;
- n_i is the number of observations in sample *i*;

⁶⁶ KRUSKALL and WALLIS, "Use of ranks in one-criterion variance analysis", 1952

•
$$\bar{\mathbf{r}}_i = \frac{\sum_{j=1}^{n_i} r_{i,j}}{n_i}$$
, where $r_{i,j}$ is the rank of observation *j* from sample *i*.

It's possible to introduce another statistic test, introducing a correction factor CF for tied values within the same sample:

$$CF = 1 - \frac{\sum_{i=1}^{G} (t_i^3 - t_i)}{N^3 - N}$$
(4.8)

Where G is the number of groupings of different tied ranks and t_i is the number of tied values within group *i*.

Through the implementation of the CF, the statistics test is the following:

$$H^{c} = \frac{H - CF}{CF}$$

$$\tag{4.9}$$

To test the null hypothesis, H-statistics must be compared with a Chi-square distribution, as following:

$$H \ge X^2(DF, N) \tag{4.10}$$

Where DF are the decrees of freedom. For this test, the significance level used by this research is 5%.

4.1.2 Final Sample: data description

Before performing the statistical test described in section 4.1.1, it's necessary to describe how the final sample used in this dissertation is distributed. In Table 4.2, it's possible to see each sub-sample yield spread (expressed in basis points), the number of observations, mean, standard deviation, first and third quartiles and median: these data can give an idea of results that will be provided by the tests described before.

Firstly, looking at the possible options written in the contract between issuer and investors, the sample is divided into 4 possible sub-samples, considering the alternatives: no option, call option, put option and presence of both call and put option. Most of the sample presents both options, and all the values confirmed that this aspect decreases yield spread. Callable securities seem to have the highest spread considering mean (64 bps more than lowest value),

first (32 bps more than lowest value) and third quartile (67 bps more than lowest value), while no option increases the value according only to median. Focusing on standard deviation, callable and no options securities present the higher values, with a difference of 72 bps between highest and lowest values.

Secondly, comparing secured (the majority of observations) and unsecured bonds, the first ones present lower spread if considering mean, median and third quartile. The most important difference (about 60 bps) is observed in mean values, but about 40 bps of difference can be observed in other measurements This sentence is confirmed also looking at standard deviation, where 46 bps difference is present.

Looking at the presence of covenants, not so recurrent in the sample (present in 119 observations), all the measurements confirm that covenants reduce yield spread: mean displays a difference of 35 bps, the same showed also by standard deviation, while about 20 bps are registered by first and third quartile. For what concern median values, on the contrary, spread is quite similar.

Considering the sub-division of the sample in listed (the majority of observations) and not listed bonds, the picture is not so clear: mean, median and quartiles explain that listed securities have higher spread (with differences passing from 20 bps for median to 47 bps for first quartile), while standard deviation tells the opposite, with a 32 bps higher spread for unlisted bonds.

The repayment scheme explains that bonds presenting amortized reimbursement (the most recurrent case in the sample) pays lower spread for quite all the measurements: the difference ranges from 54 bps for first quartile to 18 bps for standard deviation. The only value not in line with this theory is median, according to which bullet bonds pay lower spreads.

For what concern maturity, it has been decided to divide the entire sample into three subgroups: short-term bonds (with maturity lower than one year), medium-term bonds (with maturity between one and five years) and long-term bonds (with maturity higher than 5 years and the most recurrent ones in the sample). A part for a slightly difference in first quartile, medium-term bonds display higher values of spread for all the measurements, with values not so higher than long-term bonds, but much higher than short-term ones. Looking at mean, medium-term presents 61 bps more than long-term bonds and 72 bps more than short-term ones, but, observing, for example, third quartile, the differences increase, reaching +111 bps respect to short-term bonds. The only exception can be seen in first quartile, where the highest spread value is registered for short-term bonds with a difference of 78 bps to long-term ones.

Finally, a division considering the issuance year has been made (note that all the issues made before 2015 have been collected in the 2015 group, due to their very low frequency). Looking at mean and first quartile, 2016 and 2018 present higher value of yield spread, with about 30 bps more. Considering median, 2016 presents the higher spread, but it's followed by 2015, with 22 bps of difference between them. Third quartile tells another different story, because 2015 show the highest spread, with about 60 bps of difference if compared to the lowest one, 2017. Finally, a completely different situation is presented by standard deviation: 2018 has the highest spread, 12 bps more than 2015, 42 bps more than 2017 and 80 bps more than 2016.

	N° Obs.	Mean	Std. Dev.	1st Quart	Median	3rd Quart
Options						
No	22	554,30	170,71	435,26	579,28	636,97
Callable	76	573,34	222,46	454,14	545,50	653,30
Putable	53	526,78	158,36	433,10	527,85	621,79
Calleble and Putable	104	509,63	150,09	422,44	508,18	586,88
Secured						
No	183	519,50	163,00	428,90	519,06	615,45
Yes	72	578,08	209,81	420,11	558,82	659,67
Covenants						
No	136	552,23	192,70	437,82	533,03	640,86
Yes	119	517,53	160,73	416,69	528,25	617,90
Listed						
No	106	525,47	197,50	411,20	512,11	607,17
Yes	149	543,42	165,65	458,65	535,34	646, 80
Repayment Scheme						
Amortizing	138	517,67	169,96	410,12	534,24	617,83
Bullet	117	557,70	187,52	464,79	528,25	650,92
Maturity (years)						
≤ 1	46	506,44	97,97	467,40	498,69	531,15
From 1 to 5	56	578,66	191,05	465,21	580,25	652,77
>5	153	517,80	189,22	389,94	527,63	611,87
Year						
≤ 2015	50	520,71	196,03	356,58	540,40	656,85
2016	54	552,99	128,06	474,75	562,48	651,53
2017	75	516,26	166,65	415,58	507,90	598,35
2018	76	553, 60	208,19	459,69	529,72	611,98
Total	255	536,04	178,99	427,13	532,12	636,70

Table 4.2: Sample distribution for bonds' features

4.1.3 Results

For each binomial sub-sample, a Kolmogorov-Smirnov and a Wilcoxon rank sum test will be performed, while when three or more sub-samples are present within the dataset a Kruskal-Wallis test will be carried out, as previously explained.

Following the economic theory, secured bonds should pay a lower spread due to the presence of guarantees with the function to insure debtholders against the possibility of issuer's failure. However, if we look at Table 4.3, both Kolmogorov-Smirnov and Wilcoxon rank-sum test show that secured and unsecured bonds do not present any statistically significant dissimilarity in their distribution, with a significance level of 5%.

However, as it is possible to see from the two p-values in combined cases, there are slightly higher than 5%, raising some doubts on the effect this guarantees can have on spread, given that, as aforementioned, secured bonds show higher mean and median values.

As regard covenants, their presence does not cause any reduction in the corporate yield spread according to both tests' results, as is it possible to see in Table 4.4. Contrary to what discussed in the previous section – i.e. listed bonds seemed to determine a higher yield spread (see Table 4.5) – both non-parametric tests show that there are no statistically significant differences between the two sub-samples. Thus, according to the univariate approach, bond's listing does not affect mini-bonds' yield spread. This preliminary result, if confirmed, could be of considerable importance both for practitioners and firms operating in mini-bonds industry. However, its overall effect on the multivariate model looks still uncertain. Looking repayment schema (Table 4.6), the differences between bonds with a bullet repayment and bonds with amortizing repayment seems to be irrelevant. However, given that from one hand, principal amortized repayment should lower the yield spread, while, on the other hand, a bullet repayment could signal firm's soundness, this result should be further in deep analyze in order to arrive to a conclusion.

Moving to non-binomial sub-samples (see appendix C), the presence of options have a relevant effect on mini-bonds' yield spread, since Kruskal-Wallis test rejects the null hypothesis that the four sub-samples share the same distribution at a 95% confidence level. Nevertheless, options do not provide a univocal theoretical explanation, given that in the

data-sample the joint presence of both options seems to reduce the cost of debt (see table 4.2), while economic theory suggests that put options reducing the spread while call options are supposed to have the opposite effect.

Focusing now on maturity, sub-samples do not show any statistically significant difference if the 5% first type error is taken in account; however, if we pass to 10%, then maturity would significantly affect bonds' spread (see Appendix C). Thus, in the case of a univariate analysis, maturity influence on yield-spread remains uncertain.

Finally, the emission year does not highlight any difference in subsamples' distribution. Despite of this, if first type error shifts to 10% significance level, the year of the issuing becomes relevant, confirming the uncertain results underlined by the descriptive statistics exposed in Table 4.2. These conclusions will be tested in deep in the next sections.

	Koln	Kolmogorov-Smirnov			rank-sum
	Obs.	D	p-value	W	p-value
No	183	0,0505	0,9485	24 324	0,4484
Yes	72	0,1284	0,3126	8 189	0,1620
Combined	255	0,1790	0,0731	5 597	0,0617

Table 4.3: Kolmogorov-Smirnov and Wilcoxon rank-sum (Mann-Whitney) tests for Secured dummy variable

Covenants					
Kolmogorov-Smirnov				Wilcoxon	rank-sum
	Obs.	D	p-value	W	p-value
No	136	0,0490	0,9834	16 664	0,5257
Yes	119	0,0560	0,9609	15 848	0,4879
Combined	255	0,1050	0,4855	8 768	0,2503

Table 4.4: Kolmogorov-Smirnov and Wilcoxon rank-sum (Mann-Whitney) tests for Covenants dummy variable

Secured

Carromanta

Listed Bond					
	Koln	nogorov-Sm	nirnov	Wilcoxon	rank-sum
	Obs.	D	p-value	W	p-value
No	106	0,0751	0,7960	30 120	0,6062
Yes	149	0,0532	0,9527	18 204	0,4835
Combined	255	0,1264	0,2790	7 022	0,1653

Table 4.5: Kolmogorov-Smirnov and Wilcoxon rank-sum (Mann-Whitney) tests for Listed Bond dummy variable

	Kolmogorov-Smirnov			Wilcoxon rank-sum		
	Obs.	D	p-value	W	p-value	
Amortizing		0,0639	0,8575	18 322	0,4991	
Bullet		0,0754	0,7517	14 190	0,4506	
Combined	255	0,1394	0,1709	7 346	0,2158	

Table 4.6: Kolmogorov-Smirnov and Wilcoxon rank-sum (Mann-Whitney) tests for Repayment scheme dummy variable

4.2 Multi-variate analysis

In this section, six multi-variate linear regressions on mini-bonds' spread has been carried out, in order to answer the second research question (see section 3.2).

The regression model has been built in a series of step, in order to analyze how variables coming from different set can influence, in a different way, spread. The first regression considers just bonds' features (see Table 3.2), the second adds also issuers' characteristics (see Table 3.3) and the last one considers also the remaining set, the macroeconomic variables (see Table 3.4). As results, the following equations will be determined, where (4.11) considers just bonds' features, (4.12) takes in consideration also issuers' characteristics, and (4.13) includes all the variables.

$$Spread_{i} = \beta_{0} + \beta_{1} * maturity_{i} + \beta_{2} * call option_{i} + \beta_{3} * put option_{i} + \beta_{4} * Secured_{i} + \beta_{5} * Listed Bond_{i} + \beta_{6} * Covenants_{i} + \beta_{7} * Repayment scheme_{i} + \varepsilon_{i}$$

$$(4.11)$$

$$Spread_{i} = \dots + \beta_{8} * Rating_{i} + \beta_{9} * Z Score_{i} + \beta_{10} * Listed firm_{i} + \beta_{11} * CATA_{i} + \beta_{12} * Ln(Total Assets)_{i} + \beta_{13} * Manufacturing_{i} + \varepsilon_{i}$$

$$(4.12)$$

$$Spread_{i} = \dots + \beta_{14} * ESI_{i} + \beta_{15} * Nominal GDP Growth_{i} + \beta_{16} * Unemployment Rate_{i} + \varepsilon_{i}$$

$$(4.13)$$

A possible critic to this approach is that the first two regressions model could be affected by possible omitted variables bias. On one side, it's reasonable to imagine a relationship between bonds' features and issuer's characteristics and so a possible bias in the interpretation of the results of the analyses; on the other hand, macroeconomic variables, influencing in the same way all the issuers of a specific time period, should be considered quite unrelated to firm's

features. Nevertheless, the first two regression results have been used to have a first idea of the most important variables in corporate bond yield spread determination. Finally, a series of robustness tests have been carried out to verify results stability.

4.2.1 Methodology

In order to carry out the regressions in a correct way, it's necessary to guarantee that estimates are not biased or unstable. To satisfy this need, some tests have been run before and after each regression to verify model underlying hypothesis.

4.2.1.1 Multicollinearity and correlation among variables

Considering that it's quite impossible to find perfect multicollinearity among variables in a regression model, due to mistakes in the variables themselves, however their correlation could represent a strong obstacle for the final interpretation of values: in fact, this situation can increase standard errors occurrence, with a following reduction of significativity. As explained in statistic literature (Brooks, 2014), near multicollinearity doesn't influence the value of adjusted R^2 , but the possibility to extrapolate some conclusions looking at the effect of single variables on the model. Another negative effect is the instability of regression: small changes in variables or data can influence a lot the results of the model ⁶⁷. This results in a statistically significant model but characterized by none of the variable with a sufficient low p-value. To solve this problem, many instruments has been introduced by statisticians and, for this dissertation, correlation matrix and VIF (Variance inflation factor) have been used.

Correlation matrix is a method used before the regression: it displays the pairwise correlation between the variables inside the model. If two variables present a correlation index higher than a selected threshold, two indipendent models are created in order to understand which of the two variables can fit best into the regression. In literature, it's impossible to find a unique-accepted threshold to understand if two variables are too much correlated for the regression: generally, it's possible to find a range of high limits. For this dissertation, it has been decided to set a 0.5, with a significance level of 95%, aligned to the level adopted for the univariate analysis. The most important limitation of this instrument is that it's able to

⁶⁷ BROOKS, "Introductory Econometrics for finance", 2014

detect just pairwise correlation, while it can't say anything about the possibility that a variable is determined by a linear combination of others.

On the contrary, Variance Inflation Factor (VIF) is used to verify the multiple linear relationships among different indipendent variables. For each independent variable *j*, VIF is defined through the following equation:

$$VIF_{j} = \frac{1}{1 - R_{j}^{2}}$$
(4.14)

 R_j^2 is the coefficient of determination of a linear model where the variable *j* is used as dependent variables, while the remaining variables are used as regressors. VIF measures how much the variance of the estimate is influenced by near multicollinearity between multiple independent variables. In literature, it's possible to find different values of threshold to estimate if the model is affected by multicollinearity: for this dissertation, following Vercellis (2009), it has been decided to set 5 as threshold ⁶⁸.

4.2.1.2 Hypothesis and specification tests

To verify the consistence of the estimates and the veracity of the functional form employed in the model, some tests have been carried out after each step of regression. To check the possible biases due to omitted variables, proper checks relatively the distribution of errors have been done to ensure that these biases are not excessively skewing the results.

Firstly, the model has been checked not to be affected by heteroskedasticity. The presence of homoskedasticity is required to ensure that estimates are "BLUE"⁶⁹. Among different tests available to verify this form of misspecification, White's general test for heteroskedasticity (White, 1980) has been chosen because, being non-constructive (it does not give any indication on how to solve the issue in case the hypothesis of homoskedasticity has to be rejected)⁷⁰, it allows not to make any specification about the possible form of heteroskedasticity to be detected (Greene, 2003).

 ⁶⁸ VERCELLIS, "Business Intelligence, data mining and optimization for decision making", 2009
 ⁶⁹ Best Linear Unbiased Estimator

⁷⁰ WHITE, "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity", 1980

The hypothesis of the tests are the following ones:

$$\begin{split} H_o: \sigma_i^2 &= \sigma^2, \forall i \in \{1, \dots, n\} \\ H_1: Not \; H_0 \end{split}$$

The null hypothesis is related to the presence of homoskedasticity, while H_1 represents the possibility of unrestricted heteroskedasticity.

White's test is based on an auxiliary regression that uses the squared error ε_i^2 as the dependent variable and, as independent variables, a constant, the original independent variables, their squares and all the cross products. Using an example to clarify this concept, denoting with ε the error term and assuming x_i (i = 1, 2) as independent variables, the regression output is the following:

$$\varepsilon_i^2 = \beta_0 + \beta_1 x_{1,i} + \beta_2 x_{2,i} + \beta_3 x_{1,i}^2 + \beta_4 x_{2,1}^2 + \beta_5 x_{1,i} x_{2,i} + \nu_i$$
(4.15)

White demonstrated that, under the null hypothesis, the test statistic nR^2 follows a χ^2 with (n - 1) degrees of freedom, where n is the number of regressors including the constant (Brooks, 2014).

In case of heteroskedasticity, another test is applied to the regression: the "White's heteroskedasticity-consistent standard errors" (White, 1980). This adjusted model increases the standard errors of the slope coefficients if errors' variance is positively related to the square of an explanatory variable, thus requiring stronger evidence against the null hypothesis to reject it.

Moreover, it allows to find more concrete conclusions about the results of regression without the need of detecting the precise nature of heteroskedasticity ⁷¹, although at the cost of a minor strength compared to other solutions (Greene, 2003; Dougherty, 2011).

Secondly, some tests about the correct specification of the functional form have been carried out. Among the possibilities furnished by statistic literature, the test selected for this dissertation, known as Ramsey's RESET test (Ramsey, 1969), allows to detect polynomial

⁷¹ DOUGHERTY, "Introduction to econometrics", 2011

forms of misspecification either on the dependent variable y_i or on the explanatory variables x⁷². In the first case, the auxiliary model is built regressing the original dependent variable on the power of its fitted values and on the original explanatory variables, as shown by the following equation:

$$y_i = \alpha_0 + \alpha_1 \hat{y}_i^2 + \dots + \alpha_p \hat{y}_i^p + \sum \beta_j * x_{j,i} + \varepsilon_i$$

$$(4.16)$$

Under the null hypothesis of correct specification, the test statistic nR^2 is distributed as a χ^2_{p-1} , where p is the greatest order of y_i used in the regression. In the second case, the test has the following hypothesis (Greene, 2003):

$$H_0: y = X\beta + \varepsilon$$

$$H_1: y = X\beta + higher orders of power of X + \varepsilon$$

Given the relevance that literature attributes to the squared terms of variables related with the risk-return trade-off (see section 3.1), the second specification of the test is for sure of high interest for this dissertation.

Lastly, residuals' normality, fundamental in order to build appropriate confidence intervals will be checked. The test has been performed both by means of QQ-plots, because of their ability of furnish a graphical interpretation of residuals' distribution through a comparison with the quantile of the normal distribution, and by means of two statistical tests: the Shapiro-Wilk test (Shapiro and Wilk, 1965), widely recognized as one of the most powerful test to verify the normality of a set of data, and an adjustment of the Skewness-Kurtosis test to take into account sample size (D'Agostino and Belanger, 1990; Brooks, 2014).

Shapiro-Wilk test verifies the null hypothesis that a given sample, that, in this case is composed by a series of residuals of the regression, is normally distributed ⁷³.

 ⁷² RAMSEY, "Tests for specification errors in classical linear least-squares regression analysis", 1969
 ⁷³ SHAPIRO and WILK, "An analysis of variance test for normality (complete samples)", 1965

4.2.1.2 Hypothesis and specification tests

Denoting with $x_{(i)}$ the i_{th} smallest number in the sample (called order statistic), with \bar{x} the sample mean and considering the constant a_i as defined in equation (4.18), the test statistic is:

$$W = \frac{(\sum_{i=1}^{n} a_i * x_{(i)})^2}{(\sum_{i=1}^{n} (x_i - \bar{x})^2)}$$

$$(a_1, \dots, a_n) = \frac{m^T * V^{-1}}{(m^{T+1} * V^{-2})^{1/2}}$$
(4.17)
(4.18)

where $(m_1, ..., m_n)^T$ represent the vector of expected values of an independent and identically distributed random variables coming from a normal distribution, and $V = v_{i,j}$ is the correspondent variance-covariance matrix. The W-statistic defined in equation (4.17) can assume a value between 0 and 1. These values can be compared with those provided in statistical tables to accept or reject the null hypothesis.

The Skewness and Kurtosis adjusted test, used to strengthen the conclusions drawn from the previous one, is based on the hypothesis that the coefficient of skewness and kurtosis ⁷⁴ are next to zero. To test for normality, the following parameters have been used:

$$b_{1} = \frac{E(u^{3})}{(\sigma^{2})^{3/2}}$$

$$b_{2} = \frac{E(u^{4})}{(\sigma^{2})^{2}}$$
(4.19)

(4.20)

The null hypothesis of the test is that the distribution is normal, so, by definition, symmetric and mesokurtic.

 $^{^{74}}$ Since normal distribution has a kurtosis equal to 3, the test uses a coefficient for excess kurtosis defined as (b_2-3)
The statistic used for the test is defined as ⁷⁵:

$$W = T \left[\frac{b_1^2}{6} + \frac{(b_2 - 3)^2}{24} \right] \sim \chi_2^2$$
(4.21)

Among the strengths of this test, it should be noticed that it provides an evaluation both of skewness and kurtosis, allowing to better define the issue of normality of residuals. About this point, Brooks (2014) notices that leptokurtic distributions, (distribution characterized by a level of kurtosis higher than the one predicted by a normality) are frequent in financial and economic applications.

4.2.2 Results

For each regression discussed in the following sections, results of the aforementioned specification tests are displayed in table E.1 (appendix E). Appendix F will display regression tables complete of coefficients' standard deviation and confidence intervals.

4.2.2.1 Bonds' characteristics

As previously mention, the first step of our regression considers only independent variables that describe the bond characteristics (see table 3.2). As a consequence of the fact that *Maturity* and *Repayment Scheme* display a moderate level of correlation (51%), it has been decided to divide the regression in two models which the aim to compare with each other.

This comparison will be performed through the following steps, in order to include all the three sets of variables (Bond characteristics, Issuer characteristics and Macroeconomic variables) and made an undisputable choice between the two solutions.

Table 4.7 shows the results for the two regressions. As previously highlighted and as is it possible to see, these results suffer from *omitted variables bias* and for this reason should be considered only as preliminaries results.

⁷⁵ D'AGOSTINO and BELANGER, "A suggestion for using powerful and informative tests of normality", 1990

	(1) "M	" Model		(2) "R"	Model	
	β	p-value		β	p-value	
Bond						
characteristics						
Maturity	-0,130***	1,48E-06	Rep. Scheme	0,445***	5,86E-02	
Call Option	-0,037	0,8750	Call Option	-0,148	0,5512	
Put Option	-0,611**	0,0143	Put Option	-0,602**	0,0203	
Secured	0,791***	0,0012	Secured	0,787***	0,0021	
Listed Bond	0,442*	0,0582	Listed Bond	0,476**	0,0499	
Covenants	-0,163	0,4919	Covenants	-0,272	0,2725	
Intercept	6,045***	5,16E-57	Intercept	5,258***	1,75E-45	
Observations	255			255		
\mathbb{R}^2	0,1507			0,0807		
Adj. R ²	0,1301			0,0584		
F-test	7,33			3,63		
p-value	5,71E-15			0,0018		
AIC	993,9323			1014,121		
BIC	1022,262			1042,451		

*p-value < 10%, **p-value < 5%, ***p-value < 1%

Note: AIC: Akaike Information Criteria. BIC: Bayesian-Schwartz Information Criteria

Table 4.7: Regression on bonds' characteristics

In both the models, homoskedasticity is checked with a p-value of around 20%, thus not allowing to use White's heteroskedastic-consistent standard errors. In this first step, Ramsey test of specification is pointless, given the predominant presence of independent variables, which are all binaries, excluding maturity.

As regard the "*M*" *Model 1* ⁷⁶ (left side of the table), it explains 13% of the variability in yield spread, a slightly lower result if compared with the adjusted R² obtained by major researches present in literature on corporate bonds. *Maturity* is highly significant, with a negative coefficient, in line with the *credit-quality* hypothesis of Dennis et al. (2000), according to which only high-rated firms issue bonds with a long-term maturity ⁷⁷.

⁷⁶ "M" Model stay for "Model with Maturity".

⁷⁷ Others works confirm this result, as GUEDES AND OPLER. "The Determinants of the Maturity of Corporate Debt Issues". 1996

Contrary to expectations, the presence of collaterals on the bond ("Secured") contributes to increase the spread paid by the issuer's firm. A possible explanation for this result can be sought in the fact that firms with low-quality rating need to secure their bonds for lowering the spread they would have to offer if compared to high-rated firms, but even with the presence of collaterals they are not able to obtain a reduction in the cost of external financing through mini-bonds. At the same time, it is important to keep in mind that this first can suffer from bias due to omitted variables.

According to results, the presence of a put option seems to reduce the spread by 61 basis points with a level of significance of 98.6%, even if final conclusions on the effect that they can have on spread offered by the bond are deferred to the next sections, given that the level of significance is not as high as the one of the variables discussed above.

The same approach can be applied to *Listed Bond* characteristics, given its lower level of significance if compared with other aforementioned variables. However, at first sight, it seems that listing does not solve the liquidity problem, but it obliges issuers to offer on the market a bond with a higher yield for attracting the interest of investors.

Finally, the intercept – which results to be highly significant – can be interpreted as a baseline for spread set at about 600 basis points, then increased or decreased by the influence of different characteristics.

Considering the regression on the right side of the table 4.7, which include the Repayment Scheme instead of Maturity, conclusions seems to be aligned with what already discussed. In this "R" Model 2⁷⁸, the presence of Repayment Scheme increases by 45 basis points the spread, while the *Listed Bond* characteristic assumes a higher level of significance. However, it is important to point out the low level of significance that this model show respect to the previous one.

4.2.2.2 Adding issuers' characteristics

The second step of the regression model considers also issuer's characteristics (see table 3.3), in addition to mini-bonds' features. As at the first step, the correlations between mini-bond's

⁷⁸ "R" Model stay for "Model with Repayment Scheme".

maturity and repayment scheme has been identified, and two different regressions have been performed.

Table 4.8 shows the outcomes that it has been obtained (on the left-hand side, the "M" Model 2, with Maturity, while on the right-hand side the "R" Model 3, with the binary variables for Repayments Scheme).

	(3) "M" Model		(4) "R" Model		
	β	p-value		β	p-value
Bond					
characteristics					
Maturity	-0,051***	6,15E-02	Rep. Scheme	0,112	0,6068
Call Option	0,117	0,5996	Call Option	0,103	0,6499
Put Option	-0,368	0,1150	Put Option	-0,348	0,1386
Secured	0,517**	0,0231	Secured	0,485**	0,0358
Listed Bond	0,242	0,2785	Listed Bond	0,228	0,3114
Covenants	-0,194	0,3741	Covenants	-0,241	0,2762
Issuer					
characteristics					
Rating	1,057***	0,0034	Rating	1,114***	0,0023
Z-score	-0,085**	0,0478	Z-score	-0,090**	0,0370
Listed firm	0,738**	0,0386	Listed firm	0,821**	0,0214
CATA ratio	0,811*	0,0607	CATA ratio	1,017**	0,0156
Ln(Tot. Assets)	-0,522***	6,40E-09	Ln(Tot. Assets)	-0,557***	4,2 7E-10
Manufacturing	0,732***	0,0005	Manufacturing	0,812***	0,0001
Intercept	13,813***	4,42E-18	Intercept	13,982***	1,19E-17
Observations	255			255	
\mathbb{R}^2	0,3083			0,2990	
Adj. R ²	0,2740			0,2642	
F-test	8,99			8,60	
p-value	3,19E-14			1,3856E-13	
AIC	953,5759			956,9869	
BIC	1003,154			1006,565	

*p-value < 10%,**p-value < 5%,***p-value < 1%

Table 4.8: Regression on bonds' and issuers' characteristics

The two model does not present problems of multicollinearity: maximum VIF stands at 1.50 for model n° 3 as well as for model n° 4, while the average is around 1.2, far below the thresholds set at 5.

As regard the Maturity, homoskedasticity is verified with a significance level of 90% (p-value: 10%), then not requiring White's robust standard errors. In addition to this, the null hypotheses of both Ramsey's specification tests ("powers of the fitted values" and "powers of the independent variables") are accepted. As far as model n° 4 is concerned – i.e. "R" Model (4) – homoskedasticity is accepted with a significance around 95%, and Ramsey's RESET tests are verified too.

With regard the model no. 3, the only variables related to *Bond characteristics* of which it is confirmed the relevance are the presence of collaterals (*"Secured"*) and *Maturity*, even if for the former with a lower level of significance if compared with model no. 1 in Table 4.9.

As concern regressors' sign expectations (see Table 3.3), only Z-score and natural logarithm of total assets confirm the previsions. Specifically, the presence of company's Rating, with positive sign, is significant at the 99.6%. A possible explanation can be that the issuer's rating in our sample is present mostly for firms in the low-end of investment grade area or directly in speculative grade area. In this sense, the presence of Rating only confirms the low credit-quality, an does not contribute to reduce the asymmetric information, particularly pronounced among SMEs firms. In support of this, it is possible to notice the sign of Z-score characteristic in line with what expected, and with a significance of 95.2%. Thus, at firms with a low Z-score value it is required an additional spread for issuing their bonds.

As regard the *Listed firm* characteristic, the presence of the company on a Stock Exchange – contrary to our expectations – contributes to increase the yield at which that company is able to issue the bond. As noted for *Listed bond* and *Put option* characteristics in the first step, final conclusions on the effect that it can have on spread offered by the bond is deferred to the next section. However, at a first gaze, it seems that listed firms, due to the high level of disclosure required by the market, are penalized by this reduction in asymmetric information in the moment in which they decide to issue bonds. Current asset/total asset – i.e. CATA ratio – results to be significant at a level between 95% and 98% for both models.

Firm's size, measured through the natural logarithm of total assets, presents a very high level of significance (p-value: $6,40 * 10^{-10}$), with the expected sign. Accordingly, the greater the firm's size, the lower the spread. This result is in line with what the empirical literature has widely verified (e.g., Flannery et al., 2012; Klein and Stellner, 2014).

As regard the *Manufacturing* characteristic (dummy variable, taking the value of "1" if firm operates in the Manufacturing sector), presents a positive sign, with a level of significant of 99.9%. Thus, according to this result, investors require higher level of yield for bonds issued by manufacturing firms. If confirmed also by the last step, this is a remarkable result, mostly for manufacturing firms that decide to issue a mini-bond and for practitioners operating in mini-bonds' sector.

Finally, the intercept is highly significant (p-value: $4,42 * 10^{-18}$), and the fact that its value has increased to 1 380 basis points is due to the fact that two issuer-related variables express a negative sign.

Considering now the "*R*" *Model 4*, all variables of the model no. 3 are confirmed in sign and just little differences for what regard p-value are present. However, it is possible to observe that the *Repayment Scheme* it is no longer significant, if compared with model no. 2.

It should be worthwhile to note that moving from first step to second step – i.e. adding *Issuer characteristics* to *Bond characteristics* – the adj. R² increase significantly to 27% for model no. 3 and to 26% for model no. 4. At first sight, "M" Model 3 seems to better fit than "R" Model 4. Akaike Information Criteria (AIC) and Bayesian-Schwartz Information Criteria (BIC) confirm this evidence. Moreover, the F-statistics is highly significant for both regressions.

4.2.2.3 Adding macroeconomic variables

In the last step, Macroeconomic variables are added to regression models, with the aim to including factors describing the macroeconomic situation present in Italy at the time each mini-bond has been issued.

As described in section 3.4, macroeconomic variables – which are considered in literature important regressor for explain differences in corporate bond yield spread – aim at describing:

- 1. Specific region's general economic sentiment;
- 2. National economy's growth;
- 3. National economy's labor market condition.

For modelling the general economic and financial conditions that are perceived by consumers, companies, retailers and multi-national entities, we have decided to choose the Italy ESI *or Italy Economic Sentiment Index*. The second point is modelled by Italian Nominal GDP growth (QoQ^{79}). Lastly, the labor market trend is modelled by change in unemployment rate (MoM⁸⁰).

Focusing on tests, it regresses original independent variables, their squares and their crossproducts against squared residuals and controls whether their coefficients are jointly null. All models resulted to be homoskedastic with a p-value always higher than 18%, except for model no. 1. The null hypothesis of Ramsey's RESET test of misspecification of functional form is accepted in both final two models with p-values ranging from 51% to 73% as far as the fitted values of the dependent variables are concerned and from 28% to 96% for the powers of independent variables. Given the fact that – as detailed in the previous paragraph – different two models have been run to avoid correlation of variables, VIF tests do not show evidence of inflation from multicollinearity in none of the situation.

Finally, both normality tests (i.e., Shapiro-Wilk and Skewness-Kurtosis tests) have to be rejected. Analyzing the two QQ-Plots, it is possible to state that rejection is due to the presence of outliers, both in the left-tail and in the right-tail.

However, there is not a particular reason to remove these observations from the sample.

⁷⁹ Quarter over Quarter.

⁸⁰ Month over Month.

4.2.2.3 Adding macroeconomic variables

Looking at the results of Skewness and Kurtosis test (see Appendix E) – which gives information also on the reason why the normality hypothesis has to be rejected – it is possible to affirm that distribution of residuals does not present any significant skewness⁸¹, but suffers from positive excess kurtosis, i.e. – as it is common in economic and financial applications – it is leptokurtic. Given sample's small size compared to other researches and to what statistical tests suggest for stability of results, it is possible to claim that this kind of non-normality will be solved as a higher number of mini-bonds will become available for analysis. As an example, QQ-Plots, histogram and estimate density of residuals for regression n°5 – (5) "M" Model – are shown in Figures 4.1 and 4.2.



Figure 4.1: QQ-Plot of residuals for regression n° 5

⁸¹ Different studies affirm that skewness and kurtosis values between +2 and -2 can make acceptable the normal distribution hypothesis.



Figure 4.2: Actual distribution of residuals for regression n° 5

It is possible to notice that, apart from outliers aforementioned observations, all other residuals are normally distributed; moreover, looking at the tails of the estimated density, it should be noticed that they are almost flat (apart from outliers) and that a higher kurtosis is due to a higher concentration around the mean value of the distribution.

The results of the last two models – "M" Model 5 and "R" Model 6 – are shown in Table 4.9. It is possible to see how variables resulted significant in the previous step are confirmed. The Maturity variable results highly significant with a negative sign – i.e. lower maturity correspond to higher spread – confirming the hypothesis of credit-quality previously mentioned. If we consider the others Bond characteristics, only the presence of collaterals ("Secured"), seems to be significant, increasing the spread by almost 64 basis points. As already mentioned in section 4.2.2.1, this fact could be sought in the attempt – without result – by low-quality rating companies lowering the spread they would have to offer if compared to high-rated firms, securing their bonds.

	(5) "M	" Model		(6) "R"	Model
	β	p-value		β	p-value
Dond					
characteristics					
Maturity	- 0,063***	2,03E-02	Rep. Scheme	0,1	0,6402
Call Option	0,217	0,3297	Call Option	0,191	0,4002
Put Option	-0,288	0,2118	Put Option	-0,273	0,2408
Secured	0,638***	0,0055	Secured	0,575**	0,0129
Listed Bond	0,155	0,4842	Listed Bond	0,147	0,5093
Covenants	-0,158	0,4637	Covenants	-0,223	0,3105
Issuer					
characteristics					
Rating	0,902**	0,0124	Rating	0,989***	0,0071
Z-score	-0,087**	0,0405	Z-score	-0,093**	0,0296
Listed firm	0,828**	0,0189	Listed firm	0,915**	0,0100
CATA ratio	1,051**	0,0154	CATA ratio	1,272***	0,0030
Ln(Tot. Assets)	-0,541***	1,23E-09	Ln(Tot. Assets)	-0,584***	6,64E-11
Manufacturing	0,817***	0,0001	Manufacturing	0,907***	1,75E-05
Macroeconomic					
variables					
Italy ESI	-0,070***	0,0025	Italy ESI	-0,065***	0,0051
Nom. GDP growth	0,361	0,2476	Nom. GDP growth	0,344	0,2778
Unemployment rate	5,547	0,2648	Unemployment rate	4,042	0,4188
Intercept	20,957***	5,47E-13	Intercept	20,696***	2,13E-12
Observations	255			255	
\mathbb{R}^2	0,3400			0,3255	
Adj. R ²	0,2985			0,2832	
F-test	8,21			7,69	
p-value	5,71E-15			5,77E-14	
AIC	948,2988			953,2191	
BIC	1008,5			1013,421	

*p-value < 10%,**p-value < 5%, ***p-value < 1%

Table 4.9: Regression on bonds', issuers' and macro-economic variables

It is important to notice how the significance of *Listed Bond* variables found in model n° 1 is disappeared in this last step, both for model n° 5 and model n° 6. Thus, it is possible to conclude that the listing on a Stock Exchange for a bond does not play any role in influencing its spread.

Moving now to issuer related characteristics, firms' size, measured as the natural logarithm of assets, has a positive effect – i.e. negative sign in regression – the bond yield spread paid by the company to investors. In this sense, large firms should sustain a lower cost of debt if compared to smallest ones. As aforementioned, for a bond the listing does not have any influence on its spread, while if we look at the *Listed firm* variable, we can note how listed firms pay 83 basis points more than unlisted ones. It is possible to state that listing – neither in the sense of listed bonds nor listed firm – does not solve the illiquidity problem, but rather forces the listed company to offer a higher yield for attracting the investors. This is a remarkable result for any practitioners in mini-bonds sector.

For what concern the *Z*-score variable, it remains significant at about 96% in explaining minibonds yield spread, with a negative sign. This confirm the previous step result and our sign expectation. It should be worthwhile to observe how this result reinforce also our Z-score models' calculation for each firm in the sample devoid by rating.

Concluding with issuers' characteristics, it increases the significance level of CATA ratio (from 95.4% to 98.5%) and it is confirmed the strong level of significance for *Manufacturing* variable. For the former, looking at its positive sign, we can conclude that investors look at the ability of the company to meet its short-term obligations, but at the same time they consider negatively a high level of current assets if compared with the overall amount of assets. This can be explained with the fact that high levels of currents assets – as inventories, cash & cash equivalents, trade receivable, etc. – is perceived by the market as inability of the company to deal with cash and/or working capital, leading to an inefficient business management by company's top line.

As regard *Manufacturing* variable, it is evident how the industry in which the company issuing a mini-bond operate is an important factor in explain the spread that this firm has to offer on the market. Specifically, a company operating in Manufacturing sector, should pay 82 basis points more than another firm operate in another specific industry. This is another result of this paper that we think it is important to emphasize.

Moving now to macroeconomic variables, in both models – "M" Model 5 and "R" Model (6) – the only variable which resulted significant was Italy ESI. As is it possible to see from the final regression models, differently from main results obtained by empirical literature,

Nominal GDP growth (QoQ) as well as unemployment rate (MoM) do not contribute to explain yield-spread.

Considering the results of "R" Model (6), all variables significant in the model no. (6) are confirmed. However, as in the second step, the *Repayment Scheme* is no more significant. Adding to this, we can note as the presence of collaterals ("*Secured*") in model no. 6 has a significance level of 98.7%, while in the model no. 5 it is of 99.5%.

For what concern *Rating*, model n° 6 presents a slight lower level of significance if compared with model n° 5.

In both models the intercept result to be highly significant. Even if a baseline of more than 2,095 basis points might seem high, it should be notice that half of the significant variables present a negative sign, thus proportionally reducing mini-bond's yield spread.

Table 4.9 display the comparison among the result of the two models. Looking at the level of adj. R^2 it is possible to notice as starting from model n° 3 and n° 4, the two regression behave similarly, and no particular differences among variables are present.

Significant variables are confirmed in both models, supporting the conclusions at which we are arrived.

It is possible to conclude that the models in which "Maturity" is considered are preferable. Not only considering the value for adj. R², but also considering the fact that from the second step to third, *Repayment Scheme* variable is no more significant in explaining mini-bond spread.

This conclusion is strengthened also by Akaike and Beyesian-Schwartz information criteria. Summarizing the main results obtained from different regression models and looking at the different variables resulted as significant in explaining the yield spread of SMEs' mini-bonds, it is possible to argue that mini-bonds Secured – ceteris paribus – presents a cost of debt 58 to 64 basis points higher than these without collaterals.

Rated companies that issue mini-bonds – other things being equal – hold a yield spread between 90 and 99 bps higher than unrated ones. Adding to this, companies with higher level of Z-score – i.e. more safe firms – pay a lower level for cost of debt of about 10 bps, if compared with more risky ones.

Listed firms and find more difficult to finance their needs through mini-bonds issuance. In fact, they pay 80 to 90 bps more than unlisted one for attracting investors. In we consider the CATA ration, firm with a high level of current assets, if compare with the overall amount of assets, must pay a cost of debt between 100 and 130 bps higher respect to companies with a lower CATA ratio.

As regard firm's size – i.e. natural logarithm of total assets – the we have found that bigger firms pay a lower spread, specifically between 54 and 58 bps, if compared with smallest ones. This result is concordant with what is widely recognized in empirical literature.

Firms operating in Manufacturing sector are required by the investors an additional "premium" between 82 and 92 bps for accept to invest in mini-bonds. This result is particular important for practitioners of mini-bonds industry and firm operating in manufacturing industry.

Finally, among macroeconomic variable, the only one that have a significant effect on minibond spread is the Italy ESI. As general economic sentiment improves, the spread paid by firm that issue mini-bond obviously decreases.

Concluding, it is remarkable also to notice that the two final regression models – "M" Model 5 and "R" Model 6 – are able to explain 28%-29% of mini-bonds' yield spread variability. This result is consistent with major empirical studies on European or US corporate bonds. We can justify this result with homogeneity in our sample, given that it consists only of Italian SMEs not operating in the financial and Real Estate industry and that issued one or more mini-bonds in the past.

Robustness tests discussed in next section will check for the soundness of results

4.3 Robustness tests

To verify the soundness of the models previously determined and discussed, two robustness tests have been carried out. In particular, the analyses that have been performed in order to answer the following two questions:

- 1. Does outliers' presence bias results?
- 2. Does residuals' non-normality bias results?

For what concern the first point, the answer is that estimated coefficients of the various models can be biased due to the presence of outliers. Winsorizing techniques (Hastings et al., 1947; Tukey, 1962), which limit extreme value in statistical data to a given percentile, smooths their impact on regression coefficients, providing a robustness test for this issue.

On the other hand, bootstrapping techniques, based on drawing repeated samples from a specific population, allow to make statistical inferences when there are doubts about the standard hypothesis of likely distribution (Efron, 1981; Brooks, 2014). Bootstrapping techniques are particularly used in regressions, either to estimate or simply to test the robustness of standard errors and confidence intervals.

4.3.1 Robustness to outliers

As previously underlined, winsorizing variables allows to reduce the impact of outliers on results. In order to develop this test, a 92% winsorization (i.e., 4st and 96th percentiles) has been applied to the two final models (regression n°5 and n°6). Table 4.10 displays the results of winsorized models. It's possible to notice that results remain quite stable and equally significant, with just small fluctuations for what concern the significance of variables.

Looking at these results, it's possible to affirm that estimated coefficients expressed in section 4.2.2.3 are robust to outliers.

4.3.2 Robustness to distribution assumptions

As mentioned in the introduction of this section, bootstrapping techniques, introduced for the first time by Efron (1981) allow to make inferences about a population parameter when hypotheses on its distribution are not verified or are at least questionable. Considering a sample made of N observations, bootstrapping analysis consists in sampling with replacement a given number of times a sub-sample of size N from the original sample and estimating the chosen parameters on each of them.

Denoting with $\hat{\theta}_i$ the statistic calculated using the i_{th} sub-sample and with $\bar{\theta}$ the average of bootstrapped estimates, the standard error $\hat{\sigma}$ is computed as:

$$\hat{\sigma} = \sqrt{\frac{1}{k-1} \sum_{i}^{M} (\hat{\theta}_{i} - \bar{\theta})}$$

(4.22)

Bootstrapping is a very powerful instrument, because it allows to produce robust standard errors and confidence intervals without the need of strong hypothesis on the original distribution: it treats the initial sample as if it was a population from which to draw observations in a randomized way (Efron, 1987; Gilchrist and Zakrajsek, 2012).

Considering the model used in this dissertation, bootstrapping with generation of 1,000 subsamples has been chosen. Considering the final models (n°5 and n°6), results remain stable if compared to which previously illustrated, with just some small changes in terms of level of significance: this is probably given by an increase in the confidence intervals for some variables.

Looking at the results, it' possible to conclude that estimated coefficients of previous sections are significant even though residuals' normality assumption is not completely respected.

92%Winsorization					
	(5) "M	" Model		(6) "R'	Model
	β	p-value		β	p-value
	-	-		-	
Bond					
characteristics					
Maturity	-0,069***	7,03E-03	Rep. Scheme	0,117	0,5647
Call Option	0,175	0,4023	Call Option	0,146	0,4959
Put Option	-0,261	0,2281	Put Option	-0,245	0,2648
Secured	0,586***	0,0061	Secured	0,525**	0,0160
Listed Bond	0,178	0,3911	Listed Bond	0,17	0,4200
Covenants	-0,162	0,3911	Covenants	-0,231	0,2640
Issuer					
characteristics					
Rating	0,856**	0,0116	Rating	0,953***	0,0060
Z-score	-0,069*	0,0821	Z-score	-0,076*	0,0592
Listed firm	0,839**	0,0116	Listed firm	0,933***	0,0054
CATA Ratio	0,878**	0,0311	CATA Ratio	1,119**	0,0056
Ln(Tot. Assets)	-0,479***	9,65E-09	Ln(Tot. Assets)	-0,525***	4,40E-10
Manufacturing	0,793***	0,0001	Manufacturing	0,891***	8,03E-06
Macroeconomic va	ariables				
Italy ESI	-0,072***	0,0009	Italy ESI	-0,066***	0,0023
Nom. GDP growth	0,368	0,2106	Nom. GDP growth	0,348	0,2444
Unemployment rate	4,879	0,2970	Unemployment rate	3,221	0,4948
Intercept	20,187***	1,70E-13	Intercept	19,892***	9,26E-13
Observations	255			255	
R ²	0,3402			0,3208	
Adj. R ²	0,2988			0,2781	
F-test	8,22			7,52	
p-value	5,47E-15			1,22E-13	
ÂIC	916.30			923.71	
BIC	976.50			983.91	

* p-value < 10%, ** p-value < 5%, *** p-value < 1%

Table 4.10: Winsorization table

CHAPTER 5

Conclusions

5.1. Summary of main results

The aim of this dissertation is to contribute with novelty to the limited literature on the topic of mini-bonds issued by Italian SMEs, trying to understand if corporate bond yield spread, expressed as difference between the yield to maturity and risk-free rate, is influenced by some variables and how much this influence is strong. In order to perform these analyzes, it has been necessary to build a sample of mini-bonds, starting from the total amount of issues from 2012 to 2018 collected by Osservatorio of Mini-Bond, Politecnico di Milano; then, an evaluation of spread for all remained securities has been performed. As final step, a series of regression models has been carried out, considering three different set of variables: bonds' features variables, issuers' characteristics ones and macroeconomic ones.

Conclusions can be divided into three areas, according to the different set of variables:

- The relation between maturity and spread and the importance of being secured;
- The relevant effect of financial and not financial issuers' features on mini-bond yield spread;
- The connection between Italy ESI index and corporate bond yield spread.

For what concerns first point, bond's maturity results to be a very important driver for spread determination, disagree traditional risk-return trade-off theory (Klein and Stellner, 2014). On the contrary, this result is a confirmation of the theory of "credit quality" introduced by Dennis et al. (2000), according to which only well-rated firms can issue long-term bonds: this

theory explains that there is a negative correlation between maturity and spread, since lowquality companies are excluded from long-term securities market. Another interesting variable resulting determining in spread definition is the fact that the bond is secured: according to existing literature, secured bonds should pay a lower spread if compared to the unsecured ones, because the investor should be paid for the risk of default he assumes. Looking at the results of the regression model implemented by this dissertation, it's possible to observe an opposite situation: it seems that to be secured increases corporate yield spread. This situation could be explained by the fact that more risky companies prefer to secure their bonds in order to increase the possibility of attracting investors.

Looking at the second point, it's interesting to notice that all the variables, related to the issuer, present in the model have a at least moderate impact on the results. Firstly, Total Asset, expression of firm's size, following what literature says (Klein and Stellner, 2014, Flannery et al., 2012) has a negative correlation with spread. It's easy to explain this result: large firms are generally perceived as less risky by banks and so should pay lower spread if compared to smaller entities. Secondly, the fact of being a manufacturing entity or not influence the evaluation of corporate bond yield spread: results show a positive correlation between these two elements. This could be explained as Italian Manufacturing SMEs must pay. It's important to notice that statistics show that the model used in this dissertation is very suitable for this particular sector (see section 5.2).

As said before, also the other variables coming from the second set have a, at least, moderate impact on the spread evaluation. Firstly, the existing of rating issued by agencies should have a negative impact on spread, because of a reduction in the information asymmetry. This idea is not confirmed by the model: it seems to be a positive correlation between those two elements. It's important to consider that most rated companies receive a rating of BBB and BB, positioning between the investment and the speculative grade. On the contrary, Z Score results to influence spread in a negative way, following the classical Altman theory (Altman, 1968): a high level of this indicator means firm's stability and welfare, so there is a reduction of investment risk.

Another related to issuer variable that it's necessary to mention, considering the results, is the fact that the company is listed or not: according to literature (Bancel and Mittoo, 2009), the

presence of the issuer in a stock market should reduce the yield spread, because listed companies must be transparent and so they should be perceived as less risky. The model implemented by this dissertation displays an opposite situation, showing that listed firms pay a higher spread; this could be related to the high illiquidity of some Italian stock markets, not guaranteeing the advantages companies expecting by listing themselves. Finally, CATA ratio, whose expected effect was uncertain looking at existing literature, seems to have a positive correlation with spread, in agreement with the second reasoning exposed in section 3.3: large current assets is perceived by the market as inability of the firm, thus an increase of the spread is the consequence.

Considering the last set of variables used in the regression model, just one results very determinant in the spread definition: Italy Economic Sentiment Index (see section 3.3 for details). According to the construction of this indicator, there is a negative correlation with spread, because higher values mean more confidence from the financial and not financial actors in the current economic scenario, and this should decrease spread. Implemented model confirms this reasoning.

Summarizing, in order to give a clear answer to the questions introduced in section 3.2, it seems that the most important driver determining corporate bond yield spread are the financial, but not only, characteristics of the issuer, above all its size (expressed by Total Assets) and the sector in which it operates, but a very important role is played also by the level of confidence among the economic scenario (expressed by the ESI index) and by some particular features of the securities, like maturity and the presence of a warrant or not. In order to give more robustness to these results, some tests have been performed, to understand if the regression model implemented by this dissertation can be used also with other samples or variables.

The main target of this dissertation is to increase the limited existing literature about minibonds, helping Italian firms to understand if they are suitable or not for this market, considering their financial situation and other factors; moreover it can help in observing which is the difference between expected by investors and effectively provided spread for these securities. Looking at those "actors" that could obtain benefits from this model, the range is quite large. Professional investors could use this model to perform more correct analyses during investment decisions, integrating this model with the information they have, in order to verify the correct risk-return trade off. Advisors and arrangers could refer to this model to find a rigorous theoretical explanation of the impact of different features on the cost of debt, helping issuers in a better way. Finally, companies should take advantage from this dissertation because they could understand which improvements are necessary to be more "interesting" in the market and which are the best provisions to put in mini-bond contract in order to attract investors.

5.2 Limitation and recommendations for future researchers

Although the model of this dissertation permitted to reach important results, even considering their statistical robustness, and the two research questions found their answers, some limitations must be explained.

Some assumptions taken in order to perform in the most correct way the analysis have reduced the size of the sample and thus it's impossible to verify if this model can be applied also, for example, for variable coupon mini-bonds, which number is not so irrelevant in the total market. Moreover, some issues and evaluations were influenced by not availability of some financial data: it's expected that future researchers will check the results achieved through this dissertation with a higher level of information available.

For future researches, it could be interesting to build different models according for the different ATECO classes, considering the importance of manufacturing sector in Italian market the significative suitability of this dissertation model on that specific sector. It could be interesting also to observe if changes in the values of spread between Italian BTP and German Bund can have an impact on the mini-bond spread. Finally, due to their increasing importance in the last years, the introduction of some ESG variables in the model could help to find new important determinants for mini-bond yield spread.

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Appendix A ATECO 2007 Framework

Section	Title (ATECO 2007)	Title (NACE Rev. 2)	Divisions
А	Agricoltura, silvicoltura e pesca	Agricolture, forestry and fishing	01-03
В	Estrazione di minerali da cave e miniere	Mining and quarrying	05-09
С	Attività manifatturiere	Manufacturing	10-33
D	Fornitura di energia elettrica, gas,	Electricity, gas, steam and air	35
	vapore e aria condizionata	conditioning supply	
Е	Fornitura di acqua; reti fognarie,	Water supply; sewerage, waste	36-39
	attività di gestione dei rifiuti e	management and remediation	
	risanamento	activities	
F	Costruzioni	Construction	41-43
G	Commercio all'ingrosso e al dettaglio;	Wholesale and retail trade; repair of	45-47
	riparazione di autoveicoli e motocicli	motor vehicles and motorcycles	
Н	Trasporto e magazzinaggio	Transportation and storage	49-53
Ι	Attività dei servizi di alloggio e di	Accomodation and food service	55-56
	ristorazione	activities	
J	Servizi di informazione e	Information and communication	58-63
	comunicazione		
Κ	Attività finanziarie e assicurative	Financial and insurance activities	64-66
L	Attività immobiliari	Real estate activities	68
М	Attività professionali, scientifiche e tecniche	Professional, scientific and technical activities	69-75
Ν	Noleggio, agenzie di viaggio, servizi	Administrative and support service	77-82
	di supporto alle imprese	activities	
Ο	Amministrazione pubblica e difesa;	Public administration and defence;	84
	assicurazione sociale obbligatoria	compulsory social security	
Р	Istruzione	Education	85
Q	Sanità e assistenza sociale	Human health and social work	86-88
R	Attività artistiche, sportive, di	Arts, entertainment and recreation	90-93
	intrattenimento e divertimento		
S	Altre attività di servizi	Other service activities	94-96
Т	Attività di famiglie e convivenze	Activities of households as	97-98
	come datori di lavoro per personale	employers; undifferentiated goods	
	domestico; produzione di beni e	and services - producing activities of	
	servizi indifferenziati per uso proprio	households for own use	
	da parte di famiglie e convivenze		
U	Organizzazione ed organismi	Activities of extraterritorial	99
	extraterritoriali	organizations and bodies	

Appendix B Final Sample - list of emissions

Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
Mamo Invest S.p.A.	1,400	6,000%	2013 - 2nd	4,58	545,59
Prismi S.p.A.	2,560	9,000%	2013 - 2nd	3,00	886,37
Filca Cooperative S. Coop.	16,000	6,000%	2013 - 2nd	6,00	498,65
Iacobucci HF Electronics S.p.A.	4,950	8,000%	2013 - 2nd	4,00	749,86
La Zootecnica Group S.p.A.	0,650	5,000%	2014 - 1st	5,00	414,13
Microcinema S.p.A.	1,500	8,125%	2014 - 1st	3,00	799,01
JSH Group S.p.A.	1,800	7,500%	2014 - 1st	5,00	690,1 7
Ellegigi S.p.A.	1,700	3,500%	2014 - 1st	10,92	175,89
Novation Tech S.p.A.	1,200	8,000%	2014 - 1st	0,95	799,68
Energie S.p.A.	2,500	3,990%	2014 - 1st	4,00	357,93
Prismi S.p.A.	3,000	7,000%	2014 - 1st	3,00	662,44
Green Arrow 11 S.r.l.	3,200	5,000%	2014 - 1st	5,00	458,65
SEA S.p.A.	3,000	6,000%	2014 - 1st	5,00	433,10
Cipriani Profilati S.r.l.	5,000	6,000%	2014 - 1st	6,01	559,63
FRI-EL Biogas S.r.l.	12,000	4,900%	2014 - 2nd	6,98	434,22
E.s.tr.a. S.p.A.	50,000	5,000%	2014 - 2nd	5,00	465,21
Acque del Basso Livenza S.p.A.	14,000	4,200%	2014 - 2nd	19,96	254,22
Acque del Chiampo S.p.A.	13,000	4,200%	2014 - 2nd	19,96	254,23
Alto Vicentino Servizi S.r.l.	18,000	4,200%	2014 - 2nd	19,96	254,22

Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
Asi S.p.A.	15,000	4,200%	2014 - 2nd	19,96	254,22
Bim Gestione servizi pubblici S.p.A.	5,000	4,200%	2014 - 2nd	19,96	251,64
Centro Veneto Servizi S.p.A.	29,100	4,200%	2014 - 2nd	19,96	254,22
Viacqua S.p.A.	26,000	4,200%	2014 - 2nd	19,96	254,22
Gruppo PSC S.p.A.	6,000	6,000%	2014 - 2nd	5,00	584,04
Delfino Pescara 1936 S.p.A.	5,000	5,500%	2014 - 2nd	4,00	616,92
Molinari S.p.A.	5,000	6,100%	2014 - 2nd	5,00	621,79
Geodata Engineering S.p.A.	7,000	6,400%	2014 - 2nd	6,01	728,05
Azienda Solare italiana S.p.A.	20,000	3,552%	2014 - 2nd	14,09	259,16
Penelope S.p.A.	2,000	9,000%	2014 - 2nd	4,00	920,61
Thermokey S.p.A.	1,200	6,000%	2015 - 1st	1,50	626,30
Rapetti Foodservice S.r.l.	2,000	5,600%	2015 - 1st	3,00	578,16
Iacobucci HF Electronics S.p.A.	7,500	8,500%	2015 - 1st	7,74	790,45
Essepi Ingegneria S.p.A.	2,200	5,400%	2015 - 1st	5,01	556,43
Fermi S.p.A.	2,000	6,000%	2015 - 1st	2,00	620,33
First Capital S.p.A.	9,400	5,000%	2015 - 1st	5,01	695,12
Terre Cortesi Moncaro S. Coop. Agricola	5,000	6,375%	2015 - 1st	6,01	640,09
C.m.d. S.r.l.	5,000	5,000%	2015 - 1st	6,51	535,22
Capi Group S.r.l.	2,000	5,000%	2015 - 1st	6,01	481,60
Prismi S.p.A.	0,800	7,000%	2015 - 2nd	5,01	709,75
Teethan S.p.A.	0,500	8,000%	2015 - 2nd	5,01	794 , 60
Building Energy S.p.A.	20,000	2,000%	2015 - 2nd	5,01	196,67
Expert System S.p.A.	5,000	4,000%	2015 - 2nd	9,43	355,78
Intes S.p.A.	0,300	6,000%	2015 - 2nd	5,00	610,54

Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
K4A S.p.a.	2,000	7,000%	2015 - 2nd	3,02	464,79
Gross Invest S.r.l.	2,500	3,000%	2015 - 2nd	3,00	328,17
Microspore S.p.A.	5,185	5,000%	2015 - 2nd	5,01	534,54
Matica System S.p.A.	2,000	5,700%	2015 - 2nd	5,10	706,87
Delfino Pescara 1936 S.p.A.	0,196	3,500%	2015 - 2nd	5,01	356,13
SG Elettrica S.r.l.	1,000	6,000%	2015 - 2nd	5,01	607,17
Frener & Reifer S.r.l.	12,000	4,300%	2015 - 2nd	7,01	408,71
Fait Plast S.P.A.	0,400	6,500%	2016 - 1st	5,00	687,59
Rama S.p.A.	6,600	2,500%	2016 - 1st	5,00	506,60
Acque Veronesi S.r.l.	20,000	3,900%	2016 - 1st	18,48	303,29
Alto Trevigiano Servizi S.r.l.	30,000	3,900%	2016 - 1st	18,48	303,29
Azienda Gardesana Servizi S.p.A.	8,000	3,900%	2016 - 1st	18,48	303,29
Bim Gestione servizi pubblici S.p.A.	7,000	3,900%	2016 - 1st	18,48	303,29
Polesine Acque S.p.A.	12,000	3,900%	2016 - 1st	18,48	303,29
4Madonne Caseificio Emilia S. Coop.	6,000	5,000%	2016 - 1st	6,01	517,58
Trefin S.p.A.	4,000	5,500%	2016 - 1st	5,01	587,63
American Coffee Company S.p.A.	3,000	7,000%	2016 - 1st	4,68	758,10
Essepi Ingegneria S.p.A.	2,800	5,400%	2016 - 1st	6,01	513,25
Wiva Group S.p.A.	3,700	6,500%	2016 - 1st	6,01	685,86
Solis S.r.l.	3,000	4,000%	2016 - 1st	7,01	414,29
Giplast Group S.p.A.	2,100	7,000%	2016 - 1st	5,00	534,70
Giglio Group S.p.A.	3,500	5,400%	2016 - 1st	6,00	576,47
Agrumaria Reggina S.r.l.	0,500	4,800%	2016 - 1st	0,97	532,12
C.G.P. S.p.A.	1,600	6,000%	2016 - 1st	8,01	600,26

Final Sample - list of emissions

				not of citi		
Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)	
United Brands Company S.p.A.	0,200	4,750%	2016 - 1st	0,54	528,25	
Zecca Prefabbricati S.p.A.	2,000	5,000%	2016 - 1st	3,00	553,10	
Lanificio Luigi Zanieri S.p.A.	0,500	3,000%	2016 - 1st	4,75	335, 70	
K4A S.p.A.	2,000	6,500%	2016 - 1st	3,00	700,00	
Faro S. Coop. Agricola S.p.A.	0,400	6,000%	2016 - 1st	0,49	670,27	
Trafital - S.p.A.	5,000	6,500%	2016 - 1st	10,65	667,21	
Halley Consulting S.p.A.	0,400	5,800%	2016 - 1st	0,47	650,26	
ETT S.p.A.	0,750	3,980%	2016 - 1st	3,02	446,99	
Yachtline Arredomare 1618 S.p.A.	5,000	5,000%	2016 - 1st	5,10	545,41	
Yachtline Arredomare 1618 S.p.A.	5,000	5,800%	2016 - 1st	6,60	618,88	
Clabo S.p.A.	5,000	6,000%	2016 - 1st	5,00	665 , 40	
Energetica S.r.l.	5,000	5,500%	2016 - 2nd	6,00	609,78	
Unionbau S.r.l.	3,000	4,500%	2016 - 2nd	5,00	512,11	
Aristoncavi S.p.A.	5,000	5,850%	2016 - 2nd	5,00	651,95	
Tecno TF S.p.A.	5,000	5,250%	2016 - 2nd	5,45	649,85	
Adige Jewels S.p.A.	2,088	3,500%	2016 - 2nd	6,00	397,24	
TS Energy Italy S.p.A.	21,000	4,200%	2016 - 2nd	15,93	428,55	
Arcobaleno S.P.A.	1,020	4,000%	2016 - 2nd	4,00	462,67	
Energetica S.r.l.	1,000	6,000%	2016 - 2nd	5,92	663,92	
Your Voice S.p.A.	2,000	5,500%	2016 - 2nd	4,91	724,76	
Enertronica S.p.A.	7,662	5,000%	2016 - 2nd	2,00	571,86	
Aero Sekur S.p.A.	5,000	5,750%	2016 - 2nd	3,00	646, 80	
ETT S.p.A.	1,000	4,250%	2016 - 2nd	0,96	497,59	
Faro S. Coop. Agricola S.p.A.	0,400	6,000%	2016 - 2nd	0,98	691,43	

Final Sample - list of emissions

				not of citi		
Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)	
Bioera S.p.A.	2,100	6,000%	2016 - 2nd	5,00	652 , 60	
Cristiano di Thiene S.p.A.	0,200	4,200%	2016 - 2nd	0,73	507,03	
Niederstaetter S.p.A.	3,000	4,000%	2016 - 2nd	7,00	411,20	
Fermi S.P.A.	6,000	5,000%	2016 - 2nd	2,00	578,3 0	
Saxa Gres S.p.A.	5,000	7,000%	2016 - 2nd	5,00	749,35	
Osai Automation System S.p.A.	1,000	3,750%	2016 - 2nd	0,29	467,14	
Marvil Engineering S.r.l.	0,200	4,375%	2016 - 2nd	7,00	463,45	
Q&T S.p.A.	2,000	6,500%	2016 - 2nd	5,05	830,41	
SG Elettrica S.r.l.	1,000	5,500%	2016 - 2nd	5,00	607,51	
Wolftank Systems S.p.A.	5,000	5,000%	2016 - 2nd	5,00	610,57	
Seip S.r.l.	3,000	5,000%	2016 - 2nd	7,00	527,85	
PSC S.p.A.	5,000	5,000%	2016 - 2nd	6,00	552,59	
PSC S.p.A.	5,000	5,400%	2016 - 2nd	7,00	582,46	
Diapath S.p.A.	2,400	7,500%	2017 - 1st	8,00	803,58	
Danisi Engineering S.r.l.	1,600	6,250%	2017 - 1st	3,18	873,06	
Fonderia Casati S.p.A.	4,200	6,150%	2017 - 1st	6,92	592,76	
Hightel Towers S.p.A.	0,500	4,300%	2017 - 1st	0,50	507,90	
I.CO.P. S.p.A.	7,000	6,500%	2017 - 1st	7,00	662,49	
Scatolificio Salernitano S.p.A.	0,350	2,250%	2017 - 1st	0,99	307,65	
C.R. S.p.A.	0,300	4,500%	2017 - 1st	0,69	535,78	
Prismi S.p.A.	2,180	5,500%	2017 - 1st	4,67	633,49	
Agrumaria Reggina S.r.l.	0,500	4,500%	2017 - 1st	0,73	549,53	
Velier S.p.A	6,000	5,875%	2017 - 1st	6,02	536,67	
Ireos S.p.A.	0,500	4,200%	2017 - 1st	0,68	508,45	

Final Sample - list of emissions

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Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
Osai Automation System S.p.A.	1,000	3,750%	2017 - 1st	0,67	454,57
Scherer S.r.l.	2,000	3,000%	2017 - 1st	7,01	325,43
I.CO.P. S.p.A.	5,000	6,100%	2017 - 1st	6,50	641,11
Seleco S.p.A.	3,250	8,000%	2017 - 1st	4,98	863,47
La Scuola S.p.A.	6,000	3,000%	2017 - 1st	3,00	360,92
Decomar S.p.A.	50,000	8,000%	2017 - 1st	5,03	841,86
Energon Esco S.p.A.	2,000	7,000%	2017 - 1st	6,84	747,77
Giglio Group S.p.A.	1,000	2,900%	2017 - 1st	0,97	373,51
D'Amante S.p.A.	0,500	4,100%	2017 - 1st	0,49	488,87
Alois Lageder S.p.A.	5,200	2,100%	2017 - 1st	7,52	205,22
Green Bit S.p.A.	0,500	4,100%	2017 - 1st	0,47	468,17
Hotel-Textil S.r.l.	3,000	4,000%	2017 - 1st	7,01	401,67
Eurovetrocap S.p.A.	0,508	2,450%	2017 - 2nd	3,00	297,27
Prismi S.p.A.	3,200	5,500%	2017 - 2nd	5,09	1161,05
Solis S.r.l.	0,400	4,550%	2017 - 2nd	3,00	507,69
Piave Servizi S.r.l.	3,000	4,000%	2017 - 2nd	7,45	399,12
Safco Engineering S.p.A.	1,000	6,440%	2017 - 2nd	6,00	658,25
Safco Engineering S.p.A.	3,000	6,350%	2017 - 2nd	6,00	664,13
Cdr Advance Capital S.p.A.	7,000	5,000%	2017 - 2nd	5,00	563,95
Impresa Percassi S.p.A.	4,200	6,250%	2017 - 2nd	5,00	669,44
Ireos S.p.A.	0,200	4,000%	2017 - 2nd	0,66	485,21
Renovo S.p.A.	2,000	5,000%	2017 - 2nd	5,25	487,58
Citai Holding S.p.A.	2,427	3,500%	2017 - 2nd	10,00	325,70
Cristiano di Thiene S.p.A.	0,600	3,950%	2017 - 2nd	1,00	478,39

Final Sample - list of emissions

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Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)	
The Outplay Italy S.r.l.	2,000	5,500%	2017 - 2nd	5,03	598,4 0	
Space S.p.A.	0,350	4,350%	2017 - 2nd	1,00	516,74	
EdiliziAcrobatica S.p.A.	3,000	4,000%	2017 - 2nd	6,00	422,05	
EdiliziAcrobatica S.p.A.	2,000	5,000%	2017 - 2nd	6,00	527,41	
Hotel Adler S.r.l.	5,200	2,150%	2017 - 2nd	6,17	227,02	
Mpg Manifattura Plastica S.p.A.	1,800	4,000%	2017 - 2nd	7,01	409,76	
Mpg Manifattura Plastica S.p.A.	0,600	3,600%	2017 - 2nd	7,01	367,64	
Mpg Manifattura plastica S.p.A.	1,000	3,600%	2017 - 2nd	6,97	366,95	
MetExtra S.p.A.	5,000	4,000%	2017 - 2nd	5,00	438,08	
Calia Trade S.p.A.	3,000	5,000%	2017 - 2nd	4,95	542,99	
Prismi S.p.A.	1,890	5,500%	2017 - 2nd	4,25	137,96	
ETT S.p.A.	1,000	3,950%	2017 - 2nd	1,00	478,23	
Faro S. Coop. Agricola S.p.A.	0,400	6,000%	2017 - 2nd	0,49	696,62	
Italian Food S.p.A.	1,000	1,600%	2017 - 2nd	1,25	239,69	
Prismi S.p.A.	1,000	5,000%	2017 - 2nd	1,50	586,58	
Heliopolis Energia Spa	2,000	5,250%	2017 - 2nd	7,01	548,86	
PWC Coopers Advisory S.p.A	9,000	4,000%	2017 - 2nd	1,50	484,23	
Prismi S.p.A.	2,100	5,500%	2017 - 2nd	5,42	598,3 0	
La Tecnica nel Vetro S.p.A.	5,000	5,750%	2017 - 2nd	3,00	646,41	
Lefay resort S.r.l.	6,500	4,000%	2017 - 2nd	7,10	414,48	
C.R. S.p.A.	0,100	4,300%	2017 - 2nd	0,50	519,06	
Mario Schiano S.p.A.	3,000	5,000%	2017 - 2nd	5,00	536,12	
Cantiere del Pardo S.p.A	0,200	3,900%	2017 - 2nd	0,75	477,65	
Holding Dolciaria Italiana S.p.A.	3,000	5,500%	2017 - 2nd	5,07	725,57	

Final Sample - list of emissions

Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
Ireos S.p.A.	0,400	3,800%	2017 - 2nd	0,59	464,38
Gida S.p.A.	5,000	4,700%	2017 - 2nd	5,96	497,18
Intersys S.r.l.	0,100	4,300%	2017 - 2nd	0,50	519,54
Damiano S.p.A.	9,000	4,300%	2017 - 2nd	10,00	416,69
Peuterey (G&P Net S.p.A.)	9,000	4,300%	2017 - 2nd	10,00	416,69
Radio Dimensione Suono S.p.A.	15,000	4,300%	2017 - 2nd	10,00	416,68
Unionbau S.r.l.	1,500	3,500%	2017 - 2nd	6,63	372,27
Plissé S.p.A.	0,500	2,600%	2017 - 2nd	0,79	344,62
Valprosciutti S.p.A.	20,000	5,850%	2017 - 2nd	6,04	623,83
Gi.Vi. S.p.A.	6, 000	6,000%	2017 - 2nd	6,04	618,13
Lui S.p.A.	5,000	5,900%	2017 - 2nd	6,03	594,11
4Madonne Caseificio Emilia S.Coop.	0,200	4,500%	2017 - 2nd	1,00	533,95
Italian Top Food S.p.A.	10,000	5,750%	2017 - 2nd	6,02	673, 70
Osai Automation System S.p.A.	0,700	3,600%	2017 - 2nd	1,00	442, 70
PAGANELLA 2001 S.P.A.	6, 000	3,000%	2017 - 2nd	6,78	331,25
Alfa Cheese Industries Sdn. Bhd.	15,000	5,600%	2017 - 2nd	6,01	565,06
Conte Tasca d'Almerita S.a.r.l.	0,500	3,550%	2018 - 1st	0,75	429,25
CDR Advance Capital S.p.A.	1,795	2,750%	2018 - 1st	7,01	295,91
Scatolificio Salernitano S.p.A.	0,500	3,700%	2018 - 1st	1,25	437,04
Hja Italia S.r.l.	0,300	4,500%	2018 - 1st	0,50	526,60
Bossong S.p.A.	0,381	6,000%	2018 - 1st	9,95	573,53
Dema Apulia Region S.r.l.	15,000	12,000%	2018 - 1st	5,93	1238,43
Prismi S.p.A.	1,221	5,000%	2018 - 1st	5,17	509,88
CAAR S.p.A.	1,700	5,250%	2018 - 1st	6,00	517,21

Final Sample - list of emissions

Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
CAARSpA	0.300	4 750%	2018 - 1st	6.00	467.24
Malian and Cliterana S a A	0,300	F, 0000/	2010 - 1st	5.00	51656
Mouno sui Cutunno S.p.A.	0,400	5,000%	2018 - 1st	5,00	510,50
Casa Di Cura S.M. Maddalena S.p.A.	1,000	3,600%	2018 - 1st	1,00	434,20
Bioera S.p.A.	2,022	9,500%	2018 - 1st	2,94	1022,37
Anthilia Holding S.r.l.	10,000	4,000%	2018 - 1st	8,00	476,07
Your Voice S.p.A.	1,000	5,500%	2018 - 1st	4,76	584,47
Sitma Machinery S.p.A.	2,000	8,500%	2018 - 1st	4,76	874,73
Edil Baggio S.r.l.	1,100	2,000%	2018 - 1st	5,00	210,28
Zappalà S.p.A	0,500	3,750%	2018 - 1st	0,61	425,09
Faro S. Coop. Agricola S.p.A.	0,400	6,000%	2018 - 1st	1,00	673,53
Baia Silvella S.p.A.	10,000	5,000%	2018 - 1st	5,51	507,59
E3E S.r.l.	5,000	4,000%	2018 - 1st	6,65	392,9 0
Renexia Wind Offshore S.p.A.	25,000	8,000%	2018 - 1st	8,01	779,57
Marina di Punta Nera S.p.A.	25,000	7,000%	2018 - 1st	5,11	723,63
Prismi S.p.A.	3,116	5,000%	2018 - 1st	4,17	546,17
MyChoice S.r.l.	0,500	3,000%	2018 - 1st	0,50	366,35
Car Clinic S.r.l.	2,000	3,250%	2018 - 1st	5,00	355,24
Musement S.p.A.	2,500	11,000%	2018 - 1st	2,91	1190,17
Or.V.A. S.r.l.	5,000	5,500%	2018 - 1st	5,48	575,97
Or.V.A. S.r.l.	1,000	5,500%	2018 - 1st	5,48	577,71
Alma Media S.p.A.	1,850	5,500%	2018 - 1st	1,50	625,72
GS Industry S.p.A.	3,000	4,350%	2018 - 2nd	3,50	493,93
Sintexcal S.p.A.	1,000	4,000%	2018 - 2nd	1,00	470,8 0
EVA Renewable Assets ERA S.p.A.	26,000	5,900%	2018 - 2nd	11,49	549,25

Final Sample - list of emissions
Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
Coop. Allevatori Ovini Formaggi	1,750	3,600%	2018 - 2nd	1,97	312,24
Bora S.r.l.	2,800	4,500%	2018 - 2nd	5,45	490,9 0
Bora S.r.l.	2,200	4,500%	2018 - 2nd	6,45	540,7 0
C.R. S.p.A.	0,500	4,100%	2018 - 2nd	0,69	486,28
Osai Automation System S.p.A.	1,700	3,800%	2018 - 2nd	4,00	425,72
Tecnoline S.p.A.	1,500	8,000%	2018 - 2nd	5,00	857,71
Prismi S.p.A.	2,374	5,000%	2018 - 2nd	5,25	537,68
B2 S.r.l.	3,000	11,000%	2018 - 2nd	5,01	1168,28
Advice Group S.p.A.	0,300	5,800%	2018 - 2nd	0,75	650,92
Diapath S.p.A.	1,100	8,000%	2018 - 2nd	8,42	818,44
Duetti Packaging S.r.l.	0,500	4,500%	2018 - 2nd	0,81	523,20
Polomarconi Telsa S.p.A.	0,500	4,100%	2018 - 2nd	0,81	485,36
Tratter Engineering S.r.l.	4,000	3,000%	2018 - 2nd	6,40	313,12
Velenosi S.r.l.	3,000	5,650%	2018 - 2nd	5,31	607,39
ETT S.p.A.	1,000	6,500%	2018 - 2nd	7,01	366,37
ЕТ [*] Т S.p.A.	0,500	6,500%	2018 - 2nd	7,01	366,25
Prismi S.p.A.	1,430	5,000%	2018 - 2nd	5,08	531,43
Tema Technology and Materials S.r.l.	5,000	3,000%	2018 - 2nd	6,99	287,04
Conte Tasca d'Almerita S.r.l.	3,000	3,900%	2018 - 2nd	7,01	381,07
Ricci S.p.A.	1,181	5,000%	2018 - 2nd	4,00	640,11
Lavanderie dell'Alto Adige S.r.l.	3,000	5,500%	2018 - 2nd	6,35	561,98
Wearena Entertainment S.p.A.	1,000	5,000%	2018 - 2nd	1,50	570,67
Agatos S.p.A.	1,104	7,000%	2018 - 2nd	1,50	763,47
K4A S.p.A.	2,200	9,000%	2018 - 2nd	3,00	946,05

Final Sample - list of emissions

Issuer	Amount (€ mln)	Coupon	Semester	Maturity (years)	Spread (bps)
Prismi S.p.A.	1,233	5,000%	2018 - 2nd	5,50	528,00
Matrunita Mediterranea S.r.l.	0,600	6,250%	2018 - 2nd	5,00	652,77
Evolvere S.p.A	2,000	1,000%	2018 - 2nd	5,00	118,24
Plissé S.p.A	0,750	2,500%	2018 - 2nd	1,00	323,10
Space S.p.A	0,500	4,200%	2018 - 2nd	0,07	470,6 0
Arte Bianca S.r.l.	3,000	5,000%	2018 - 2nd	5,59	533,77
Pharmakrymi S.p.A.	2,000	5,500%	2018 - 2nd	5,00	580,25
Fermi S.p.A.	8,000	5,000%	2018 - 2nd	2,00	566,02
Thermokey S.p.A.	1,500	4,500%	2018 - 2nd	6,06	474,91
Prismi S.p.A.	1,125	5,000%	2018 - 2nd	4,58	127,01
2M S.r.l.	0,500	4,200%	2018 - 2nd	1,00	500,73
TSW Industries S.r.l.	1,000	6,000%	2018 - 2nd	5,00	639,9 0
ETT S.p.A.	2,500	6,500%	2018 - 2nd	6,28	691,1 0
ExperGreen S.r.l.	2,000	4,600%	2018 - 2nd	7,01	475,39
Cobral S.r.l.	0,500	4,000%	2018 - 2nd	0,44	499,79
Lucaprint Group S.p.A.	0,500	4,500%	2018 - 2nd	0,50	535,34
Rottami Metalli Italia RMI S.p.A.	2,500	5,000%	2018 - 2nd	5,00	539,67
Graded S.p.A.	1,500	5,300%	2018 - 2nd	5,00	574,79
TSW Industries S.r.l.	0,600	6,000%	2018 - 2nd	5,00	643,10
Clevertech Group S.p.A.	5,000	5,600%	2018 - 2nd	5,00	599,21

Final Sample - list of emissions

Appendix C

Additional Univariate Tests

Maturity (years)				
			Kruskal-Wa	llis
	Obs.	Chi-squared	df	p-value
≤ 1	46	45	45	0,0752
From 1 to 5	56			
>5	153			

Table C.1: Kruskal-Wallis test for Maturity variable

Options

			Kruskal-Wallis	
	Obs.	Chi-squared	df	p-value
No	22	21	21	0,0089
Callable	76			
Putable	53			
Callable and Putable	104			

Table C.2: Kruskal-Wallis test for Option variables

Year				
			Kruskal-Wa	llis
	Obs.	Chi-squared	df	p-value
≤ 2015	50	45,5	45	0,0603
2016	54			
2017	75			
2018	76			

Table C.3: Kruskal-Wallis test for Issuance year

Appendix D

Variables Correlation Matrix

Table D.1: Correlation Matrix

		(a)	(q)	(c)	(p)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(1)	(m)	(u)	
(b) 0,01 1 (c) 0,06 -0,12 1,00 (d) 0,11 -0,09 0,05 1,00 (e) 0,01 0,12 0,03 0,05 1,00 (f) 0,21 -0,12 0,13 0,23 0,20 (f) 0,21 -0,13 0,13 0,23 0,20 (h) 0,01 -0,19 0,11 0,23 -0,02 (i) -0,09 0,01 0,12 -0,23 -0,02 (i) -0,09 0,01 0,12 -0,23 -0,02 (i) -0,09 0,01 0,12 -0,23 -0,02 (i) -0,09 0,01 -0,12 0,01 0,03 (i) 0,26 0,01 -0,12 -0,12 0,03 (m) -0,12 0,03 0,12 -0,12 0,03 (m) -0,12 0,03 0,12 -0,12 0,13 (m) -0,12	(a)	1														
	(q)	0,01	1													
(d) 0,11 -0.09 0,05 1,00 (e) 0,01 0,12 0,37 0,03 0,00 1,00 (f) 0,21 -0,03 0,37 0,23 0,20 1,00 (g) -0,51 0,13 0,13 0,23 0,20 1,00 (h) 0,01 -0,19 0,11 0,13 0,23 0,20 1,00 (h) 0,01 -0,19 0,11 0,12 0,12 0,02 0,02 (i) -0,02 0,01 -0,12 0,12 -0,12 0,02 (i) -0,02 -0,01 0,01 -0,12 0,02 0,03 (ii) -0,02 -0,01 0,01 0,01 0,03 0,13 0,12 0,01 (m) -0,12 0,01 -0,12 0,12 -0,12 0,03 (ii) -0,26 -0,03 0,13 0,15 -0,11 0,10 (m) -0,12 0,03	(c)	90'0	-0,12	1,00												
(e) 0,01 0,12 0,36 0,00 1,00 (f) 0,21 -0,03 0,37 0,23 0,20 (g) -0,51 0,18 -0,13 -0,23 -0,02 (h) 0,01 -0,19 0,10 0,02 -0,02 (i) -0,09 -0,10 0,12 -0,23 -0,02 (i) -0,09 -0,10 0,12 -0,23 -0,02 (i) -0,09 -0,10 0,12 -0,23 -0,02 (i) -0,09 -0,10 0,12 -0,24 0,03 (i) 0,26 -0,03 0,12 -0,12 0,09 (ii) 0,26 -0,03 0,12 -0,12 0,03 (m) -0,16 0,06 0,06 0,10 0,10 (m) -0,01 0,00 -0,01 0,01 0,01 (m) -0,01 0,00 0,01 0,01 0,01 (m) -0,01 <t< td=""><th>(p)</th><td>0,11</td><td>60'0-</td><td>0,05</td><td>1,00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	(p)	0,11	60'0-	0,05	1,00											
(f) 0,21 -0,03 0,37 0,23 0,20 (g) -0,51 0,13 0,13 -0,23 -0,02 (h) 0,01 -0,19 0,10 0,06 0,20 (i) -0,09 -0,10 0,12 -0,02 -0,03 (i) -0,09 0,01 -0,15 -0,12 0,03 (i) -0,02 -0,04 0,04 0,03 0,03 (i) 0,26 -0,04 0,04 0,03 0,13 0,13 (ii) 0,26 -0,03 0,15 -0,11 0,10 (m) -0,16 0,06 0,06 0,10 -0,01 (n) -0,01 0,00 -0,01 -0,01 -0,01 (n)	(e)	0,01	0,12	0,36	0)00	1,00										
(g) -0,51 0,13 -0,23 -0,02 (h) 0,01 -0,19 0,10 0,06 0,20 (i) -0,09 -0,10 0,12 -0,04 0,03 (i) -0,09 -0,10 0,12 -0,04 0,03 (i) -0,09 0,01 -0,15 -0,12 0,09 (i) 0,26 -0,03 0,01 -0,12 0,09 (ii) 0,26 -0,03 0,15 -0,11 0,10 (m) -0,16 0,06 0,06 0,10 -0,01 (n) -0,01 0,00 -0,01 -0,01 -0,01 -0,01	(f)	0,21	-0,03	0,37	0,23	0,20	1,00									
(h) <th>(g)</th> <td>-0,51</td> <td>0,18</td> <td>-0,13</td> <td>-0,23</td> <td>-0,02</td> <td>-0,28</td> <td>1,00</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	(g)	-0,51	0,18	-0,13	-0,23	-0,02	-0,28	1,00								
(i) -0,09 -0,10 0,12 -0,04 0,03 (j) -0,09 0,01 -0,15 -0,12 0,09 (k) -0,29 -0,04 0,03 0,15 -0,12 0,09 (k) -0,29 -0,04 0,04 0,05 0,13 0,13 (m) -0,16 0,06 0,06 0,10 -0,01 0,10 (n) -0,01 0,00 -0,01 0,00 -0,01 -0,04	(µ)	0,01	-0,19	0,10	0'00	0,20	0,14	-0,20	1,00							
(j) -0,09 0,01 -0,15 -0,12 0,09 (k) -0,29 -0,04 0,05 0,13 0,13 (l) 0,26 -0,03 0,15 -0,11 0,10 (m) -0,16 0,06 0,06 0,10 -0,07 (n) -0,01 0,00 -0,01 -0,01 -0,04	(i)	60'0-	-0,10	0,12	-0'0	0,03	0,10	0,02	0,29	1,00						
(k) -0,29 -0,04 0,04 0,05 0,13 (l) 0,26 -0,03 0,15 -0,11 0,10 (m) -0,16 0,06 0,06 0,10 -0,07 (n) -0,01 0,00 -0,01 -0,04 -0,04 -0,04	(j)	60′0-	0,01	-0,15	-0,12	60'0	-0,15	10'0	90'0-	-0,31	1,00					
(l) 0,26 -0,03 0,15 -0,11 0,10 (m) -0,16 0,06 0,06 0,10 -0,07 (n) -0,01 0,00 -0,01 -0,04 (a) 0,00 0,00 0,00 0,00	(K)	-0,29	-0,04	0,04	0'02	0,13	0,04	90'0	0,15	0,47	60′0-	1,00				
(m) -0,16 0,06 0,06 0,10 -0,07 -0,07 -0,07 -0,07 -0,04	()	0,26	-0,03	0,15	-0,11	0,10	0'02	-0,20	0,10	-0,06	20'0	-0,11	1,00			
(n) -0,01 0,00 -0,01 -0,04 -0,04 -0,04 -0,04	(m)	-0,16	0'00	90'0	0,10	-0'0	0'02	90'0	-0,12	0,02	0),00	0,14	-0,10	1,00		
	(u)	-0,01	00'0	-0,01	-0,11	-0'04	-0'05	0,10	-0'02	-0,01	10'0	-0,05	0,03	0,14	1,00	_
	(0)	00'0	0,04	0,10	-0,03	0'0	0,02	6,04	-0'02	-0,02	60′0	90'0-	0)00	0,02	0,17	
(p) -0,25 -0,10 0,09 0,04 0,02	(d)	-0,25	-0,10	60'0	10 [°] 0	0,02	-0,02	0,13	90'0-	0,17	-0,14	0,16	-0,03	0,15	0,02	

Appendix E

Regression tests

The following tables display the results of the specification and Variance Inflation Factor tests performed for each regression.

	(1)	(2)	(3)	(4)	(5)	(6)
White Test						
chi squared	4.91	3.87	3.93	3.781	3.25	2.99
p-value	0.1817	0.2716	0.1819	0.2262	0.1521 1	0.1332
RESET Test on fitted	values of s	spread			-	
F-statistic	3.27	1.81	0.62	0.17	0.43	0.12
p-value	0.0716	0.1802	0.4300	0.6805	0.5133	0.7311
RESET Test on regres	ssors					
F-statistic	2.40	n.a	1.13	0.35	2.28	0.45
p-value	0.0288	n.a.	0.3397	0.9775	0.2884	0.9621
Shapiro-Wilk						
W	0.9631	0.9744	0.9717	0.9757	0.9703	0.9768
p-value	3.92E-06	0.0002	5.96E-05	0.0002	3.71E-05	0.0004
Bera-Jarque (Skewnes	s-Kurtosis) Test				
Skewness	0.6143	0.4541	0.2810	0.2713	0.3155	0.2728
Kurtosis	4.8858	4.3306	4.6452	4.5382	4.9156	4.7449
chi squared	53.82	27.57	32.33	28.27	43.22	35.51
p-value	2.05E-12	1.03E-06	9.53E-08	7.27E-07	4.12E-10	1.94E-08

First step: (1) "M" Model 1; (2) "R" Model 2;

First step: (3) "M" Model 3; (4) "R" Model 4;

First step: (5) "M" Model 5; (6) "R" Model 6.

Table E.1: Results of specification tests

	(1) VIF	"M" Model 1/VIF		(2) VIF	"R" Model 1/VIF
Maturity	1,032	0,969	Rep. Scheme	1,127	0,887
Call Option	1,036	0,966	Call Option	1,061	0,943
Put Option	1,301	0,769	Put Option	1,301	0,768
Secured	1,054	0,949	Secured	1,077	0,929
Listed Bond	1,175	0,851	Listed Bond	1,174	0,852
Covenants	1,248	0,801	Covenants	1,266	0,790
Mean	1,141		Mean	1,168	

Table E.2: VIF values for step one regression – Model $n^{\circ}1$ and $n^{\circ}2$

	(3)	"M" Model		(4) '	'R" Model
	VIF	1/VIF		VIF	1/VIF
Maturity	1,281	0,780	Rep. Scheme	1,205	0,830
Call Option	1,080	0,926	Call Option	1,101	0,908
Put Option	1,342	0,745	Put Option	1,340	0,746
Secured	1,085	0,922	Secured	1,108	0,902
Listed Bond	1,264	0,791	Listed Bond	1,266	0,790
Covenants	1,244	0,804	Covenants	1,259	0,794
Rating	1,184	0,845	Rating	1,201	0,833
Z-score	1,496	0,669	Z-score	1,492	0,670
Listed firm	1,167	0,857	Listed firm	1,150	0,870
Current Assets/Tot. Assets	1,386	0,721	Current Assets/Tot. Assets	1,290	0,775
Ln(Tot. Assets)	1,109	0,901	Ln(Tot. Assets)	1,067	0,937
Manufacturing	1,109	0,902	Manufacturing	1,063	0,941
Mean	1,229		Mean	1,212	

Table E.3: VIF values for step two regression – Model $n^{\circ}3$ and $n^{\circ}4$

	(5) VIF	"M" Model 1/VIF		(6) VIF	"R" Model 1/VIF
Maturity	1,279	0,782	Rep. Scheme	1,198	0,835
Call Option	1,079	0,927	Call Option	1,100	0,909
Put Option	1,351	0,740	Put Option	1,351	0,740
Secured	1,095	0,913	Secured	1,113	0,898
Listed Bond	1,267	0,789	Listed Bond	1,270	0,787
Covenants	1,234	0,810	Covenants	1,247	0,802
Rating	1,182	0,846	Rating	1,196	0,836
Z-score	1,481	0,675	Z-score	1,478	0,677
Listed firm	1,169	0,855	Listed firm	1,154	0,866
CATA Ratio	1,395	0,717	CATA Ratio	1,310	0,763
Ln(Tot. Assets)	1,099	0,910	Ln(Tot. Assets)	1,061	0,943
Manufacturing	1,107	0,904	Manufacturing	1,066	0,938
Italy ESI	1,078	0,928	Italy ESI	1,067	0,937
Nom. GDP growth	1,020	0,980	Nom. GDP growth	1,024	0,976
Unemployment rate	1,007	0,993	Unemployment rate	1,008	0,992
Mean	1,189		Mean	1,176	

Table E.4: VIF values for step three regression – Model $n^{\circ}5$ and $n^{\circ}6$

Appendix F Regressions output

The following tables display the output of the eight regressions performed, complete of p-values, standard errors and confidence intervals for coefficients' estimates.

	(1) "Μ β	" Model p-value	Std. Error	Conf. Interval (95%)
Bond characteristics				
Maturity	-0,130***	1,48E-06	2,6430867	[-18,24 ; -7,83]
Call Option	-0,037	0,8750	23,582809	[-50,16; 42,73]
Put Option	-0,611**	0,0143	24,756136	[-109,86 ; -12,34]
Secured	0,791***	0,0012	24,076907	[31,71; 126,55]
Listed Bond	0,442*	0,0582	23,224643	[-1,53; 89,94]
Covenants	-0,163	0,4919	23,641803	[-62,83; 30,29]
Intercept	6,045***	5,16E-57	28,759652	[547,83;661,28]
Observations	255			
R ²	0,1507			
Adj. R ²	0,1301			
F-test	7,33			
p-value	5,71E-15			
AIC	993,9323			
BIC	1022,262			

* p-value < 10%, ** p-value < 5%, *** p-value < 1%

Table F.1: Output table - Regression 1

	(2) "R	." Model				
	β	p-value	Std. Error	Conf. Interval (95%)		
Bond characteristics						
Rep. Scheme	0,445***	5,86E-02	23,403522	[-1,62;90,56]		
Call Option	-0,148	0,5512	24,831375	[-63,72;34,08]		
Put Option	-0,602**	0,0203	25,762838	[-110,91 ; -9,43]		
Secured	0,787***	0,0021	25,325264	[28,77; 128,53]		
Listed Bond	0,476**	0,0499	24,149954	[0,01;95,14]		
Covenants	-0,272	0,2725	24,773566	[-76,04;21,55]		
Intercept	5,258***	1,75E-45	29,907093	[466,94 ; 584,75]		
Observations	255					
\mathbb{R}^2	0,0807					
Adj. R ²	0,0584					
F-test	3,63					
p-value	0,0018					
AIC	1014,121					
BIC	1042,451					

Table F.2: Output table – Regression 2

	(3) "M β	" Model p-value	Std. Error	Conf. Interval (95%)
Bond characteristics				
Maturity	-0,051***	6,15E-02	2,7238737	[-10,48;0,25]
Call Option	0,117	0,5996	22,267937	[-32,16;55,57]
Put Option	-0,368	0,1150	23,251245	[-82,58;9,02]
Secured	0,517**	0,0231	22,593125	[7,17;96,17]
Listed Bond	0,242	0,2785	22,275972	[-19,68;68,07]
Covenants	-0,194	0,3741	21,830504	[-62,44 ; 23,56]
Issuer characteristics				
Rating	1,057***	0,0034	35,724835	[35,35;176,09]
Z-score	-0,085**	0,0478	4,2825411	[-16,95;-0,08]
Listed firm	0,738**	0,0386	35,467908	[3,88;143,62]
CATA Ratio	0,811*	0,0607	43,01481	[-3,67; 165,79]
Ln(Tot. Assets)	-0,522***	6,40E-09	8,6704093	[-69,28 ; -35,12]
Manufacturing	0,732***	0,0005	20,865271	[32,07;114,27]
Intercept	13,813***	4,42E-18	146,99981	[1091,77;1670,89]
Observations	255			
R ²	0,3083			
Adj. R ²	0,2740			
F-test	8,99			
p-value	3,19E-14			
AIC	953,5759			
BIC	1003,154			

Table F.3: Output table – Regression 3

	(4) "R" Model			
	β	p-value	Std. Error	Conf. Interval (95%)
Bond characteristics				
Rep. Scheme	0,112	0,6068	21,650957	[-31,49 ; 53,81]
Call Option	0,103	0,6499	22,638732	[-34,31 ; 54,88]
Put Option	-0,348	0,1386	23,396153	[-80,85;11,32]
Secured	0,485**	0,0358	22,988497	[3,25;93,82]
Listed Bond	0,228	0,3114	22,44568	[-21,45;66,98]
Covenants	-0,241	0,2762	22,1122	[-67,69;19,42]
Issuer characteristics				
Rating	1 114***	0.0023	36 225475	[40 09 · 182 81]
Z-score	-0.090**	0.0370	4 3064095	[-17 51 · -0 55]
Listed firm	0.821**	0.0214	35.444181	[12.26 : 151.89]
CATA Ratio	1,017**	0,0156	41,770905	[19,47;184,03]
Ln(Tot. Assets)	-0,557***	4,27E-10	8,5618636	[-72,61;-38,88]
Manufacturing	0,812***	0,0001	20,564637	[40,71;121,73]
Intercept	13,982***	1,19E-17	151,10313	[1100,59 ; 1695,88]
Observations	255			
P ²	233 0. 2 990			
Adi R ²	0,2990			
E tost	0,2042 8.60			
r-itsi	0,00 1 30E 13			
p-value	1,3912-13			
	1007 ECE			
BIC	1006,565			

Table F.4: Output table – Regression 4

Regressions	outpi	Jt
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	(5) "M" Model			
	β	p-value	Std. Error	Conf. Interval (95%)
Bond characteristics				
Maturity	- 0,063***	2.03E-02	2.7105079	[-11.67 : -0.99]
Call Option	0,217	0,3297	22,174297	[-22,03 ; 65,34]
Put Option	-0,288	0,2118	22,995126	[-74,09;16,51]
Secured	0,638***	0,0055	22,543386	[18,78; 107,59]
Listed Bond	0,155	0,4842	22,072274	[-28,01 ; 58,95]
Covenants	-0,158	0,4637	21,51585	[-58,18 ; 26,59]
Issuer characteristics				
Rating	0,902**	0,0124	35,793808	[19,72; 160,75]
Z-score	-0,087**	0,0405	4,2158458	[-16,99 ; -0,38]
Listed firm	0,828**	0,0189	35,039634	[13,81 ; 151,86]
CATA Ratio	1,051**	0,0154	43,07925	[20,27; 189,99]
Ln(Tot. Assets)	-0,541***	1,23E-09	8,5570318	[-70,99 ; -37,27]
Manufacturing	0,817***	0,0001	20,744219	[40,81 ; 122,54]
Macroeconomic variable	s			
Italy ESI	-0,070***	0,0025	2,2739293	[-11,43 ; -2,47]
Nominal GDP growth	0,361	0,2476	31,17015	[-25,27;97,53]
Unemployment rate	5,547	0,2648	496,29295	[-422,97;1532,62]
Intercept	20,957***	5,47E-13	274,56229	[1554,8;2636,55]
Observations	255			
R ²	0,3400			
Adj. R ²	0,2985			
F-test	8,21			
p-value	5,71E-15			
AIC	948,2988			
BIC	1008,5			

Table F.5: Output table – Regression 5

	(6) "R" Model			
	β	p-value	Std. Error	Conf. Interval (95%)
Bond characteristics				
Rep. Scheme	0,1	0,6402	21,471469	[-32,25 ; 52,35]
Call Option	0,191	0,4002	22,649761	[-25,53;63,71]
Put Option	-0,273	0,2408	23,245911	[-73,13;18,46]
Secured	0,575**	0,0129	22,925118	[12,29; 102,61]
Listed Bond	0,147	0,5093	22,338439	[-29,24; 58,77]
Covenants	-0,223	0,3105	21,896687	[-65,39 ; 20,88]
Issuer characteristics				
Rating	0,989***	0,0071	36,401554	[27,2;170,62]
Z-score	-0,093**	0,0296	4,2568031	[-17,7;-0,93]
Listed firm	0,915**	0,0100	35,229639	[22,08;160,88]
CATA Ratio	1,272***	0,0030	42,442671	[43,58;210,8]
Ln(Tot. Assets)	-0,584***	6,64E-11	8,5367014	[-75,19;-41,56]
Manufacturing	0,907***	1,75E-05	20,678945	[49,92;131,39]
Macroeconomic variable	s			
Italy ESI	-0,065***	0,0051	2,2885314	[-10,97;-1,96]
Nominal GDP growth	0,344	0,2778	31,583069	[-27,86;96,57]
Unemployment rate	4,042	0,4188	499,06276	[-578,96 ; 1387,29]
Intercept	20,696***	2,13E-12	279,19471	[1519,61 ; 2619,6]
Observations	255			
R ²	0,3255			
Adj. R ²	0,2832			
F-test	7,69			
p-value	5,77E-14			
AIC	953,2191			
BIC	1013,421			
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Table F.6: Output table – Regression 6