Pontifícia Universidade Católica do Rio de Janeiro

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Corporate Bond Pricing: A Systematic Literature Review on Influential Factors

Dissertação de Mestrado

Dissertation presented to the Programa de Pós-graduação em Engenharia de Produção of PUC-Rio in partial fulfillment of the requirements for the degree of Mestre em Engenharia de Produção.

Advisor: Igor Tona Peres
Co-advisor: Davi Michel Valladão

Rio de Janeiro
March 2024

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Abstract

Lopes, Bianca Bunjes; Peres, Igor Tona (Advisor); Valladão, Davi Michel (Co-advisor). **Corporate Bond Pricing: A Systematic Literature Review on Influential Factors.** Rio de Janeiro, 2024. 51p. Dissertação de Mestrado - Departamento de Engenharia Industrial, Pontifícia Universidade Católica do Rio de Janeiro.

This thesis provides a systematic literature review on the pricing of corporate bonds worldwide. These securities are essential financing mechanisms for companies worldwide and are vital to transfer resources and catalyze economic growth. The democratizing potential of capital markets is highlighted, emphasizing that anyone can become an investor, thus facilitating wealth creation and boosting the national economy. The main exploration of the study is the bond pricing process in financial markets, focusing on the determinants of the price of these securities. Through a systematic review of selected literature, the research elucidates complex relationships between bond valuation, credit ratings, macroeconomic indicators, and specific bond characteristics. The greatest contribution is a final table that categorize the factors into corporate, issuance, liquidity and macroeconomic/market. This categorization is important to serve as a guide for future works. The existing literature lacks comprehensive reviews on the factors influencing corporate bond prices, and there is a notable absence of categorizations of these factors.

Keywords

Systematic Review; Corporate Bond Pricing; Credit Spreads; Bond Valuation; Bond Factor; Factor Analysis; Factors Categorization.

Resumo

Lopes, Bianca Bunjes; Peres, Igor Tona (Advisor); Valladão, Davi Michel (Co-advisor). **Precificação de Títulos Corporativos: Uma revisão sistemática da literatura sobre os fatores que influenciam**. Rio de Janeiro, 2024. 51p. Dissertação de Mestrado - Departamento de Engenharia Industrial, Pontifícia Universidade Católica do Rio de Janeiro.

Esta tese fornece uma revisão sistemática da literatura sobre a precificação de títulos corporativos ao redor do mundo. Estes títulos são mecanismos de financiamento essenciais para empresas do mundo inteiro e são primordiais para transferir recursos e fomentar o crescimento económico. O mercado de capitais é um mercado democrático e acessível, onde qualquer pessoa pode se tornar investidor, facilitando assim a criação de riqueza e dinamizando a economia. O processo de precificação de títulos de dívidas corporativas é o foco principal do trabalho, em que vai ser estudado quais são os fatores determinantes do preço desses títulos. Através de uma revisão sistemática da literatura, a pesquisa elucida relações complexas entre a precificação dos títulos, classificações de crédito, indicadores macroeconômicos e características específicas das emissões. A maior contribuição do presente estudo é uma tabela final que categoriza os fatores de determinação do preço em: corporativos, da emissão, de liquidez e macroeconômico/de mercado. Essa categorização é importante para servir de guia para trabalhos futuros. A literatura existente carece de revisões abrangentes sobre os fatores que influenciam os preços dos títulos corporativos de dívida e há uma notável ausência de categorizações destes fatores.

Palavras Chaves

Revisão Sistemáica; Precificação de títulos corporativos; Spread; Renda Fixa Corporativa; Análise de Fatores.

Table of Contents

List of Figures

List of Tables

1. Introduction

The financial and capital markets operate as an important financing tool for companies and entrepreneurs worldwide. The capital market let companies to issue bonds to obtain the necessary resources to carry out their activities. Due to this characteristic, corporate bonds can be considered true corporate debt instruments (HECK, 2022).

Compared to equity issuance by companies, corporate debt securities have the benefit that they do not impact ownership or control of the companies' activities. However, corporate debt contracts generally include covenants that must be complied with over the term of the debt and can interfere in the company's decisions even without changing its ownership control (KONRAHT; SOARES, 2020). Additionally, companies have a variety of types of debt securities to offer investors according to the their demand (HECK, 2022). However, despite the relevance of corporate debt securities and their close relationship with the real economy, in equity markets, hundreds of factors have been proposed to explain the return of those assets, and equity managers have applied factor investing successfully for decades. Factor investing in corporate bonds, on the other hand, is a relatively unexplored field (DANG; HOLLSTEIN; PROKOPCZUK, 2023).

The fundamental component of corporate bond prices is the credit risk associated with the issuer. This implies that, as issuing companies of the bonds have a non-zero probability of not being able to repay investors, these investors receive compensation in the form of risk premium, commonly referred to as the spread (HECK, 2022). However, it is not only credit risk that influences corporate bond prices. There are other components that concern market participants and directly influence asset pricing, such as the illiquidity of corporate bonds (GOLDSTEIN; NAMIN, 2023), exchange-rate risk, duration, equity momentum and others (DANG; HOLLSTEIN; PROKOPCZUK, 2023).

The analysis of the components of bond prices is crucial as it seeks to explain the yields of corporate debt (DRIESSEN, 2005). Therefore, this study aims to perform a

systematic literature review to investigate the pricing process of corporate debt assets in the financial market, specifically focusing on factors that are determinant for the composition of the final price.

A systematic literature review (SLR) stands as significant research undertaking in its own right, distinct from a mere recapitulation of prior writings. It addresses specific research questions (RQs) and constitutes a methodology that systematically identifies existing studies, meticulously chooses and assesses their contributions, analyzes and synthesizes data, and presents the evidence in a manner conducive to drawing reasonably clear conclusions about the known and unknown aspects within the subject matter (THOMÉ; SCAVARDA; SCAVARDA, 2016). In the present study we aim to analyze economic and market conditions that impact on the risk premiums accepted by investors and that will ultimately define the price of securities. We aim to answer two research questions: “Witch factors influence the price of corporate bonds?” and “How can these factors be grouped into “macro factors”, such as macroeconomic or market factors, liquidity factors, issuance factors and corporate factors. This review contributes significantly to the literature, as it provides a summary of articles about corporate debt prices and makes a correlation between them, in addition to providing a detailed view of the factors studied and also providing a categorization and summary of these analyzed factors.

This thesis is structured as follows. Section 2 presents the theoretical background, Section 3 presents the materials and methods used, Section 4 brings the results, divided into bibliometric analysis, descriptive analysis and content analysis, and Section 5 presents the discussion, summarizing the studies and where the factors are categorized in a table.

2. Theoretical background

Before delving into the actual presentation and explanation of the results of our studies, it is important to provide a theoretical introduction regarding the main concepts addressed in this work.

The most relevant and foundational term is “corporate bond”. A corporate bond is a type of debt instrument, issued by a company and sold to investors (HECK, 2022). It means that investors lend money to companies, and, in return, the company has a debt obligation to pay interest accrued on the principal and to return the principal when the bond comes due (US SECURITY, 2024). The corporate bonds are one of the most important components of the bond market.

There is a significant distinction exists between corporate bonds and stocks. An investor purchasing corporate bonds acquires a debt instrument from the company and is essentially lending money to the corporation. On the other hand, an investor acquiring stocks is buying a share of ownership in the company. It means that bond issuing do not affect the ownership of the company or how the company is operated (HECK, 2022).

Bonds can be divided into various categories. In terms of the type of issuer, bonds can be corporate or public. For instance, there are government debt securities for each country within the bond markets, and there are those issued by companies, known as corporate bonds, which are the focus of this study. Bonds can also be classified based on its maturity, which is the date when firms are obligated to return the principal to investors. Lastly, bonds can be divided according to the type of interest payment. There are bonds that pay a fixed rate of interest, meaning the payments remain constant regardless of changes in market interest rates. There are also bonds that adjust their interest payments periodically and are subject to changes in market interest rates — these are known as “floating rate” bonds (US SECURITY, 2024) .

A bond is issued when a company needs to raise funds. During the bond issuance, parameters such as maturity, volume, interest rate, and issuance guarantees are defined.

Once issued, the bond can be acquired by investors and subsequently sold on a secondary market. The larger the company and the better the credit characteristics of the issuance, the more liquidity the bond will have — making it easier to convert the bond into cash. Liquidity will be a frequently discussed term in this study, typically referring to the cost and time it takes to buy or sell securities. Another commonly used term in the credit market is default risk (or credit risk), which is the risk that the issuer is unable to pay the total agreed-upon coupons and the principal during the lifetime or at the maturity of the bond.

3. Materials and Methods

The data and methods used in the present work will be detailed in the following topics of search strategy, eligibility criteria for selection of articles and data extraction. The systematic literature review was conducted and reported according to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (LIBERATI et al., 2009; MOHER et al., 2009).

3.1. Search strategy

From inception to June 2023, we searched Scopus data base. There are other study databases that we could use but, considering that Scopus is currently the largest existing multidisciplinary one, we believe that it will not be detrimental to the final result of the work. Several combinations of inclusion and exclusion criteria of articles were tested in order to find the one that would best achieve the desired documents and that would contribute to the proposed review.

The first search included articles using keywords, title and abstract. At this preliminary phase, it is crucial to ensure that potentially relevant articles are not overlooked; hence, the selection criteria must be judiciously balanced. Therefore, we used English as the language filter and also the combination of the words “bond*”, “credit spread*”, “pric*”, “spread*”, “yield*”, “corporate*”, “model*”, “estim*” and “factor*”. For the exclusion criteria, any articles with the terms “CDS*”, “Swap*”, or “Derivative*” in their titles, abstracts, or keywords were systematically excluded. This decision was based on the fact that the pricing of assets with any form of attached option or swap is highly specific and is conducted in differently from the approach proposed in this work.

A relevant question that may arise at this juncture is why not remove the word "option." The selection of words in a systematic review can be deceptive, and since “option” is a common word, it may be present in the text with a different meaning than financial options, which are derivatives. For this reason, the exclusion of articles dealing with options had to be accomplished through the identification of other keywords (CDS, swap and derivative) or through the discernment gained by reading

the articles themselves. The detailed inclusion criteria and the advanced literature search can be accessed in the Supplementary Materials I and II, respectively.

3.2. Selection of articles

The selection of articles consisted of three stages: (i) formulation of eligibility criteria; (ii) reading articles title and abstract; (iii) selection of articles for the full text reading (PERES et al., 2020; THOMÉ; SCAVARDA, 2016).

To define and refine the eligibility criteria, it was essential to review some of the articles identified in the preliminary phase by assessing the title and abstract of selected articles. For an article to advance to the subsequent stage of this investigation, it needed to be aligned with the overarching theme; that is, it should focus on the pricing of corporate securities. Based on the above considerations, we established the following eligibility criteria: (i) articles that propose a pricing model for securities; and (ii) articles that solely focus on corporate debt securities. Exclusion criteria included: (i) articles unrelated to the proposed topic; (ii) not about pricing or credit; (iii) articles that study other types of bonds such as convertible bonds, green bonds and others; (iv) articles that focus on other themes such as risk of default, liquidity, equity and, lastly; and (v) articles that studies derivatives.

3.3. Data extraction

The process of data extraction and synthesis stands as an important part in systematic review endeavors. Its paramount importance is underscored by the necessity to facilitate a lucid and structured comparison of the studies under consideration. In such reviews, the objective is to present a comprehensive view that transcends a mere collation of different studies. Instead, it aims to weave them together in a cohesive manner, highlighting contrasts, similarities, and emergent patterns.

For the current work, to effectively gather and organize key information from each article, we developed an initial table using ten articles as a test case. After reviewing these ten articles, we determined the specific variables we would collect. The following data, when available, were recorded: year, author(s), methodology,

country where the study was conducted, the databases utilized for bonds extraction, period of data analysis, variables of study and the specific factors considered.

3.4. Literature analysis

The following work encompasses a comprehensive research approach, employing bibliometric analysis, descriptive analysis, and content analysis.

The bibliometric analysis involves the quantitative examination of scholarly publications, citations, and related bibliographical data to discern patterns and trends within the research field. It was done using “Bibliometrix”, a statistical package written in the open-source R language, encompassing statistical algorithms, mathematical functionality, and visualization features, to make a bibliometric compilation of the scientific works identified in the initial research (ARIA; CUCCURULLO, 2017).

The descriptive analysis focuses on providing a detailed examination and summary of the characteristics, trends, and key features present in the selected studies. This type of analysis aims to provide a comprehensive overview of the existing literature relevant to the topic of interest. The descriptive analysis includes a synthesis of each study characteristics. Lastly, the content analysis delves into the qualitative exploration of textual materials, scrutinizing themes, patterns, and, mainly, the factors involved in pricing corporate bonds.

4. Results

4.1. Selection of studies

852 articles were identified in the initial research. After the removal of articles that did not follow the eligibility criteria, 147 articles were selected for full text analysis. Reading all the 147 articles, 40 was selected to compose the present literature review. The article inclusion diagram can be seen in Figure 1.

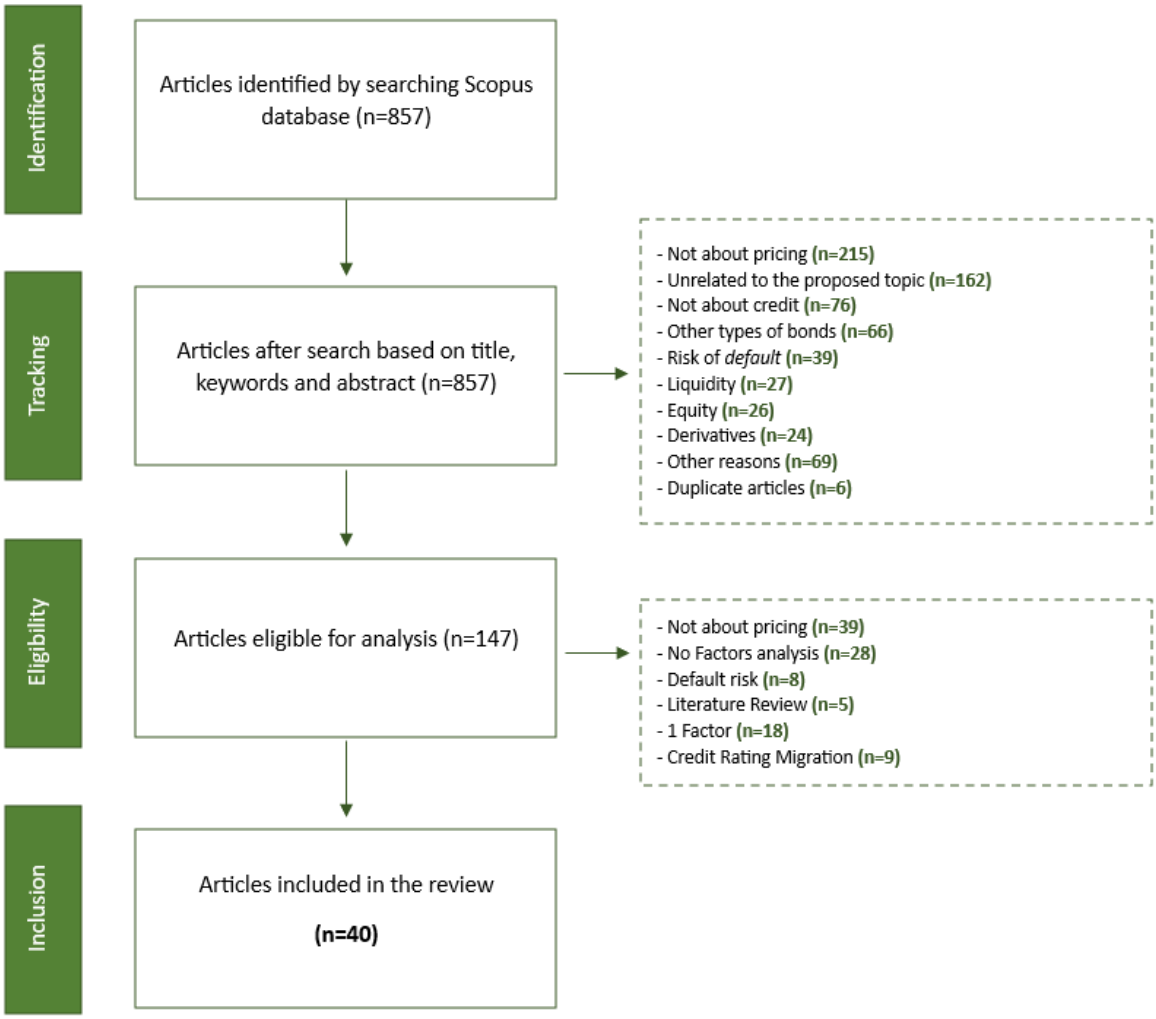

Figure 1: Article Inclusion Diagram.

The first sample of included studies share common research objectives, aiming to analyze the pricing of fixed-income corporate securities. Articles that priced assets other than the bond itself were excluded, for example articles that priced the company's default risk, liquidity risk or the ones that discuss companies' share prices. Most of the studies introduce a proposed methodology, encompassing various modeling approaches or empirical reviews. Initially, this review did not apply any filters to the factors identified in the analyses, allowing studies that examine the relationship of a single factor to bond pricing or even multiple factors. In the second stage of the process, when reading these articles, it was found that single factor studies would add little to the discussion and, therefore, they were excluded.

4.2. Bibliometric analysis

We performed a bibliometric analysis of the 40 articles included in the initial search (Figure 2). By analyzing the publication source of the studies, we can observe that most of them are published in high quality and well-known journals, such as Journal of Banking and Finance and Journal of Financial Economics. Another notable characteristic that can be observed is that all the sources are related to the subjects of

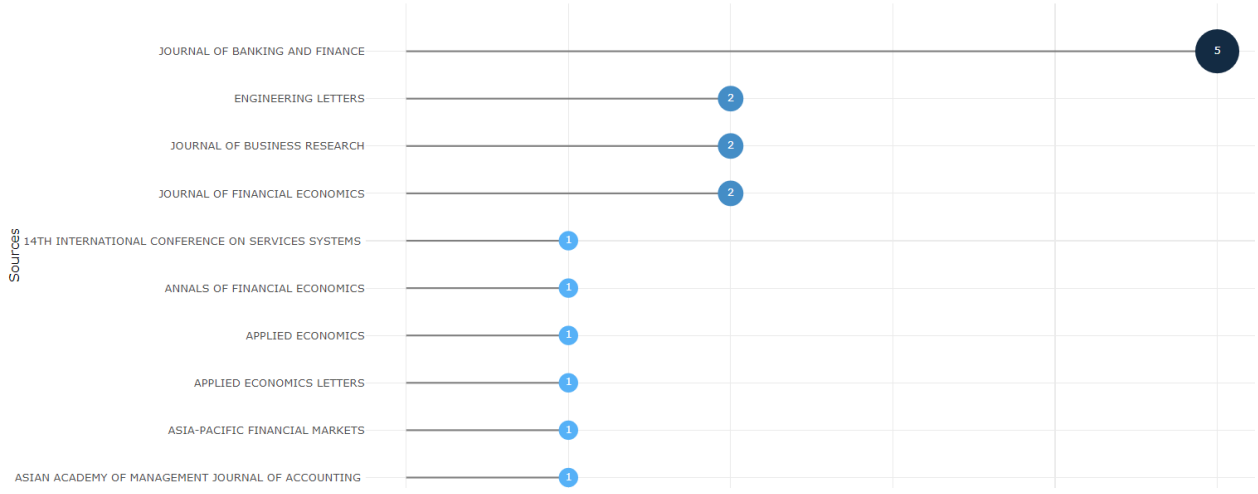

Figure 2: Most Relevant Sources

finance and economics. This aligns with expectations, given the thematic focus of the current research.

Going specifically into the subject of this work and examining the content of the articles, we can see a word cloud done using the abstract of the 40 articles (Figure 3). In summary, word clouds are used for information visualization, offering a quick and intuitive way to understand, summarize, and communicate textual data. Their

Figure 3: Wordcloud using Keywords

simplicity and effectiveness make them valuable tools. As expected, the words “Corporate Bond”, “Credit Risk”, and “Credit Spread” (and other related) are the more relevant ones.

Finally, the last figure of the bibliometric analysis is a thematic map (Figure 4). Thematic map is a very intuitive plot and is used to analyze themes according to the quadrant in which they are placed. Upper-right quadrant is motor themes, lower-right quadrant is basic themes, lower-left quadrant is emerging or disappearing themes,

upper-left quadrant is very specialized/niche themes. Themes in the upper-right quadrant are both well developed and important for the structuring of a research field. Themes in the lower-right quadrant are "important for a research field but are not developed" (ESFAHANI, 2019). As we can see in Figure 4, "Corporate Bond" and "Credit Risk" appears in the middle of these quadrants, which means that, in the sample used, they are relevant, well developed and able to structure the research field. Themes in the upper-left quadrant have well developed internal ties but unimportant external ties and so are of only marginal importance for the field such as "Ratings". Themes in the lower-left quadrant are both "weakly developed and marginal", mainly representing either emerging or disappearing themes, such as "default risk" and "equity market". It is important to mention that the analysis above is based on a sample of the 40 articles considered on this study. "Default Risk", for example, is a theme well developed, but in the sample of the present SLR, it remained in the "Emerging or Declining Theme" quadrant.

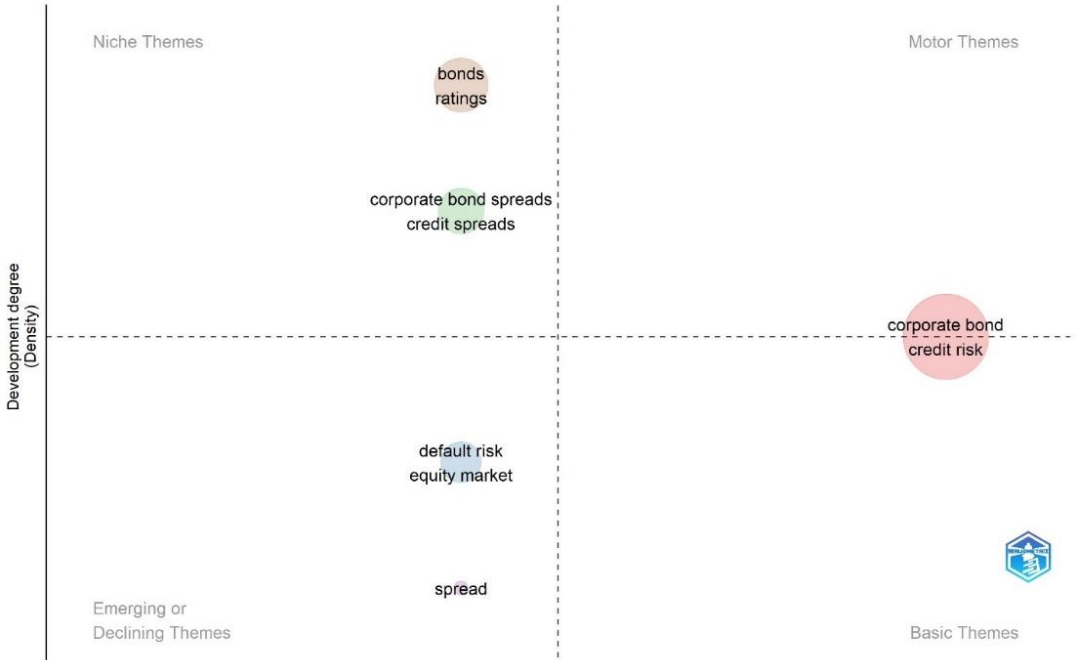

Figure 4: Thematic Map

Through this simple bibliometric analysis, looking for the words in Figure 3 and Figure 4, it is possible to conclude that we are on the right path and have a broad selection of articles on the chosen topic to advance to our systematic literature review.

4.3. Descriptive analysis

Through the previously mentioned criteria, valuable data were extracted from the articles included in the systematic review. As there are numerous articles and a wealth of information, in order to facilitate the comparison and understanding of these studies, Table 1 was constructed. Table 1 presents the main information from the studies, such as author and year, country, methodology, database used, period of analysis, dependent variable, and number of factors. From Table 1, it is possible to have a first and more general overview of the articles included in the review. For example, that the United States are the most studied country, with a total of 19 works, followed by China with nine.

Regarding the variables analyzed, the focus is always on the price (spread, return, yield) that we are seeking to explain. As for the method, given the scope of this study, regression is the method that we predominantly observed in this review. The number of factors analyzed is quite volatile, and the idea of the next chapters is precisely to better understand these factors to determine which ones are more relevant and sensitive to asset pricing.

Furthermore, upon examining the publication years of the research, it becomes evident that this subject has been under investigation for an extended period. Nevertheless, the current topic still presents itself as a substantial challenge, and undoubtedly additional academic contributions on the pricing bond will occur in the future.

Table 1. Main characteristics of included studies

Author	Country	Methodology	Bonds Data	Date	Dependent Variable	# Factors
Dupoyet et al. (2023)	United States	Rigobon's (2003) unique heteroskedasticity-based identification	Barclay investment-grade and high-yield corporate bond indices and Treasury rates of various maturities	1973-2019	Spread	10
Özdemir-Dilidüzgün et al. (2022)	Turkey and Europe	Regression	Turkey: Borsa İstanbul A.Ş. Europe: EUR Bloomberg Eurozone	2010-2017	Bond Return	Turkey: 5 Europe: 4
Lee (2022)	United States	ICAPM + Regression	Sydney Ludvigson's website; NancyXu's website; Federal Reserve bank of St. Louis website;S&P 500 daily returns available on FRED; Baker, Bloom, and Davis website	1973-2020	Bond Return	24
Jiemin (2022)	China	Regression	Shanghai Exchange and Shenzhen Exchange	2012-2018	Spread	6
Megananda et al. (2021)	Indonesia	Regression	IDX	2015-2019	Yield	6
Guimarães et al. (2021)	Brazil	Regression	NA	2010-2018	Spread	15
Luo and Liu (2021)	China	Regression	NA	2017-2019	Spread	20
Kim et al. (2020)	United States	Regression	Trade Reporting and Compliance Engine (TRACE) and Fixed Income Securities Database	2003-2009	Spread	8
Zhang and Li (2020)	China	Nelson and Siegel + Autoregressive models	CSMAR database	2008-2016	Yield	3
Garay et al. (2019)	Many Emerging Markets	Regression	Datastream	2007-2013	Spread	14
Mukherjee (2019)	India	Regression	Fixed Income Money Market and Derivatives Association (FIMMDA).	2011-2016	Spread	12

Gao et al. (2019)	China	Descriptive statistics, Correlation analysis, Regression models and Robustness tests	Shanghai Exchange and Shenzhen Exchange	2007-2017	Significante Risk Waring (SubstanTip) / Credit Spread	13
Huang et al. (2019)	China	Regression	Wind database	2012	Spread	9
Fischer and Stolper (2019)	United States	Markov-switching vector autoregressive Model	NYSE	2004-2016	Spread	4
Zhou et al. (2019)	China and United States	Nelson-Siegel Model and Regression	Wind Database and the Bloomberg	2011-2017	Spread	6
Thakur et al. (2018)	India	Panel Data Approach andTraditional Approach (analysis on average CCS data)	National stock exchange, India	2014-2016	Spread	6
Xie et al. (2018)	China	Structure Model	Wind Datbase	2013-2017	Spread	4
Yongqian Liang and Zhengxuan Zhu (2017)	China	Regression	China Bond Information Network, National Bureau of Statistics, wind database and Rui Si database.	2013-2015	Spread	8
Simu (2017)	Indonesia	Regression	Indonesia Bond Market Directory (IBMD)	2015-2016	Yield	4
Barsotti, and Viva (2015)	United States	Merton + Regression	Merrill Lynch Corporate Index and the Merrill Lynch High Yield Master II index	1996-2010	Spread	7
Pavlova et al. (2015)	United States	Regression	Datastream	2006-2011	Spread	6
Castegnetti and Rossi (2013)	Europe	Factor model framework, data-driven approach, and a heterogeneous panel data model with a multi-factor error structure using the Pesaran (2006) estimator.	IBOXX Euro Bond Index Morgan Stanley World All Country Index and DataStream	2002-2004	Spread	13
Wang et al. (2013)	China	Regression	Shanghai Exchange and Shenzhen Exchange	2011-2012	Spread	6

Chen et al. (2011)	United States	Regression	Bond and Convertible Database; Center for Research in Security Prices (CRSP); COMPUSTAT	1993-2008	Spread	22
Krishnan et al. (2010)	United States	3-factor Diebold–Li model	Center for Research in Security Prices (CRSP)	1990-2005	Spread	3
Beckworth et al. (2010)	United States	Vector Autoregression (VAR)	Fred database at the St. Louis Federal Reserve Bank	1959-2008	Spread	5
Qi et al. (2010)	Many	Regression	SDC Platinum Global New Issues Database	1980-2006	Spread	41
Lu et al. (2010)	United States	Regression	Bond and Convertible Database; Center for Research in Security Prices (CRSP); COMPUSTAT	2001-2006	Spread	13
Paiva and Savoia (2009)	Brazil	Regression	Not available	2000-2004	Spread	5
Liu et al. (2009)	United States	Structure Model	Lehman Brothers Fixed Income Database distributed by Warga	1987-1996	Yield	5
Davies (2008)	United States	Markov Switching Models (MS), Self-Extracting Threshold (SETAR), and cointegration techniques	Federal Reserve Bank of St. Louis Data archive	1921-2004	Spread	5
Avramov et al. (2007)	United States	Empirical Analysis (Time Series, Regression)	Datastream	1990-2003	Spread	17
Covitz and Downing (2007)	United States	Regression	Depository Trust Company (DTC)	1998-2003	Spread	6
Gajjala (2006)	India	Regression	National Stock Exchange (NSE) and the Stock Exchange Mumbai	1998-2002	Risk Premium	8
Yu (2005)	United States	Nelson & Siegel + Regression	Lehman Database	1991-1996	Spread	7
King and Khang (2005)	United States	Regression	Lehman Database	1985-1998	Spread	10
Gabbi and Sironi (2005)	Canada, Europe, Japan and USA	Regression	Capital Data BondWare and Moody's Corporate Default	1991-2001	Spread	21
Elton et al. (2004)	United States	Regression	Lehman Database	1987-1996	Pricing Error	5

Bewley et al. (2004)	Australia	Time series analysis and econometric modeling	NA	1998-2001	Spread	
Boardman and McEnally (1981)	United States	Modelling and Regression	Merrill, Lynch, Pierce, Fenner & Smith, Inc's Municipal and Corporate Bond Computer Service	1972-1975	Price	9

4.4. Content Analysis - Key Factors Affecting Bond Pricing

To provide a clear understanding of each author's findings, Table 2 presents the main factors studied during the review. The table differentiates factors that were found to be significant and those that were not, aiming to guide and simplify the reader's interpretation.

A comprehensive analysis of the diverse studies on corporate bonds reveals recurring themes and shared insights across various dimensions. Several authors focus on the correlation between credit spreads and interest rates, emphasizing the importance of interest rate variations in determining corporate bond spreads. Dupoyet et al. (2023), Lee (2022), and Garay et al. (2019) highlights the negative correlation between credit spreads and interest rates, with Lee (2022) specifically noting the tax policy uncertainty as a significant driver.

The comparison of the risk factors impact is another common thread. Özdemir-Dilidüzgün et al. (2022) found that liquidity risk plays a more substantial role than market risk in influencing Turkish and Eurozone bonds. On the other hand, Covitz and Downing (2007) concluded that liquidity is a key factor in commercial paper spreads in the United States, however, credit risk dominates, impacting spreads significantly. Fischer and Stolper (2019) concluded that liquidity has the largest effect on the credit spreads during high volatility markets. Simu (2017), in Indonesia, established that liquidity, maturity, coupon, and rating altogether contribute to the variation occurring in the bond yield is amounting to 80.7%, while the remaining 19.3% is influenced by other variables. Chen et al. (2011) analyzed many factors, but the fundamental contribution was that corporate internal liquidity risk has a robust and positive impact on bond yield spreads, persisting even after accounting for established determinants. The findings highlight the imperative to integrate internal liquidity risk into bond yield spread modeling for enhanced predictive accuracy in assessing corporate credit risk, particularly in post-financial crisis contexts.

Similar to Chen et al. (2011), some other studies started from the well-known Fama-French Factors, like Jiemin (2022), emphasizing the role of risk factors, company size, book-to-market ratio, and credit ratings in shaping bond spreads. Wang et al. (2013) concluded that smaller firms with higher risk, lower book-to-market ratios, and increased default risk are associated with higher bond spreads. Credit ratings also play a crucial role, with AAA-rated bonds having lower spreads.

Liu et al. (2009) mentioned that, not only the Fama–French three factors significantly impact yields, but also default risk and taxes. King and Khang (2005) noted that, despite the relevance of bond betas to equity market factors, they have limited explanatory power for corporate bond yield spreads. Structural model variables such as asset volatility, leverage, rating, coupon rate, bond size, and age are identified as more significant determinants, emphasizing their importance in explaining cross-sectional variation in yield spreads.

Gao et al. (2019) contributed with a different approach, showing that substantial risk warnings in annual reports significantly increase credit spreads, particularly in non-state-owned enterprises. Garay et al. (2019) analyzed emerging market and concluded that country and industry-specific factors significantly influence the net spread. Zhang and Li (2020) proposed an Autoregressive Model and contribute with valuable insights by highlighting the superior predictive ability of linear models in forecasting corporate bond yields.

Studies like Megananda et al. (2021) address the multifaceted nature of yield determinants, considering factors such as interest rates, exchange rates, coupon rates, and inflation. The authors suggested that these factors collectively contribute to 51% of yield variations, leaving 49% influenced by other variables.

Risk factors are not limited to corporate or liquidity indicators. Huang et al. (2019) brought a unique perspective, revealing correlations between economic indicators and credit spreads in Chinese and United States corporate bonds. They emphasize the predictive potential of credit spreads over economic determinants.

Several studies delve into the influence of macroeconomic factors on credit spreads. Thakur et al. (2018) showed that the level of the yield curve, inflation, and stock market returns significantly impact corporate credit spreads in the Indian bond market. Similarly, Zhou et al. (2019) identified negative links between Chinese bond spreads and GDP (gross domestic product), contrasting with positive associations for American bonds with stock market volatility. In addition, Xie et al. (2018) mentioned that macro conditions undergo substantial structural changes, particularly impacting bond spreads as ratings declines. Liang and Zhu (2017)realized that interest rate risk and credit spreads were significantly negatively correlated while treasury yield curve slope

and volatility of the stock were significantly positive. The magnitude of the impact of macroeconomic variables on credit spreads for corporate bonds with different credit ratings is different.

Furthermore, the importance of non-financial factors in bond pricing is highlighted by Luo and Liu (2021) who find that factors related to fundraising project are also significant to explain credit spreads, together with financial factors, such as the quick ratio and operating income growth rate.

Regarding politics, the study by Qi et al. (2010) considered more than 35 countries and realized that higher political rights lead to significantly lower yield spreads and higher credit ratings in international debt markets, with a one standard deviation increase associated with an 18.6% decline in spreads. Freedom of the press plays a crucial role, suggesting that improved information availability contributes to the positive impact of political freedom on credit markets. Beckworth et al. (2010) noted that monetary policy shocks significantly influence corporate bond yield spreads in the U.S., with positive shocks leading to notable reductions in these spreads.

In the Brazilian market, Paiva and Savoia (2009) concluded that the bond price index is more important than credit risk as a variable to explain the spread. This fact is due to investors' expectations, more oriented to protection against inflation, a consequence of the relative new period of stabilization in the country. Ex-post analysis shows bonds linked to inflation tend to have higher returns than bonds linked to interest rates. Choices of long-term bonds have strong association with better ratings, and investors accept low credit bonds only for very short listings. Guimarães et al. (2021) proposed a final model with spread over the inflation indexed government bond as the dependent variable. Credit rating, maturity, industrial classification, tax exemption, coupon frequency, and the number of days since going public, all of which were statistically significant at a 5% level.

While each study provides unique insights into the complex world of corporate bonds, the collective body of research reveals consistent themes. Market risk factors, corporate risk factors, macroeconomic indicators, and non-financial influences emerge as critical determinants in shaping credit spreads, yields, and bond prices.

Examining all the points presented and the analyzed works, it is evident that the factors scrutinized and deemed significantly exhibit many synergies and commonalities. Factors such as rating, interest rate, and maturity are analyzed and considered significant in nearly all studies. Nevertheless, there are other factors, such as tax policy, revenue and accounting transparency for example, under investigation, leading to a lack of quantitative "convergence" and a conclusive statement regarding all the factors influencing the price of a debt security.

Table 2. Factors analyzed by each included study

Title	Authors	Methodology	Country	Factors	Significant factors
A new take on the relationship between interest rates and credit spreads	DUPOYET; JIANG; ZHANG, 2023	Rigobon's (2003) unique heteroskedasticity-based identification	United States	Interest Rates; Macroeconomic Shocks; Market Uncertainty; Business Cycles; Bond Callability; Rating; Industrial Productivity Index (IPI) growth residuals; Personal Disposable Income (PDI) growth residuals; Personal Consumer; Expenditures (PCE) growth residuals; Excess Stock Market Returns (RMRF) residuals;	Interest Rates; Macroeconomic Shocks; Market Uncertainty; Business Cycles; Bond Ratings
Spread Determinants in Corporate Bond Pricing: The Effect of Market and Liquidity Risks	ÖZDEMIR-DILIDÜZGÜN; ALTIOK-YILMAZ; AKBEN-SELÇUK, 2022	Regression	Turkey and Europe	Turkey: Liquidity Factors: Turkish Benchmark Treasury Bond's daily bid-ask spread (L1) and ratio of daily corporate bond market trading volume to outstanding corporate bond issuances (L2) Market Risk Factors: change in USD / TRY exchange rate (M1), Borsa Istanbul 100 Index (BIST100) daily return (M2), and Turkey Sovereign 10-year Credit Default Swap Contracts (CDS) daily price change (M3) Europe: two market risk factors (MSCI Europe Index and Euro Stoxx 50 Volatility Index) and two liquidity factors (ILLIQ measure and 10-Year-Generic-Eurozone Sovereign Bond's bid-ask spread)	Turkey: Stock market indicators, USD/TRY exchange rates, and CDS rates. Europe: Country-specific stock market factors and regional economic stability
Which uncertainty measures matter for the cross-section of corporate bond returns? Evidence from the U.S. during 1973–2020	LEE, 2022	ICAPM + Regression	United States	Financial uncertainty index, Real uncertainty index, Macro uncertainty index, Economic Policy Uncertainty index, Economic Policy Uncertainty news component, Risk aversion index, Economic uncertainty index, Implied volatility of S&P 500 index, Realized volatility of S&P 500 index, Monetary policy uncertainty using world news, Monetary policy uncertainty using 10 major U.S newspapers, Monetary policy uncertainty, Climate policy uncertainty index, Geopolitical risk, Fiscal Policy, Taxes, Government spending, Health care, National security, Entitlement programs, Regulation, Financial Regulation, Trade policy, Sovereign debt and currency crises.	Tax policy uncertainty was the one that stood out as significantly priced in the cross-section of corporate bond returns
The Influence of Size and Value Factors on	JIEMIN, 2022	Regression	China	HMLe and SMBe; HMLb and SMBb; DEF (Default Factor); TERM (Term Factor); Rating	Company Size (SMBe); Book-to-Market Ratio (HMLe); Default Factor (DEF); Term Factor (TERM); Rating; Size and Book-to-

Corporate Bond Spread Yields in China					Market Ratio in Bond Market (SMBb and HMLb):
Determinants of Corporate Bond Yield: Empirical Evidence from Indonesia	MEGANANDA et al., 2021	Regression	Indonesia	Interest rates, exchange rates, coupon rates, duration, inflation, and bond ratings	Interest rates, coupon rates, duration, inflation
Regularization Methods For Estimating a multi-factor corporate bond pricing model: An Application for Brazil	GUIMARÃES; CANDIDO; RONZANI, 2021	Regression	Brazil	Credit rating, maturity, Macaulay duration, issuer governance level, industrial classification number one, industrial classification number two, collateral, tax exemption, public offering modality, financial volume, coupon frequency, issue number, number of days since going public, Brazilian basic interest rate and its lagged version	Credit rating, maturity, industrial classification number one, tax exemption, coupon frequency, and the number of days since going public
Model of corporate bond spread based on improved neural network	LUO; LIU, 2021	Regression	China	Internal Rate of Return (IRR), Payback period, Scale (Total investment of fundraising projects / bond issuance scale), Bond maturity (Tem), Bond size (Amount), Revenue, Shibor, Debt ratings (MRatin91, MRatin92, MRatin93), Credit enhancement measures (Guarantee), Administrative level (Govem1, Govem2), Quick ratio (QR), EBITDA/interest-bearing debt (SolVency), Non-operating income/net profit (NOI), Gross margin (GPM), Operating income growth rate (Incomeg), Assets and liabilities (ALR)	Bond maturity (Tem), Bond size (Amount), Revenue, Shibor, Debt ratings (MRatin91, MRatin92, MRatin93), Credit enhancement measures (Guarantee), Quick ratio (QR), Operating income growth rate (Incomeg), Assets and liabilities (ALR)
Modeling non-normal corporate bond yield spreads by copula	KIM; KIM; JUNG, 2020	Regression	United States	Equity Volatility, Interest Rate Volatility, R, Slope, Rating, Liquidity, Coupon Rate, Maturity	Equity Volatility, Interest Rate Volatility, R, Slope, Rating, Liquidity, Coupon Rate, Maturity
Forecasting the yield of Chinese corporate bonds	ZHANG; LI, 2020	Nelson and Siegel + Autoregressive models	China	Level, slope and curvature (Nelson and Siegel)	Do not apply
Country and industry effects in corporate bond spreads in emerging markets	GARAY; GONZÁLEZ; ROSSO, 2019	Regression	Many Emerging Markets	Dividend Yield (DY), Leverage (LEV), 5-year Growth (GRW), Return On Equity (ROE) , Size (SIZ) , Equity Volatility (EV), Time to Maturity (TM) ,Interaction between Leverage and Time to Maturity (LEV × TM), Amount of the debt issue (AM), Public Debt (PD), Country Size (CS), Consumer Price Index (CPI), VIX (Chicago Options Exchange implied volatility index), US 10-year Yield (USCRV)	Dividend Yield (DY) - Significant in some specifications.; Leverage (LEV) - Consistently significant.; 5-year Growth (GRW) - Consistently significant in some specifications.; Return On Equity (ROE) - Significant in some specifications.; Size (SIZ) - Consistently significant.; Equity Volatility (EV) - Consistently significant.; Time to Maturity (TM) - Consistently significant.;

					Interaction between Leverage and Time to Maturity (LEV × TM) - Significant.; Amount of the debt issue (AM) - Consistently significant.; Public Debt (PD) - Significant.; Country Size (CS) - Significant in some specifications.; Consumer Price Index (CPI) - Significant in some specifications.; US 10-year Yield (USCRV) - Significant in some specifications.
Demystifying Yield Spread on Corporate Bonds Trades in India	MUKHERJE E, 2019	Regression	India	Coupon Rate; Residual Maturity; Bond Age; Credit Rating; Number of Bond Trades; Segment Dummies; NIFTY 500 (value of equity index); NIFTY 500 Turnover (equity market turnover); USD/INR change; GOI-10Y (risk-free yield level); GOI (10Y-2Y) (slope of risk-free yield curve); OIS-1Y (Overnight Indexed Swap rate)	Credit rating; LN (NIFTY 500); GOI-10Y
Do significant risk warnings in annual reports increase corporate bond credit spreads? Evidence from China	GAO; WANG; TIAN, 2019	Descriptive statistics, Correlation analysis, Regression models and Robustness tests	China	SubstanTip; Company Size; Profitability (ROA), Credit Rating, Maturity, Issue Size, Liquidity Deficiency, Interest Rate of Treasury Bond	SubstanTip; Company Size; Profitability (ROA), Credit Rating, Maturity, Issue Size, Liquidity Deficiency, Interest Rate of Treasury Bond
Analysis of Macroeconomic Factors Affecting the Corporate Bond Yield Spread	HUANG; CHANG; TIAN, 2019	Regression	China	PMI, PPI, CGPI, SALE, VALUE, GDP, CPI, M2 and the exchange rate	PPI, CGPI, exchange rate, VALUE, PMI
The nonlinear dynamics of corporate bond spreads: Regime-dependent effects of their determinants	FISCHER; STOLPER, 2019	Markov-switching vector autoregressive Model	United States	Yield curve, Stock market development, Market liquidity	Yield curve, Stock market development, Market liquidity
Macroeconomic Determinants of Credit Spreads: An Empirical Comparison between	ZHOU et al., 2019	Nelson-Siegel Model and Regression	China and United States	GDP, Money Supply, Stock market index, Stock market volatility (VIX), Risk free interest rate, Slope	GDP, Stock market index, Slope

Chinese and American Corporate Bonds					
Determinants of corporate credit spread: evidence from India	THAKUR; KANNADHASAN; GOYAL, 2018	Panel Data Approach and Traditional Approach (analysis on average CCS data)	India	Level of the yield curve, Slope of the yield curve, Equity return, Stock market return (S&P BSE Sensex returns), Inflation, IIP growth rate (Index of Industrial Production growth rate)	Level of the yield curve, Inflation, Stock market return (S&P BSE Sensex returns)
Dependence of credit spread and macroconditions based on an alterable structure model	XIE et al., 2018	Structure Model	China	Macroeconomic Performance (g), Stock Market (Si), Money Supply (M) and Investor Sentiment (Ci)	Do not apply
A study on the factors affecting credit spreads of corporate bonds from the perspective of credit risk	YONGQIAN LIANG; ZHENGXU AN ZHU, 2017	Regression	China	Risk-free interest rate, bond yield curve slope, stock market yield, stock market volatility and bond market liquidity monetary policy, inflation, Economic growth	Risk-free interest rate, bond yield curve slope, stock market yield, stock market volatility and bond market liquidity monetary policy, inflation, Economic growth
Determinants of Indonesian corporate bond yield	SIMU, 2017	Regression	Indonesia	Bond trading volume, Maturity, coupon rate, and bond rating	Maturity, Coupon and Rating
Performance and determinants of the Merton structural model: Evidence from hedging coefficients	BARSOTTI; VIVA, 2015	Merton + Regression	United States	Standard deviation of equity excess return; Standard deviation of bonds excess return; Log average time to maturity; Average leverage; Average Book to Market ratio; Average log size; Distress - Binary dummy for negative book to market ratios.	Volatility, time to maturity, size, distress, liquidity and information quality
Credit Spreads and Regime Shifts	PAVLOVA et al., 2015	Regression	United States	Treasury rate, term structure slope, Barclay's high-yield bond index, TED spread, S&P 500, VIX	Treasury rate, term structure slope, Barclay's high-yield bond index, S&P 500

EURO CORPORATE BOND RISK FACTORS	CASTAGNETTI; ROSSI, 2013	Modelling and Regression	Europe	10gov (Changes in the government bond rate level); slope (Changes in the slope of the government yield curve); conv (Changes in the convexity of the government yield curve); 5dss (5-year delta credit spread - Liquidity proxy); nofissue (Monthly variation in the number of issues of the corporate bonds - Liquidity proxy); iret2 (Squared index monthly return - Liquidity proxy); avgret (Mean of daily excess return on equity) stdret (Standard deviation of daily excess return on equity); downg (Rating downgrade); upg (Rating upgrade); mseuro (Morgan Stanley Euro Index price return); Credit market factor based on bond's beginning-of-month; rating classification; cs (Initial credit spread level)	cs: Initial credit spread level; dcsrat: Rating downgrade changes; mseuro: Morgan Stanley Euro Index price return; Credit market factors: Using IBOXX sub-indices based on bond rating.
The influence of Fama-French factors in equity and bond markets on corporate bond spread	WANG et al., 2013	Regression	China	HMLe and SMBe; HMLb and SMBb; DEF (Default Factor); TERM (Term Factor); Dummy Variables (Bond Ratings)	Company Size (SMBe); Book-to-Market Ratio (HMLe); Default Factor (DEF); Term Factor (TERM); Credit Ratings (Dummy Variables); Size and Book-to-Market Ratio in Bond Market (SMBb and HMLb):
Internal liquidity risk in corporate bond yield spreads	CHEN; LIAO; TSAI, 2011	Regression	United States	Standardized Internal Liquidity (S_IL); Internal Liquidity Volatility (ILV); Leverage Ratio (LEV); Equity Volatility (VOL); Coupon Rate; Maturity (LFFL); Bond Age (Bage); Natural Log of Amount Issued (Lnamt); Accruals Quality (AQ); Number of Analysts (NANAL); Dispersion in Analysts' Forecasts (DISP); Bond Rating (RAT); GDP; ILVxGDP; S_ILxGDP; SMB; HML; Momentum; VIX; MOVE; Slope; 10Y; Swap; LIQ; SP_R	Standardized Internal Liquidity (S_IL); Internal Liquidity Volatility (ILV); Leverage Ratio (LEV); Equity Volatility (VOL); Coupon Rate; Maturity (LFFL); Bond Age (Bage); Natural Log of Amount Issued (Lnamt); Accruals Quality (AQ); Number of Analysts (NANAL); Dispersion in Analysts' Forecasts (DISP); GDP; ILVxGDP; S_ILxGDP; SMB; HML; VIX; Slope; 10Y; Swap; LIQ;
Predicting credit spreads	KRISHNAN; RITCHKEN; THOMSON, 2010	3-factor Diebold–Li model	United States	Shape and Structure of the Credit Spread Curve and Riskless Yield Curve	Shape and Structure of the Credit Spread Curve and Riskless Yield Curve
Monetary policy and corporate bond yield spreads	BECKWORTH; MOON; TOLES, 2010	Vector Autoregression (VAR)	United States	Industrial production, 3-month t-bill rate, Real S&P Composite Index, Real money balances, Nominal stock of money	Industrial production, Real S&P Composite Index, 3-month t-bill rate, and Corporate bond yield spreads.

Political rights and the cost of debt	QI; ROTH; WALD, 2010	Regression	Many	Political rights, Freedom of the press (FoP), Socio-political instability (SPI), Expropriation, Corruption, Freedom of the press (WEF), Newspaper circulation, Media development, Disclosure, Earnings management, Number of analysts, Political constraints, Executive constraints, Continuous years of competitive elections, Risk of political instability (IMD), Creditor rights, Legal origin, Legal rights index, Effectiveness of bankruptcy law, Real GDP per capita, Log GDP per capita, Sovereign rating, Yield spread, Log Yield spread, Bond rating, Public bond issue, Floating bond, Callable, Putable, Duration, Convexity, Total assets, Log Total assets, MTBV, MTBV missing, ROA, Leverage, Cross-list	Political rights, Freedom of the press (FoP), Expropriation, Corruption, Newspaper circulation, Media development, Disclosure, Political constraints, Executive constraints, Continuous years of competitive elections, Risk of political instability (IMD), Creditor rights, Legal origin, Legal rights index, Effectiveness of bankruptcy law, Real GDP per capita, Log GDP per capita, Sovereign rating, Yield spread, Log Yield spread, Bond rating, Public bond issue, Callable, Duration, Total assets, Log Total assets, ROA, Cross-lists
Information uncertainty, information asymmetry and corporate bond yield spreads	LU; CHEN; LIAO, 2010	Regression	United States	Leverage Ratio (LEV); Equity Volatility (VOL); Time to Maturity (LFFL); Log of Amount Issued (Lnamt); Bond Age (Bage); Coupon; Credit Rating (RATi) Information Asymmetry and Uncertainty Proxies: Operational Indicator (OI) PIN and ADJPIN; PSOS; AQ, NANAL, AGE, DISP;	Leverage Ratio (LEV); Equity Volatility (VOL); Time to Maturity (LFFL); Log of Amount Issued (Lnamt); Coupon; Credit Rating (RATi), OI, ADJPIN, PSOS, NANAL, AGE, and DISP
Pricing corporate bonds in Brazil: 2000 to 2004	PAIVA; SAVOIA, 2009	Regression	Brazil	Rating, indexer, maturity, Brazilian country risk, basic interest rate, difference between long- and short-term rates, stock index and exchange rate	Indexer, maturity, rating and exchange rate
The determinants of corporate bond yields	LIU et al., 2009	Structure Model	United States	Default risk, taxes, and the Fama–French three factors.	Default risk, taxes, and the Fama–French three factors.
Credit spread determinants: An 85 year perspective	DAVIES, 2008	Markov Switching Models (MS), Self-Extracting Threshold (SETAR), and cointegration techniques	United States	Treasury bill rate (T Bill); S&P 500 Index return; Industrial production (Ind Prod); Slope variable; Error correction term (derived from long-run equilibrium)	Lagged Spread (D Spreadt;t−1; Error Correction Term (ECT); S&P 500 Return (D S&P 500t;t−1)
Understanding Changes in Corporate Credit Spreads	AVRAMOV; JOSTOVA; PHILIPOV, 2007	Regression	United States	Equity Market Return; Change in Aggregate P/B (Price-to-Book) Ratio; Change in Aggregate Idiosyncratic Equity Volatility; Spot Rates (2-Year, 5-Year, 10-Year, 30-Year); Term-Structure Slope (e.g., 30Y - 10Y, 30Y - 2Y); Stock Return; Stock	Changes in government rates, equity market returns, the term-structure slope, idiosyncratic volatility, and the P/B ratio. Company-level characteristics such as

				Momentum; Change in Company-Level Idiosyncratic Equity Volatility; Change in Company-Level P/B (Price-to-Book) Ratio	changes in leverage, idiosyncratic volatility, and stock returns.
Liquidity or Credit Risk? The Determinants of Very Short-Term Corporate Yield Spreads	COVITZ; DOWNING, 2007	Regression	United States	Trade Volume, Dollar Volume, Maturity, EDF, Credit Rating, Equity Volatility	Trade Volume, Dollar Volume, Credit Rating, Equity Volatility
Pricing of risk in the indian Corporate Bond Market: Some Evidence	GAJJALA, 2006	Regression	India	Credit rating, term structure effect, trade size, trading frequency, coupon rate, residual maturity, redemption mode, e promoter status	Credit rating, term structure effect, trade size, trading frequency, coupon rate, residual maturity, redemption mode, e promoter status
Accounting transparency and the term structure of credit spreads	YU, 2005	Nelson & Siegel + Regression	United States	Issuer characteristics— Accounting transparency (DISC), Leverage, Volatility; and issue characteristics: Maturity, Age, Rating and Liquidity	Issuer characteristics— Accounting transparency (DISC), Leverage, Volatility; and issue characteristics: Maturity, Age and Liquidity
On the importance of systematic risk factors in explaining the cross-section of corporate bond yield spreads	KING; KHANG, 2005	Regression	United States	Market Beta (MKT); Small-Minus-Big Beta (SMB); High-Minus-Low Beta (HML); Leverage (LEVERAGE); Asset Return Volatility (ASSETVOL); Duration (DURATION); Moody's Rating (RATING); Coupon Rate (COUPON); Bond Size (BONDSIZE); Age (AGE)	Market Beta (MKT); Small-Minus-Big Beta (SMB); High-Minus-Low Beta (HML); Leverage (LEVERAGE); Asset Return Volatility (ASSETVOL); Duration (DURATION); Moody's Rating (RATING); Coupon Rate (COUPON); Bond Size (BONDSIZE); Age (AGE)
Which factors affect corporate bonds pricing? Empirical evidence from eurobonds primary market spreads	GABBI; SIRONI †, 2005	Regression	Canada, Europe, Japan and USA	Rating, Subordinated Dummy, Amount, Coupon, Registration Dummy, Managers, Fees, Country Dummies, Currency Dummies, Quarter and year dummies, Sector Dummies, Clauses Dummies	Rating, Subordinated dummy, Maturity, Sector Dummy, Coupon, Currency Dummy, Force Majeure Clause
Factors affecting the valuation of corporate bonds	ELTON et al., 2004	Regression	United States	Liquidity, Differences in bond ratings, Differences between S&P and Moody's ratings, Bond coupons, Age of the bond.	Liquidity, Differences in bond ratings, Differences between S&P and Moody's ratings, Bond coupons, Age of the bond.
The impact of stock market volatility on	BEWLEY; REES;	Time series analysis and	Australia	Volatility implied from options prices; Volatility derived from a GARCH model of changes in a stock market index; Lagged	Volatility derived from the GARCH model and the lagged change in the log of the

corporate bond credit spreads	BERG, 2004	econometric modeling		change in the log of the Commonwealth Government Securities yield; Interactive dummy on the change in volatility	Commonwealth Government Securities yield
Factors Affecting Seasoned Corporate Bond Prices	BOARDMAN; MCENALLY, 1981	Modelling and Regression	United States	Coupon Payments, Non-Present Value of Coupon Payments (NPVC), Sinking Fund Dummy, Security Status Dummy, Log of Quantity Outstanding, Exchange Listing Dummy, Industrial Dummy, Transportation Dummy, Bond Beta	Call value, sinking fund status, security status, quantity of the issue outstanding, industry membership, and beta (with caveats related to the estimation period)

5. Discussion

In the current investigation, we conducted a comprehensive systematic literature review aiming to scrutinize the principal determinants influencing corporate bond prices. This research delves into the intricate processes that govern the valuation of these financial instruments, revealing a diverse array of determinant factors that significantly impact the pricing dynamics of these assets.

A noteworthy contribution of this review is presented on Table 3, which offers an in-depth categorization of these influential factors. The preceding tables highlight the multitude of factors proposed to elucidate the pricing mechanisms of the asset in question. Despite this diversity, these factors can invariably be distilled into cohesive sets of determinants.

The factors under examination predominantly encompass corporate, issuance, liquidity, and macroeconomic and market factors. In an effort to systematically categorize each identified factor across the 40 studies, Table 3 provides a comprehensive overview, outlining the primary articles that delve into each of the macro factors. Additionally, it details the specific variables utilized by each author within these overarching categories. This analytical approach enhances our understanding of the multifaceted landscape influencing corporate bond prices.

Going through Table 3, Corporate Factors are those that pertain to the company itself, specifically its financial health and default risk. For this reason, as can be seen in the table, the factors typically considered are balance sheet indicators such as leverage, sector, and credit rating.

On the other hand, issuance factors are those related to the characteristics of the bond and play a fundamental role in its price, as they directly impact the issuance risk. For this reason, the most studied and relevant factors include the bond's issuance rating (which may differ from the company's rating, as it considers information such as guarantees and maturity), maturity and coupon.

Regarding liquidity factors, these are the elements that will determine the liquidity risk of bonds, meaning how easily the bond can be sold if an immediate conversion to cash is necessary. Liquidity is one of the most challenging factors to quantify and is extensively studied in the literature. For this segment, various proxies are considered, such as the issuance volume (which is

an issuance characteristic, and could be classified as an "issuer factor," but is used as a metric to quantify liquidity), trading volume and volume outstanding.

Lastly, the risk of a debt issuance does not solely depend on the company, liquidity, or issuance characteristics, but also on market and macroeconomic factors. Among these factors, the most studied ones are interest rates and stock price volatility.

Table 3. Factors Categories

Corporate Factors	Guimarães et al. (2021)	Issue number, number of days since going public
	Luo and Liu (2021)	Quick ratio (QR), EBITDA/interest-bearing debt (SolVency), Non-operating income/net profit (NOI), Gross margin (GPM), Operating income growth rate (Incomeg), Assets and liabilities (ALR)
	Kim et al. (2020)	Rating, Maturity, Coupon Rate
	Gao et al. (2019)	SubstanTip (Risk information Disclosure); Company Size; Profitability (ROA) and Credit Rating
	Garay et al. (2019)	Dividend Yield (DY), Leverage (LEV), 5-year Growth (GRW), Return on Equity (ROE), Public Debt (PD)
	Mukherjee (2019)	Segment Dummies;
	Barsotti, and Viva (2015)	Average leverage; Average Book to Market ratio; Average log size;
	Castegnetti and Rossi (2013)	Rating Downgrade/Upgrade
	Chen et al. (2011)	Leverage Ratio (LEV); Number of Analysts (NANAL); Dispersion in Analysts' Forecasts (DISP);
	Lu et al. (2010)	Leverage Ratio (LEV); Age; OI (Order imbalance – (buyer-initiated Trades minus seller-initiated trades divides by the total trades of the firm), ADJPIN (Probability of information trading in Duarte and Young (2009) model), Number of Analysts (NANAL), Dispersion in Analysts' Forecasts (DISP);
	Qi et al. (2010)	Total assets, Log Total assets, MTBV, MTBV missing, ROA, Leverage and Cross-list
	Liu et al. (2009)	Default risk
	Avramov et al. (2007)	P/B (Price-to-Book) Ratio
	Covitz and Downing (2007)	Log of the 1-year expected default frequency (EDF), Credit Rating, Equity Volatility
	Gabbi and Sironi (2005)	Rating, Sector, Country, Currency
	King and Khang (2005)	Leverage (LEVERAGE); Asset Return Volatility (ASSETVOL);
	Yu (2005)	Accounting transparency (DISC) and Leverage
	Elton et al. (2004)	Rating
	Boardman and McEnally (1981)	Exchange Listing Dummy, Sector (Industrial Dummy or Transportation Dummy)
Issuance Factors	Dupoyet et al. (2023)	Bond Callability and Bond Rating
	Jiemin (2022)	Dummy Variables (Bond Ratings)
	Guimarães et al. (2021)	Credit rating, maturity, Macaulay duration, issuer governance level, industrial classification number one, industrial classification number two, collateral, tax exemption, public offering modality, coupon frequency
	Luo and Liu (2021)	Internal Rate of Return (IRR), Payback period, Scale (Total investment of fundraising projects / bond issuance scale), Bond maturity (Tem), Bond size (Amount), Revenue, Debt ratings (MRatin91, MRatin92, MRatin93), Credit enhancement measures (Guarantee) and Administrative level (Govem1, Govem2)
	Megananda et al. (2021)	Coupon rates, Duration, Rating

	Gao et al. (2019)	Maturity and Issue Size
	Garay et al. (2019)	Size (SIZ), Time to Maturity (TM)
	Mukherjee (2019)	Bond Age; Credit Rating;
	Simu (2017)	Maturity, Rating, Coupon
	Simu (2017)	Maturity, Coupon rate, and Bond Rating
	Barsotti, and Viva (2015)	Standard deviation of bonds excess return; Log average time to maturity;
	Castegnetti and Rossi (2013)	Rating classification; cs (Initial credit spread level); Credit market factor based on bond's beginning-of-month;
	Wang et al. (2013)	Dummy Variables (Bond Ratings)
	Chen et al. (2011)	Coupon Rate; Maturiy (LFFL); Bond Age (Bage); Natural Log of Amount Issued (Lnamt); Accruals Quality (AQ); Bond Rating (RAT)
	Krishnan et al. (2010)	Shape and Structure of the Credit Spread Curve
	Lu et al. (2010)	Equity Volatility (VOL); Time to Maturity (LFFL); Log of Amount Issued (Lnamt); Coupon; Credit Rating (RATi),
	Qi et al. (2010)	Yield spread, Log Yield spread, Bond rating, Public bond issue, Floating bond, Callable, Putable, Duration and Convexity
	Paiva and Savoia (2009)	Indexer, Maturity, Rating
	Gajjala (2006)	Credit rating, Residual maturity, Promoter status, Coupon rate and Redemption mode
	Gabbi and Sironi (2005)	Maturity, Clauses, Coupon, Register, Number of managers in the syndicate, Fees, Price
	King and Khang (2005)	Duration (DURATION); Moody's Rating (RATING); Coupon Rate (COUPON); Bond Size (BONDSIZE); Age (AGE)
	Yu (2005)	Maturity, Age and Rating
	Elton et al. (2004)	Differences in bond ratings, Bond Coupon, Age, Recovery Rate
	Boardman and McEnally (1981)	Coupon Payments, Non-Present Value of Coupon Payments (NPVC), Sinking Fund Dummy and Security Status Dummy, Bond Beta
Liquidity Factors	Özdemir-Dilidüzgün et al. (2022)	Ratio of daily corporate bond market trading volume to outstanding corporate bond issuances;Own mesure of the author using a formula that involves stock return, trading volume, market cap and time; Bid-ask spread of sovereign bond
	Guimarães et al. (2021)	Financial volume
	Kim et al. (2020)	Ratio of the number of days on which the bond traded over the one month preceding the bond trading day to the total number of business days for the same month
	Fischer and Stolper (2019)	Market liquidity
	Gao et al. (2019)	Stock Liquidity
	Garay et al. (2019)	Amount of the debt issue (AM)
	Mukherjee (2019)	Coupon Rate; Residual Maturity; Number of Bond Trades;
	Simu (2017)	Bond Trading Volume

	Yongqian Liang and Zhengxuan Zhu (2017)	3-month Shanghai interbank market lending rate (SHIBOR)
	Pavlova et al (2015)	TED spread
	Castegnetti and Rossi (2013)	5-year delta credit spread; Monthly variation in the number of issues of the corporate bonds
	Chen et al. (2011)	Standardized Internal Liquidity (S_IL); Internal Liquidity Volatility (ILV);
	Lu et al. (2010)	PSOS (Probability of symmetric order flow shock)
	Covitz and Downing (2007)	Log of the number of trades (Trade Volume); Log of the total face value issued (Dollar Volume); Log of the days to maturity of the commercial paper in each CP transaction (Maturity)
	Gajjala (2006)	Trade size, Trading frequency and Term structure effect
	Gabbi and Sironi (2005)	Amount of the debt issue
	Yu (2005)	Proxy (logarithm of the dollar amount outstanding of the bond issue)
	Elton et al. (2004)	3 proxies: dollar value outstanding, the percentage of months a bond was matrix priced, and whether a bond was recently issued
	Boardman and McEnally (1981)	Log of Quantity Outstanding
Macroecomic and Market Factors	Dupoyet et al. (2023)	Industrial Productivity Index (IPI) growth residuals; Personal Disposable Income (PDI) growth residuals; Personal Consumer; Expenditures (PCE) growth residuals; Excess Stock Market Returns (RMRF) residuals; Interest Rates (Treasury rates); Macroeconomic Shocks; Market Uncertainty; Business Cycles (NBER business cycle dates);
	Jiemin (2022)	HMLe and SMBe; HMLb and SMBb; DEF (Default Factor); TERM (Term Factor);
	Lee (2022)	Uncertainty Indexes
	Özdemir-Dilidüzgün et al. (2022)	Exchange Rate; Stock Market Index; Sovereign CDS Price
	Guimarães et al. (2021)	Brazilian basic interest rate and its lagged version
	Luo and Liu (2021)	Shibor
	Megananda et al. (2021)	Interest rates, Exchange Rates, Inflation
	Kim et al. (2020)	Equity Volatility, Interest Rate Volatility and Slope
	Fischer and Stolper (2019)	Yield curve, Stock market development
	Gao et al. (2019)	Interest Rate of Treasury Bond
	Garay et al. (2019)	Equity Volatility (EV), Country Size (CS), Consumer Price Index (CPI), VIX (Chicago Options Exchange implied volatility index), US 10-year Yield (USCRV)
	Huang et al. (2019)	PMI, PPI, CGPI, SALE, VALUE, GDP, CPI, M2 and the exchange rate
	Mukherjee (2019)	NIFTY 500 (value of equity index); NIFTY 500 Turnover (equity market turnover); USD/INR change; GOI-10Y (risk-free yield level); GOI (10Y-2Y) (slope of risk-free yield curve); OIS-1Y (Overnight Indexed Swap rate)
	Zhou et al. (2019)	GDP, Money Supply, Stock market index, Stock market volatility (VIX), Risk free interest rate, Slope

	Zhou et al. (2019)	GDP, Money Supply, Stock market index, Stock market volatility (VIX), Risk free interest rate, Slope
	Thakur et al. (2018)	Level of the yield curve, Slope of the yield curve, Equity return, Stock market return, Inflation, IIP growth rate (Index of Industrial Production growth rate)
	Xie et al. (2018)	Macroeconomic Performance (g), Stock Market (Si), Money Supply (M), Investor Sentiment (Ci);
	Yongqian Liang and Zhengxuan Zhu (2017)	Risk-free interest rate, slope of yield curve, stock market yield, stock market volatility, monetary policy, inflation and economic growth (PMI)
	Jiemin Huang, Kai Chang, Yixiang Tian (2016)	PMI, PPI, CGPI, SALE, VALUE, GDP, CPI, M2
	Barsotti, and Viva (2015)	Standard deviation of equity excess return;
	Pavlova et al (2015)	Treasury rate, term structure slope, Barclay's high-yield bond index, S&P 500, VIX
	Castegnetti and Rossi (2013)	avgret (Mean of daily excess return on equity); stdret (Standard deviation of daily excess return on equity); mseuro (Morgan Stanley Euro Index price return);
	Wang et al. (2013)	HMLe and SMBe; HMLb and SMBb; DEF (Default Factor); TERM (Term Factor);
	Chen et al. (2011)	Equity Volatility (VOL); GDP; SMB; HML; VIX; Slope; 10Y; LIQ
	Beckworth et al (2010)	Industrial production, 3-month t-bill rate, Real S&P Composite Index, Real money balances, Nominal stock of money
	Krishnan et al. (2010)	Riskless Yield Curve
	Qi et al. (2010)	Political rights, Freedom of the press (FoP), Socio-political instability (SPI), Expropriation, Corruption, Freedom of the press (WEF), Newspaper circulation, Media development, Disclosure, Earnings management, Number of analysts, Political constraints, Executive constraints, Continuous years of competitive elections, Risk of political instability (IMD), Creditor rights, Legal origin, Legal rights index, Effectiveness of bankruptcy law, Real GDP per capita, Log GDP per capita and Sovereign rating
	Liu et al. (2009)	Fama–French three factors and Taxes
	Paiva and Savoia (2009)	Long-term (one year)and short-term(one month)premium of fixed rates of swaps "sprtx"; the Selic rate, the one day financing rate of federal government bonds "txselic"; the inflation index "igpm"; the exchange rate dollar-real "dollar"; the stock index of the São Paulo Stock Exchange, "ibovespa"; Brazilian country risk
	Davies (2008)	Treasury bill rate (T Bill); S&P 500 Index return; Industrial production (Ind Prod); Slope variable;
	Avramov et al. (2007)	Equity Market Return; Stock Return; Stock Momentum; Term-Structure Slope; Spot Rate; Equity Volatility
	King and Khang (2005)	Market Beta (MKT); Small-Minus-Big Beta (SMB); High-Minus-Low Beta (HML);
	Yu (2005)	Equity Volatility
	Bewley et al (2004)	Options prices; Changes in a stock market index; Log of the Commonwealth Government Securities yield;

6. Conclusion

Credit spread determinants have been a central theme in numerous studies, revealing a plethora of factors that influence bond valuations. These determinants are a blend of macroeconomic indicators, bond-specific attributes, market dynamics, company financial information, among others. The insufficiency of relying solely on credit ratings for bond valuation has been noted, due to differences within the same rating class, influenced by aspects like liquidity, tax treatment, and bond age. While credit ratings remain universally important in bond pricing across various markets, a broader scope of information disclosure can lead to more accurate and lower credit spreads.

Liquidity risk is a standout factor in determining credit spreads, emphasized not just in specific markets but resonating across different studies and regions. Furthermore, the role of market risk, particularly equity market returns, significantly influence credit spreads, underscoring the intertwining nature of global financial markets. Different methodologies, from regression analyses to structure models, reveal the depth and complexity of understanding credit spread dynamics. Bond characteristics, such as bond age and coupon rates, are critical in shaping these spreads, especially in times of high equity volatility.

Furthermore, the relationship between credit spreads and interest rates is particularly significant. However, it's essential to note regional variations: while some factors may be universally influential, the degree to which they affect credit spreads can differ based on regional contexts, from emerging markets to developed economies. In conclusion, bond valuation and credit spreads are influenced by a multifaceted mix of factors. As global markets continue to evolve, navigating this intricate landscape becomes imperative for both scholars and market professionals.

Moving forward, it's evident that the intricacies of bond valuation and credit spread dynamics merit further exploration. As possible limitations of the present work and as a suggestion for future ones, we can mention the use of only one database and the low number of articles for bibliometric analysis. Also, the absence of the snowballing and meta-analysis procedure can be explored further.

Given the rapidly changing global economic landscape, future research might delve deeper into the temporal dynamics of credit spreads over different economic cycles. A concentrated focus

on emerging markets could unearth unique determinants affecting bond valuations, often distinct from more mature markets. The burgeoning integration of technology in financial markets, from artificial intelligence to blockchain, also presents a fresh frontier. Analyzing their impact on traditional bond markets and their valuation dynamics can provide essential insights. Additionally, as global events like geopolitical shifts and technological advancements continue to shape financial landscapes, understanding their profound effects on credit spread variations remains crucial.

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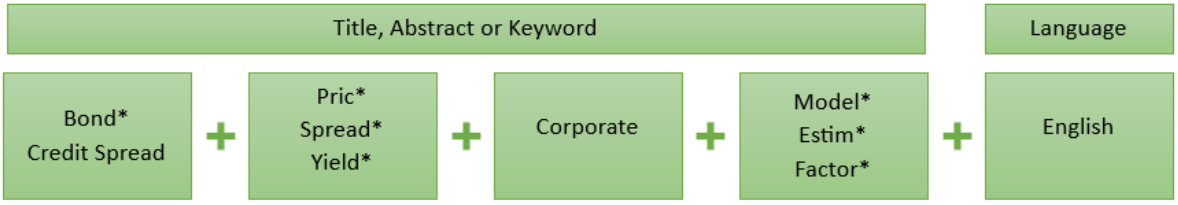
Supplementary Material I - Inclusion Criteria



Supplementary Material II - Advanced literature search code

(TITLE-ABS-KEY("Spread") OR TITLE-ABS-KEY("Pric*") OR TITLE-ABS-KEY("Yield*"))*
AND (TITLE-ABS-KEY("Debenture") OR TITLE-ABS-KEY("Bond*") OR TITLE-ABS-KEY("Credit Spread*"))*
AND (TITLE-ABS-KEY("Corporate"))
AND (TITLE-ABS-KEY("Model") OR TITLE-ABS-KEY("Estimat*") OR TITLE-ABS-KEY("Factor*"))*
AND (LIMIT-TO (LANGUAGE , "English"))
AND NOT (TITLE-ABS-KEY("CDS") OR TITLE-ABS-KEY("Swap") OR TITLE-ABS-KEY("Derivative*"))*