RESEARCH ARTICLE

WILEY

Judicial efficiency, debt structure, and cost of debt

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Funding information
No funding was received to assist with the preparation of this manuscript.

Abstract

In the framework of law and finance literature, this study investigates the link between judicial efficiency and financial debt cost in 1487 non-financial firms across the euro zone from 2010 to 2021. Utilizing qualitative (rule of law) and quantitative (judicial proceeding length) indicators from the Worldwide Governance Indicators and Doing Business databases, our findings support the hypothesis that efficient justice lowers financial debt cost. Additionally, we observe a moderating effect of debt structure, specifically that private non-bank debt enhances the reduction impact of judicial efficiency on debt cost, unlike bank and corporate bonds debt.

JEL CLASSIFICATION
K42, G32

1 | INTRODUCTION

Judiciary plays a fundamental role in economic and social life. From the citizens' and businesses' point of view, justice is the most important mechanism that may protect their rights against infringements. From an economic point of view, the financial literature recognizes that the legal system is among the main drivers of economic development and growth. Researchers and legal practitioners widely agree that to fulfill this role, judiciary requires well-functioning institutions, which are able to enforce the law in an efficient way. La Porta et al. (1997, 1998) and Djankov et al. (2003, 2007) have shown that legal protection and the level of procedural formalism in courts matter. Bhattacharya and Daouk (2009) emphasize that in addition to the content of the legislation, its efficient implementation by judicial institutions is a key factor. Therefore, the research on the role of judiciary goes in two converging directions. On the one hand, it focuses on the impact of the content of laws and on the other, on their efficient implementation by courts, so-called judicial efficiency.

Given the key role of financial institutions in economic development, the impact of judicial efficiency on access and cost of external financing has attracted particular attention among researchers. According to Daher (2017), efficient contract enforcement benefits credit markets. The author points out that in the case of financial institutions, this may be even more important than the legal content of credit agreements itself. A wide range of studies shows that in the presence of legal security, firms have better access to external finance and on better terms (e.g., Bae & Goyal, 2009; Fabbri, 2010; Jappelli et al., 2005; La Porta et al., 1997; Laeven & Majnoni, 2005; Moro et al., 2018).

Regarding the theoretical framework, the study is framed in the Law and Finance literature. La Porta et al. (1997, 1998, 1999) and Djankov et al. (2003, 2007) revealed the existence of a close link between the judicial system, business financing, and economic growth. Those authors have shown that, depending on how the legal origin of, legal protection offered by, and the degree of formality in judicial procedures differ from one legal context to another, this can have an impact on the costs related to the execution of contracts. Moreover, numerous academics have stated that, in addition to the content of the legislation, its efficient application by judicial institutions is important (Bhattacharya & Daouk, 2009; Modigliani & Perotti, 1997; Pistor et al., 2000). The relationship between judicial efficiency and cost of debt is based on the notion that if an efficient judiciary can reduce part of the risk associated with legal uncertainty and strategic default, the willingness of funding providers to extend credit at a lower cost may increase.

In this context, the objective of the present work is twofold: on the one hand, to determine the influence of the functioning of judicial institutions on the cost of financial debt obtained by listed firms in the euro zone; on the other hand, to establish whether there is a moderating effect of the debt structure in the aforementioned relationship. This research question is based on the fact that creditors (banks, bondholders, and other "non-bank" private creditors) have different information and negotiation advantages in the event of insolvency. It is therefore possible that their attitude is conditioned differently by judicial efficiency.

The review of the empirical literature allows us to detect a gap regarding the two research questions raised. Regarding the first objective, unlike previous studies, which focused on bank debt, this work takes into account the cost of financial debt. This includes financing obtained not only through bank loans but also from the issuance of corporate bonds and other non-bank private debt. In this vein, Arena (2018), in his study on the incidence of litigation risk in the cost of debt, states that it is important to take into account all types of debt. In this sense, it is worth highlighting that, although continental European countries are characterized by a greater orientation toward banking, listed companies largely use bond issues. In addition, according to our knowledge, the only study that analyzes the relationship between the judicial efficiency on the cost of debt for the euro area focuses on SMEs (Galli et al., 2017) but not on larger or listed firms.

Regarding the second objective, most previous studies that have analyzed debt structure have considered the dichotomy between bank and public debt (e.g., Asamoah et al., 2022; Ben-Nasr et al., 2021; Boubaker et al., 2018; Boubakri & Saffar, 2019; Grimme, 2023). "Non-bank" private debt, although considered in some previous research (e.g., Arena, 2011; Denis & Mihov, 2003; Kale & Meneghetti, 2011; Ojah & Manrique, 2005; Rauh & Sufi, 2010), has received less attention than bank and public debt. In addition, to our knowledge, there is no prior study that has analyzed the moderating effect of debt structure on the relationship between judicial efficiency and debt cost.

The results, obtained from a sample of 1487 listed, non-financial firms in eurozone countries over the period 2010–2021, reveal that firms located in countries with higher judicial efficiency experience a lower cost in financial debt. Moreover, we obtained evidence that debt structure—exactly the proportion of non-bank private debt—exerts a moderating effect on the relationship between judicial efficiency and the cost of debt. Specifically, a higher weight of this debt contributes to judicial efficiency having a greater dampening effect on the cost of debt. These results hold in the presence of different robustness analyses.

Thus, our study contributes to the empirical literature by showing the causal link between judicial efficiency and the cost of financial debt. Nevertheless, it differs in several aspects from previous works. Firstly, our study considers the cost of debt at the firm level, stemming from all financial creditors. Secondly, by analyzing the effect of debt structure, we take into account not only bank debt and public debt but also other forms of "non-bank" private debt. This allows us to analyze the moderating effect of debt structure on the relationship between judicial efficiency and the cost of debt, adding an important contribution to the previous research. Thirdly, the focus on the euro area with coordinated monetary policy, extensive harmonization of legally binding standards in many aspects of financial systems, and a single currency that alleviates the risk of exchange rate offers an advantage in analyzing the cost of debt. In addition, the research of Ojah and Manrique (2005) shows that in the euro area, non-bank private debt acts as a substitute given the low supply of public debt, which we believe makes the eurozone an interesting scope for the study. Specifically, to contribute to the research focused on the eurozone, we extend our analysis to listed firms. Fourth, to measure judicial efficiency, we take into account its qualitative and quantitative dimensions and use the rule of law and length of judicial proceedings, respectively.

The rest of the paper is organized as follows. Section 2 reports the background, while Section 3 briefly provides the theoretical framework. Section 4 discusses the related literature and presents the hypothesis regarding the relationship between judicial efficiency, debt structure, and cost of debt. Section 5 addresses the methodological aspects, which include the sample selection, variable definitions, and the specification of the empirical models. Section 6 reports and discusses the empirical results. Finally, Section 7 contains a summary and a concluding remark.

2 | BACKGROUND

The World Justice Project and Rule of Law Index (Agrast et al., 2010) indicate that legal efficiency in Europe is very high in comparison to the rest of the world. European countries have a common heritage and political traditions, low levels of corruption, effective regulations, and accessible justice systems. According to the World Bank's Doing Business report (Doing Business, 2013), European institutions are effective in the protection of investors' rights, contract enforcement, and access to finance, having less complex and less expensive regulatory processes. More recently, the World Bank's Doing Business Report (Doing Business, 2020) further confirms that most European economies, especially those in Western and Central Europe, continue to maintain good positions in terms of the efficiency of their institutions, with countries in other parts of the world also converging, thanks to progressive reforms.

European governmental policies support a favorable legal and institutional environment, which can attract investments and consequently have an impact on long-term economic growth. However, it is important to ensure that the quality of law is accompanied by its efficient enforcement. The quality of legal protection depends on both statutory provisions and the degree to which they are enforced (Dahya et al., 2008). The system should protect investors against expropriation and ensure the protection of their rights. Otherwise, there would be little confidence in the market, which could negatively affect participation in economic life. In this sense, the justice system in Europe functions well when compared to the rest of the world. However, both researchers and regulatory bodies still highlight the existence of significant differences and weaknesses in the functioning of justice systems across European countries.

In the year 2000, the 23rd Conference of European Justice Ministers—called "Delivering justice in the 21st century"—recognized the important need to make advances in modernizing the forms of justice provided to citizens. In 2002, the Committee of Ministers of the Council of Europe created the European Commission for the Efficiency of Justice (CEPEJ), an analytical institution whose mission is to improve the efficiency and functioning of justice in the member States of the Council of Europe, strengthening at the same time court attendees' confidence in the judiciary.

The functioning of justice is an important part of European policies. This is due to the fact that judicial reforms, the constant evaluation of justice systems, and improvements in the functioning of the courts contribute not only to the continued respecting of fundamental rights, such as the right to a trial within a reasonable period of time but also to economic development. In accordance with this, the European Commission (EC) asserts: "Effective justice systems are essential for the application and enforcement of EU laws and upholding the rule of law and other values the EU is founded on and which are common to the Member States" (EU, COM 2022, 234:9). The EC emphasized the importance of systematic, reliable and comparable information related to the functioning of the justice systems and therefore decided to cooperate with CEPEJ. As a result, from 2013, the EC, based on the methodology developed in 2002 by CEPEJ, published annual reports called "EU Justice Scoreboard," which serves as a source of comparative information to improve the efficiency of the judicial systems of the member countries of the EU. The 2022 EU Justice Scoreboard concludes that the effectiveness of EU justice systems continues to improve in a large majority of Member States.

As we have previously indicated, this work focuses on analyzing the effect of judicial efficiency on the cost of financial debt in the eurozone. We consider that the analysis of companies in the eurozone is of particular interest for several reasons. First, these countries share the same currency and the European Central Bank establishes their interest rates; they also have similar levels of economic development. Second, although the efficiency of the regulatory framework in Europe is high in comparison with the rest of the World, there are important differences in the functioning of justice systems among European countries. In this sense, the Anglo-Saxon countries are characterized by their major orientation to the markets, compared to continental Europe, where a predominance of the banks in the financial system can be observed. In fact, with the objective of being independent of banking finance, in 2015, the European Commission approved the initiative of the Capital Markets Union. Specifically, in the eurozone, the prominence of corporate finance in the market has been duplicated, rising from 10% in 2008 to 20% in 2020 (European Central Bank, 2022). The significant increase in issues is largely explained as an alternative to the credit restrictions imposed by many banks during the crisis of 2008. In this vein, and different from previous studies, this work is based on the cost of financial debt. This does not only include financing obtained through bank loans but also the process of issuing corporate bonds and other "non-bank" private debt. Arena (2018), in his study on the incidence of litigation and the cost of debt, affirmed that it is crucial to have all types of debt.

3 | THEORETICAL FRAMEWORK

Institutions, including legislation and courts, have an impact on the operation and disruption of financial markets. It is necessary, for one, that the financial markets are in large measure regulated by the governments and react to the legislative changes. For other reasons, items that appear in the stores can be affected by decisions relating to the content of the legislation that is regulated. In addition to the content of legislation, its efficient application by judicial institutions is important (Bhattacharya & Daouk, 2009; Modigliani & Perotti, 1997; Pistor et al., 2000). Therefore, the legislation is not effective because it requires a judicial system capable of dealing with cases in a reasonable time. Thus, in parallel with studies centered on the impact of the content of the laws, it is important to examine the effect of its efficient application.

The analysis of the impact of judicial efficiency in economic decisions, both at macro and microeconomic levels, is framed in the literature on Law and Finance, initiated by the works of La Porta et al. (1997, 1998, 1999), which published a series of articles under the legal protection of investors and their consequences. La Porta et al. (1997) pointed to the importance of property rights assigned to investors. The authors associated differences in the level of investor protection granted by law with legal origin, suggesting that historically determined legal traditions explain financial development. In particular, indicated that legal rules originating in common law tend to protect investors more than those originating in civil law. The level of legal protection, in turn, can impact financing decisions and thus the size of the debt market and the securities that are part of the financial market. These conclusions have been supported among others by Demirgüç-Kunt and Maksimovic (1998), Pistor et al. (2000), and Beck et al. (2003). In the same vein, Claessens and Laeven (2003) indicated that the underdevelopment of the financial system and the weak protection of property rights have effects on firms.

Law and Finance is based on the theory of contracts that indicates the protection of property rights as an important factor in securing the flow of capital into the business. According to contract theory (Hart, 1995), contracts are incomplete by nature and credit contracts are no exception. Lenders do not have the ability to foresee all future events, nor do they have complete information about the creditworthiness and intentions of borrowers, which implies that the performance of loan contracts is subject to uncertainty. Due to the costs associated with acquiring information, it is impossible to include all possible ex ante events and obtain a complete contract. Therefore, as Hart (1995) pointed out, a set of rules and a third party to ensure their respect are needed. This role belongs to institutions that can alleviate and mitigate the effect of asymmetric information and transaction costs (Levine, 2005).

Furthermore, it is important to mention the intersection that exists between property rights, contractual agreements, and institutions. In this regard, it is worth mentioning the contributions of the New Institutional Economics made by North (1990). As is well known, financial markets are very sensitive to all kinds of risks that may result in economic losses. Although a priori the contractual parties do not

have full information about their intentions, which increases the legal risk, judicial institutions have a mitigating effect on this because they introduce in advance a set of rules that must be respected. Otherwise, the institutions can enforce compliance.

The Law and Finance literature has a very important impact on studies on the determinants of economic development. The studies developed by La Porta et al. are initially centered on legal efficiency, which mainly refers to the content of the legislation. Subsequently, Djankov et al. (2003) created an index of procedural formalism, which has shown that the time required for dispute resolution is extremely long and differs from one economy to another. La Porta et al. (1997, 1998) and Djankov et al. (2003, 2007) have provided the most important contributions, which have revealed the existence of a close link between the judicial system, business financing, and economic growth. These authors have shown that depending on the legal origin, legal protection and the degree of formality in judicial procedures differ, which, in turn, can impact the costs related to the execution of contracts. This drew attention to the fact that the quality of the content of the legislation and the quality of its application understood in terms of efficiency, should not be considered as substitutes. In fact, the legislation is not efficient per se and requires a judicial system capable of processing cases in a reasonable time. Therefore, in parallel to the studies focused on the impact of the content of the laws, the effect of their efficient application is examined.

As financial institutions play a critical role in economic development, special attention has been paid to the impact of judicial efficiency on access to and cost of external financing. Until now, the functioning of the credit market has been explained by the factors that affect the supply and demand of loans, but most studies omitted institutional factors. However, its inclusion is important because, from the point of view of business development, all obstacles to access to financing must be eliminated. Daher (2017) pointed out that efficient enforcement of contract compliance benefits the credit market and that, in the case of financial institutions, this may be even more important than the legal content of the contractual conditions of credit contracts. Consequently, thanks to legal certainty, companies have better access to financing and more favorable conditions (Bae & Goyal, 2009; Demirgüç-Kunt & Maksimovic, 1998; Diamond, 2004; La Porta et al., 1997; Laeven & Majnoni, 2005; Moro et al., 2018; Shvets, 2012).

4 | LITERATURE REVIEW AND HYPOTHESES

4.1 | Judicial efficiency and cost of debt

Both academics and regulatory bodies recognize that the judicial system must fully respond to citizens' rights, ensuring efficient compliance with contractual conditions and reducing costs and uncertainty in financial markets (Palumbo et al., 2013). Therefore, an effective judicial system that allows for a swift recovery of the capital invested through judicial channels is an important condition for the appropriate functioning of financial markets (Baklouti et al., 2016).

Authors who contributed to the theory of credit emphasize that when creditors can easily proceed with contract enforcement, execution of guarantees, or even obtain control over the company, they are willing to grant financing at a lower cost (Aghion & Bolton, 1992; Hart & Moore, 1994, 1998; Townsend, 1979). Given that creditors do not have all the information about borrowers and that credit agreements are incomplete; they will not grant funding in the absence of third parties responsible for the execution of contracts. This role belongs to judicial institutions. Therefore, their functioning can influence the borrower's future willingness to repay the debt. The debtor, knowing beforehand that enforcement of the loan agreement may be affected by court delays, may act opportunistically, and, even being solvent, stop paying debt (Jappelli et al., 2005).

Among investors, banks and other issuers of debt instruments are particularly sensitive to risk. Thus, the functioning of justice may influence their decisions on whether to grant a loan and on what terms. In this sense, the creditors being aware of the shortcomings in the functioning of justice may compensate ex ante for the costs of possible litigation by applying a higher interest rate. Arena (2018) showed that litigation increases the cost of the debt given that entry into court proceedings in cases of contract infringement, involves direct and indirect costs. At the same time, Marciano et al. (2019) argued that inefficient law enforcement may cause borrowers' opportunistic behavior leading to creditors acting in an anticipated manner, which may increase the interest rates.

To summarize, when the debtor defaults on a loan, creditors expect to enforce the contract in the jurisdiction set out in the contractual conditions. In this case, the judicial system should allow for prompt and efficient recovery of invested capital or enforcement of guarantees. Moreover, under the existence of creditor protection and efficient law enforcement, the borrower's risk is easier to control (Moro et al., 2018). Therefore, if an efficient judiciary can reduce part of the risk associated with legal uncertainty and strategic default, the willingness of funding providers to extend credit at a lower cost may increase.

Regarding empirical evidence, in the literature focused on the impact of judicial efficiency on the cost of debt, we can distinguish studies focused on one particular country—Pinheiro and Cabral (1999), Brazil; Jappelli et al. (2005), Italy; Fabbri (2010), Spain; Arena (2018), United States—and investigations carried out at international level, the latter, on the one hand, calculating the cost of debt at the aggregate (country) level (Padilla & Requejo, 2000; Laeven & Majnoni, 2005) and, on the other, using loans granted to firms as a unit of analysis. These include that of Qian and Strahan (2007), covering 43 countries between 1994 and 2003. The authors find a positive but statistically insignificant relationship between the degree of legal formalism used to approximate how efficiently the courts enforce contracts and the cost of loans. Bae and Goyal (2009) covered the same period using a sample of loans provided by banks. As a measure of legal system efficiency, they focus on creditor rights, but in a robustness analysis, they found that banks respond to poor contract enforcement by increasing loan spreads. However, the indicator of judicial efficiency measuring the time needed to enforce contracts

refers only to 1 year (2004); hence, after the study period (1994–2003). Galli et al. (2017) analyzed SMEs from 11 euro area countries in the period 2009–2013 using as a proxy for judicial efficiency the cost and number of procedures required to resolve a dispute. Nevertheless, in their study the cost of debt is measured based on a survey; therefore, it does not indicate a specific numerical value, making a comparative analysis between the countries difficult. Finally, Álvarez-Botas and González (2021), based on a sample of firms from 37 countries, found that the cost of firm debt decreases with a higher value of the rule of law indicator used as a proxy for legal enforcement.

In line with these theoretical arguments, as well as the empirical evidence, the first hypothesis of the study (H1) is a follows:

> **H1.** A better judicial efficiency reduces the firm's cost of financial debt.

4.2 | Judicial efficiency and cost of debt. The moderating effect of debt structure

Debt is considered the principal source of external financing. Firms, especially listed ones, are mainly financed by bank loans and bonds issued in the public debt markets (Boubaker et al., 2018; Schwert, 2020). Consequently, the literature on debt structure highlights that firms choose mainly between these two types of debt (e.g., Kale & Meneghetti, 2011; Ben-Nasr et al., 2021), and several studies have analyzed the use of both, namely, public and private debt, by firms. However, most works on debt structure equate private debt only with bank debt (e.g., Liu et al., 2018; Boubaker et al., 2018; Boubakri & Saffar, 2019; Ben-Nasr et al., 2021; Asamoah et al., 2022; Grimme, 2023). A limited number of papers consider that there is both bank and non-bank debt in private debt when analyzing its structure (Johnson, 1997; Carey et al., 1998; Denis & Mihov, 2003; Ojah and Manrique, 2006; Arena & Howe, 2009; Rauh & Sufi, 2010; Kale & Meneghetti, 2011; Arena, 2011). Non-bank private debt includes a heterogeneous set of debt from different types of creditors. Thus, in studies focused on the USA, this type of debt includes for example private placements of debt securities under Rule 144A and Rule 506 and other private placements (Arena, 2011; Arena & Howe, 2009; Denis & Mihov, 2003; Rauh & Sufi, 2010). Carey et al. (1998) referred to non-bank private debt as finance company debt because they consider that finance companies present differences as creditors with banks. Rauh and Sufi (2010) also included program debt and convertible debt inside non-bank private debt. Finally, there are studies that do not specify what type of debt includes non-bank private debt, simply noting that it is neither bank nor public debt (Johnson, 1997; Ojah & Manrique, 2005). In conclusion, non-bank debt can therefore be considered hybrid debt.

Bank debt has traditionally predominated in Europe, especially within Continental Europe countries. Nevertheless, the creation of the euro area triggered the development and use of the European bond market (Blomkvist et al., 2018; Pagano & Von Thadden, 2004; Van Lanschoot, 2008). Rajan and Zingales (2003) have found that the growth of the corporate bond market was higher in euro area member countries than in non-euro economies. However, although the data from Eurostat shows increased use of debt securities, in 2021, in non-financial corporations located in the euro area, they represented only 16.7% of the liabilities related to loans and debt securities.

To analyze the choice between public and private debt, Kale and Meneghetti (2011) referred to the characteristics of banks as creditors based on two sets of arguments: information-based theory and liquidation/renegotiation arguments. The former refers, on the one hand, to the ability of banks to obtain and produce ex ante private information to analyze the quality of borrowers and, on the other, to their superior role as monitors vis-à-vis multiple individual investors once financing has been granted, which reduces the agency costs of the monitoring (Altman et al., 2010; Diamond, 1984; Fama, 1985; Leland & Pyle, 1977). The latter relates to the greater ability of banks vis-à-vis other lenders to liquidate the firm or renegotiate debt terms in case of financial distress (Park, 2000; Rajan, 1992). Banks also have more flexibility to renegotiate debt contracts in other conflict situations that may arise (Roberts & Sufi, 2009). Chemmanur and Fulghieri (1994) explained that banks differ from bondholders in being "long-term players in the debt market" (p.476); therefore, they have to develop a reputation regarding their more understandable and flexible approach to firms in financial difficulties. This greater ability of banks for flexibility and negotiations may have an impact on banks' risk management practices and accounting of losses on their non-performing loans. In this sense, following renegotiation (after receiving several payments and ensuring the financial viability of the borrower), a non-performing loan can be reclassified as performing (Garrido, 2012). This at the same time can encourage banks toward the use of out of courts agreements.

Together with the possibility of using debt from a single, well-informed lender, as is the case of banks, companies can raise debt from a pool of dispersed and potentially less-informed bondholders (Blomkvist et al., 2018). Within this framework, the general notion is that dispersed debt is associated with coordination difficulties and a higher possibility of conflict of interest, which can make the renegotiation of debt terms more complex (Bolton & Freixas, 2000; Bris & Welch, 2005; Garrido, 2012). Garrido (2012) recognized that the homogeneity of creditors is a relevant factor for successful debt restructuring in informal negotiations. According to the author, this may even lead banks to one-on-one negotiations with their debtors in order to reach informal arrangements for debt restructuring. Furthermore, banks may exercise higher influence and pressure on management than on bondholders because of their concentrated holdings and better access to information. Bondholders generally tend to have free rider monitoring problems that might discourage them from participating in costly monitoring activities (Ben-Nasr et al., 2021; Denis & Mihov, 2003).

In relation to providers of non-bank private debt, Carey et al. (1998) indicated that they are similar to banks when it comes to the resolution of problems related to the asymmetric information of borrowers. However, the authors considered that the borrowers of both types of private debt differ in relation to risk: while banks grant debt

to low-risk borrowers, non-bank lenders are more willing to provide funds to high-risk borrowers. Denis and Mihov (2003) asserted that, one the one hand, non-bank private debt differs from bank debt in terms of maturity, regulatory requirements, placement structures, and concentration and identity of creditors. On the other hand, compared with public debt, non-bank private debt shows lower flotation costs and custom design covenants. Specifically, in environments where the use of public debt is very low. Ojah and Manrique (2005) argued that non-bank private debt serves as a means of reduction of hold-up costs of bank loans. Additionally, according to these authors, banks' expertise in information gathering and monitoring places them in a better position as providers of debt to risky firms, while well-heeled firms may be better able to access non-bank private debt sources in a debt market that has no public debt (456). Those ideas lead to the conclusion that in this type of financial market, non-bank private debt sources could act as substitutes for public debt ones.

Although judicial efficiency (or inefficiency) is a key factor for creditors in general when making investment decisions, it could have a different level of significance depending on the creditor type. Under this assumption, banks could be less concerned about the functioning of justice than other lenders given their advantages related to access to information, monitoring, bargaining power in debt renegotiations, and fewer coordination problems. In this sense, Berlin and Mester (1992) argued that bank debt is costlier and has harsher conditions than public debt because it allows for renegotiation. Additionally, Santos and Winton (2008) and Grimme (2023) used the same arguments based on the bank's ability to acquire information beyond what is publicly available, and the maintenance of long-term relationships with borrowers to explain how bank debt costs change in times of crisis. However, while the former found that bank spreads increase in recessions, the latter showed that in periods of heightened uncertainty spreads on loans are maintained. Therefore, on the one hand, due to the advantages of solving difficult situations without recourse to the courts banks might not be so concerned by the functioning of judiciary in their decisions regarding the cost of debt. On the other hand, Garrido (2012) pointed out that the greater the number of creditors, the more difficult it is to reach an agreement on debt restructuring. One of the reasons for this is that in the presence of multiple creditors, the aggregation of different legal provisions becomes more complex. Consequently, as this scenario mainly describes the situation of public debt holders, the role of justice for them may be much more relevant, because, in the event of default by firms, they do not have the extra-judicial resources of banks. Therefore, for bondholders, a well-functioning judiciary is relevant in relation to setting the cost of their debt. Similarly, efficient justice may be relevant for non-bank lenders that possess hybrid characteristics of bank and bond debt. In this sense, non-bank private debt does not reach the dispersion of public debt, but at the same time, it is not as concentrated as bank debt. Moreover, non-bank debt holders do not tend a similar power to solve insolvency problems via out-of-court agreements. Therefore, it is expected that justice plays an important role in their decisions.

Regarding the empirical evidence, most previous studies that analyzed debt structure have considered the dichotomy between bank and public debt (e.g., Asamoah et al., 2022; Ben-Nasr et al., 2021; Boubaker et al., 2018; Boubakri & Saffar, 2019; Grimme, 2023; Liu et al., 2018). The non-bank private debt, although considered in some earlier research (e.g., Denis & Mihov, 2003; Ojah & Manrique, 2005; Rauh & Sufi, 2010; Kale & Meneghetti, 2011; Arena, 2011), has received less attention than bank and public debt. In addition, to our knowledge, there is no previous study that has analyzed the moderating effect of debt structure in the relationship between judicial efficiency and debt cost.

The above-mentioned differences between banks and other lenders when they act as creditors lead to the conclusion that debt structure could affect the relationship between judicial efficiency and the cost of debt. Consequently, our second hypothesis (H2) is as follows:

H2.1. A higher weight of private bank debt in the corporate debt structure does not affect the relationship between judicial efficiency and the cost of debt.

H2.2. A higher weight of public debt in the corporate debt structure enhances the negative relationship between judicial efficiency and the cost of debt.

H2.3. The effect of non-bank private debt on the relationship between judicial efficiency and cost of debt is indeterminate due to the hybrid composition of non-bank private debt.

5 | RESEARCH DESIGN

5.1 | Sample and sources of information

The sample, obtained from the OSIRIS database (Osiris, n.d.), is composed of listed firms located in the euro area countries in the period 2010–2021. We accounted for non-financial[1] active firms. Given the objective of the study, we required firms to have financial debt and financial expenses on the balance sheet. Following these criteria, we obtained an initial sample of 1629 firms and 19,548 observations. However, after deleting the observations from Latvia and Lithuania, which joined the euro zone in 2014 and 2015, respectively, 1594 companies and 19,128 observations form the sample. The data for the year 2010 was used for the calculation of the lagged variables. Therefore, the study period is 2011–2021, totaling 1594 firms and 17,534 observations. Since the study focuses on listed companies, we have excluded from our sample micro-enterprises defined as those whose sales and assets are equal to or below 2 million euro. Following the criteria used by Chen et al. (2020), we excluded the country with less than 50 observations (Slovakia) during the analyzed period. Additionally, we eliminated the observations of the firms with the cost of debt over 100% (Chui et al., 2016) and below the third percentile or above the 97th percentile from their respective countries. Finally, we eliminated the observations with missing values for any of the

variables used in the econometric models. As a result, we obtained an unbalanced panel of 13,550 observations for 1487 firms in the period 2011–2021[2] belonging to 16 euro zone countries.[3] A summary of the selection sample process can be seen in Table A1 of Appendix A.

5.2 | Variables

5.2.1 | Dependent variable

Cost of debt

In line with our hypotheses, the variable object of the study is the cost of debt, specifically financial debt (Bliss & Gul, 2012; Chui et al., 2016; Fabbri, 2010; Magnanelli & Izzo, 2017; Ye et al., 2023). Following previous studies (e.g., Moscariello et al., 2014; Regenburg & Seitz, 2021), the cost of a firm's financial debt is calculated as the ratio between financial expenses in year t and the average financial debt in years t and $t-1$.[4] We follow previous studies (Arifin et al., 2020; Bliss & Gul, 2012; Minnis, 2011; Moscariello et al., 2014) that use the interest payment information disclosed in financial statements to calculate the cost of debt. Using interest expenses has the advantage because it includes interest payments to both public and private debtholders, hence can better reflect a firm's total cost of financial debt (Chui et al., 2016). The financial debt includes both long-term debt and short-term interest-bearing debt and aggregates banks' debt, corporate bonds, and non-bank private debt. However, following the research of Wang et al. (2020), it is to be noted that this ratio may not fully reflect the actual interest rate charged on loans. The reason is that it tends to be affected by outlier values coming from errors due to loan repayment, interest income received, and other costs unrelated to borrowing.[5] Thus, to control the outliers, similar to previous studies (e.g., Badertscher et al., 2023; Minnis, 2011), we truncate the sample at the third and 97th percentiles of the distribution of the variable for each country. The variable *cost of debt* is presented as a percentage.

5.2.2 | Explanatory variable

Judicial efficiency

We used two indicators as a proxy for judicial efficiency, rule of law (ROL) and length of judicial proceedings (duration). The first approximates the qualitative dimension while the second is the quantitative one. The two indicators were obtained from databases held by the World Bank. The ROL index was taken from the World Bank's Governance Indicators (World Bank's WGI, n.d.) and the duration required to enforce contracts from the World Bank's (Doing Business Database, n.d.). These indicators have been widely used in previous research (e.g., Bae & Goyal, 2009; Galli et al., 2017; Moro et al., 2018; Shah & Shah, 2016).

According to the WGI definition, ROL "captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, …".

The value of the indicator ranges from −2.5 to 2.5 with higher values corresponding to better outcomes in ROL.[6] Therefore, it is expected that the more efficient the rule of law in the country, the more security creditors will have regarding the future performance of contracts. Consequently, the higher the value of ROL, the lenders will be more willing to reduce interest rates (Álvarez-Botas & González, 2021). Among the studies that have used the ROL are Padilla and Requejo (2000), Laeven and Majnoni (2005), Chen et al. (2016), Chui et al. (2016), Meng and Yin (2019), Zhu et al. (2020), and Álvarez-Botas and González (2021).

In the economic area of studies, one of the most widely used indicators is the time taken by the courts to resolve a dispute (Fabbri & Padula, 2004; Jappelli et al., 2005; Chemin, 2010; Fabbri, 2010; Shah et al., 2017; Sarpong-Danquah et al., 2023). "Duration" is the time taken to resolve a commercial dispute and has an inverse meaning. As such, longer trial duration represents lower judicial efficiency. Following the "Doing Business" methodology, time is registered in calendar days, starting from the moment when the seller files a lawsuit in court until payment. This does not only account for the days when actions take place but also considers waiting periods. The time is an average duration of three different stages: (1) filing and service, (2) trial and judgment, and (3) enforcement.[7] In order to facilitate the interpretation of the results, the Inv_duration variable has been created (Khan et al., 2024; Shah et al., 2017). Specifically, we have computed this variable by subtracting from the maximum value of the duration (in years) of all the countries and years that amounts to 4.69 (rounded to 5), the duration (in years) of each country. In this way, the variable Inv_duration adopts smaller values for the countries with longer duration, which indicates lower judicial efficiency. Therefore, in both proxies of judicial efficiency a higher value indicates greater judicial efficiency.

5.2.3 | Moderating variables

In order to test the second hypothesis, we consider the interaction between judicial efficiency and the debt structure. For this purpose, we split financial debt into three types: bank debt, bonds, and non-bank private debt.[8] Bank debt includes revolving-credit facilities (lines of credit and bank loans), bank overdrafts, and leasing. Bonds consist of public debt issues. Therefore, following Johnson (1997), we explicitly identify bank and public debt, and all other long-term interest-bearing debt is private non-bank debt. Studies that consider these types of debt are scarce (Denis & Mihov, 2003; Johnson, 1997; Rauh & Sufi, 2010). All the variables are relativized by total financial debt. Thus, we create the interaction variables between judicial efficiency and debt structure, namely, *JudEfixBankdebt*, *JudEfixBonds*, and *JudEfixNonBankPdebt*. *JudEfi* is ROL or Inv_duration.

5.2.4 | Control variables

In line with previous studies, we included firm and country-level sets of control variables considered important determinants of the cost of debt (Álvarez-Botas & González, 2021; Bliss & Gul, 2012; Chen

et al., 2016; Chui et al., 2016; Fabbri, 2010; Galli et al., 2017; Goss & Roberts, 2011; Laeven & Majnoni, 2005; Magnanelli & Izzo, 2017; Ye et al., 2023). Consequently, our models include *leverage*, *tangibility*, *risk of insolvency (Z-Altman)*, *profitability (ROA)*, *firm size*, and *age*. In addition to firm-level control variables, we include country-level characteristics such as *GDP per capita*, *interest rate*, as well as *industry* and *year*. A summary of the variables is shown in Table A3 of Appendix A.

5.2.5 | Econometric model

The relationship between judicial efficiency and the cost of debt is explored using a panel data approach, which allows for data analysis over time. The advantage of the panel data model is that it can consider unobserved heterogeneity that characterizes the firms over the period. To avoid a possible reverse causality between the financial variables (*ROA*, *leverage*, *tangibility*, and *Z-Altman*) and the dependent variable, they are included in the models with a time lag (Chui et al., 2016; Wang et al., 2020). In addition, to eliminate outliers, ROA and Z-Altman were winsorized at the 1st and 99th percentiles.

The functional models are as follows:

$$
\begin{aligned}
Cost\ of\ debt_{i,t} = {} & \beta_0 + \beta_1 Judicial\_Efficiency_{i,t} + \beta_2 Leverage_{i,t-1} \\
& + \beta_3 Tangibility_{i,t-1} + \beta_4\ Z\ Altman_{i,t-1} + \beta_5 ROA_{i,t-1} \\
& + \beta_6 Size_{i,t} + + \beta_7 Age_{i,t} + \beta_8 GDP\ per\ capita_{i,t} \\
& + \beta_9\ Interest\ rate_t + + \mu_i + \lambda_t + \varepsilon_{i,t};
\end{aligned}
\tag{1}
$$

$$
\begin{aligned}
Cost\ of\ debt_{i,t} = {} & \beta_0 + \beta_1 Judicial\_Efficiency_{i,t} + \beta_2\ Bankdebt_t \\
& + \beta_5\ JudEfixBankdebt_t\ \beta_3\ Bonds_t + \beta_4\ NonBankPdebt_t + \\
& + \beta_6\ JudEfixBonds_t \\
& + \beta_7\ JudEfixNonBankPdebt_t\ \ \beta_8 Leverage_{i,t-1} \\
& + \beta_9 Tangibility_{i,t-1} + \beta_{10} ZAltman_{i,t-1} + \beta_{11} ROA_{i,t-1} \\
& + \beta_{12} Size_{i,t} + + \beta_{13} Age_{i,t} + \beta_{14} GDP\ per\ capita_{i,t} \\
& + \beta_{15}\ Interest\ rate_t + + \mu_i + \lambda_t + \varepsilon_{i,t},
\end{aligned}
\tag{2}
$$

where *Cost of debt*$_{i,t}$ is the cost of financial debt of firm *I* at time *t* and β_0 is an intercept. Judicial efficiency (JudEfi) is measured either by ROL or I*nv_duration* and the coefficients of the control variables are β_2 to β_9 and β_8 to β_{15} in Models 1 and 2, respectively. In the model, μ_i controls for unobservable characteristics of firms that are constant over time (unobservable individual heterogeneity), λ_t represents industry-year[9] dummies and $\varepsilon_{i,t}$ is the error term of firm *I* at time *t*. To choose the most suitable regression model for our analysis, we applied the Hausman specification test (Hausman, 1978). The results (chi^2 = 110.40 and *p* = .0000) suggest the use of fixed effects. All models are estimated using the STATA 14 statistic package.

6 | EMPIRICAL RESULTS AND DISCUSSION

6.1 | Descriptive analysis

Table 1 presents the descriptive statistics of debt cost and the two indicators of judicial efficiency, ROL and Inv_duration for the country.

The figures vary significantly between countries, which, on the one hand, is linked to the country's size and population and, on the other, by the stock exchange size and the number of companies listed on it.

According to the data taken from financial statements, the average cost of financial debt in the euro area is 5.89%. The lowest cost is observed in firms in Estonia (4.63%), Austria (4.76%), and Spain (4.91%) while the highest cost of debt is observed in Luxembourg (7.27%), Cyprus (7.21%), and Germany (7.07%). As a preliminary assessment, we look at the standard deviation and the median of the distribution. The values indicate some heterogeneity in the cost of debt among firms within the same country. Therefore, it is important to consider the specific characteristics of firms.

The average score of the ROL is 1.32, but it ranges between 0.29 in Greece and 2.04 in Finland. The countries with the highest value of ROL are Nordic countries and those located in Central Europe (Finland, the Netherlands, Austria, Luxembourg, and Germany), while the countries of Southern Europe (Greece, Italy, and Cyprus), show the lowest scores. The average of the Inv_duration is 3.30 years and it varies from 1.03 in Greece to 4.12 in Luxembourg. It can be observed that 69% of economies are over the euro zone average (Luxembourg, Austria, Germany, Finland, Estonia, France, Malta, Belgium, Spain, Netherlands, and Ireland), which indicates higher judicial efficiency (shorter duration of judicial proceedings); 31% of countries have less efficient judiciary (longer duration) being below the euro zone average (Portugal, Cyprus, Italy, Slovenia, and Greece).

It can be observed that there is a certain geographical consistency in both measures of judicial efficiency as Northern and Central Europe countries have a better score in the ROL as well as shorter duration of judicial proceedings. On the contrary, the countries located in the Mediterranean and Southern Europe have a lower score in ROL and a longer duration.

This preliminary analysis indicates that there is consistency between the quantitative and qualitative dimensions of judicial efficiency. In addition, it shows the existence of significant differences in the handling of lawsuits by courts across countries. Over the years both indicators of judicial efficiency vary slightly (see Tables A4 and A5 in Appendix A). This could be explained by the fact that reforms linked to the improvement of judicial efficiency require a longer time. It also takes time to change the user's perception of judiciary. Nevertheless, variations between countries can still be observed.

We use the Kruskal–Wallis test (see Table 1) to assess if there is a statistically significant difference in the debt cost, depending on the degree of judicial efficiency, for both indicators. The results show that different levels of judicial efficiency are associated with different average country levels of debt cost (chi^2 = 12,635 for ROL and 10,196 for Inv_duration *p* = .0001 in both).

Table 2 shows the descriptive statistics of the debt structure's variables. It can be observed that bank debt predominates in all countries, with an average of 59.93% (median of 70%).

However, important differences between countries can be observed in the level of bank debt that ranges between 37% in Ireland and 81% in Spain. The average level of non-bank private debt is 18.57%. The lowest non-bank private debt is in Finland (4.90%) and

TABLE 1 Descriptive statistics of the cost of debt and judicial efficiency by country.

Country	Cost of debt (%)			Rule of Law index (2011–2021)			Inv_Duration (years) (2011–2020)		
	Average	Median	SD	Average	Median	SD	Average	Median	SD
Austria	4.7639	4.4423	2.1900	1.8490	1.8426	0.0465	3.9123	3.6876	0.1311
Belgium	6.4962	5.0772	5.1409	1.4208	1.4299	0.0642	3.6164	3.6164	0
Cyprus	7.2171	6.0490	4.4264	0.8894	0.8882	0.1820	2.4038	1.9863	0.4939
Estonia	4.6387	4.0415	2.9513	1.2811	1.2700	0.0848	3.7774	3.7534	0.0375
Finland	5.9166	4.6697	4.2563	2.0415	2.0600	0.0576	3.7622	3.6712	0.1386
France	4.8455	3.8749	3.6668	1.4028	1.4098	0.0490	3.7753	3.7753	0
Germany	7.0786	5.3717	5.4646	1.6562	1.6273	0.0844	3.7595	3.6876	0.1311
Greece	6.9303	6.4769	2.6916	0.2978	0.3200	0.1439	1.0320	0.712	0.7383
Ireland	5.4473	4.5344	4.0056	1.5754	1.5022	0.1467	3.2883	3.2192	0.1449
Italy	5.5106	4.7694	3.3812	0.3570	0.488	0.0795	1.8287	1.7534	1.0519
Luxembourg	7.2785	5.6228	5.2155	1.8088	1.7988	0.0457	4.1205	4.1205	0
Malta	5.9488	4.8141	4.3922	1.1076	1.1355	0.1621	3.6164	3.6464	0
Netherlands	5.8134	4.7305	3.7206	1.8336	1.8221	0.0729	3.5918	3.5918	0
Portugal	6.0825	5.0925	3.7893	1.1026	1.1300	0.0516	2.7699	2.6164	0.1577
Slovenia	6.1129	4.8470	5.8341	1.0380	1.0300	0.0403	1.6507	0.5205	0.1686
Spain	4.9184	4.5937	2.5387	1.0029	1.0131	0.0798	3.8999	3.6027	0.0055
Average all sample	5.8929	4.8065	4.2666	1.3224	1.4364	0.5102	3.3054	3.6712	0.9080
Chi-sq. (KW)	1043.32***			12,635.44***			10,196.7***		

Note: Variables' description in Table A1 of Appendix A.

Abbreviations: KW, Kruskal–Wallis test; SD, standard deviation.

*Significant at 10%.

**Significant at 5%.

***Significant at 1%.

Source: Own elaboration from the OSIRIS, World Bank's WGI, and Doing Business databases.

the highest in Ireland (57.45%). The corporate bond issuance in our sample represents 11.76% with an average weight of less than 1% in Ireland and more than 20% in Malta.

In Table A6 of Appendix A, we present summary statistics of control variables, and the distribution of the sample by sector is presented in Table A7 in Appendix A. Finally, Table A8 in Appendix A presents a correlation matrix. The correlation coefficients are not extremely high, except for the correlation between the two proxies of judicial efficiency (0.87) and the correlations between the bank debt and non-bank debt (−0.66). Consequently, the variables related to the debt structure are not included in the same model. The variance inflation factors (VIFs) range between 1.08 and 1.53 in all models; hence, we can assume that there is no multicollinearity.

6.2 | Econometric results

Table 3 reports the coefficient estimates from the regression models considering the ROL as a proxy of judicial efficiency. Model 1 includes only ROL, while in Models 2 and 3, we added the debt structure variables and their interaction with the ROL.

In all models, the coefficient of ROL is negative and significant at 1% ($p < .01$), indicating that a higher judicial efficiency leads to a reduction in the cost of financial debt. These outcomes support H1. Regarding the moderating effect of debt structure, the results of Model 2 indicate that the interaction is not significant. Therefore, it supports H2. Likewise, in Model 3, the bonds and their interaction with ROL are not significant. Non-bank debt is non-significant, but the interaction with the ROL is negative and significant. These results take out offer support to H2.3 but not H2.2.

Summing up, we can conclude that only the proportion of non-bank debt in debt structure has a moderating effect between the judicial efficiency and the cost of financial debt. To facilitate the interpretation of this moderating effect, in Figure 1, the coefficients of Model 3 and the average values of control variables in the sample are presented. This graph represents the evolution of the cost of debt as a function of the different levels of non-bank debt (0, 25%, 50%, 75%, and 100%) and for the three levels of the rule of law (minimum, 0.075; medium, 1.32; and maximum, 2.13).

In Figure 1, we can observe several effects. Firstly, higher judicial efficiency corresponds to a lower cost of debt, independently of the debt structure. Secondly, a higher proportion of non-bank debt

TABLE 2 Descriptive statistics of the debt structure by country (2011–2021).

Country	Bankdebt_FD			Bonds_FD			NonBankPdebt_FD		
	Average	Median	SD	Average	Median	SD	Average	Median	SD
Austria	0.5316	0.4824	0.3603	0.1650	0	0.2532	0.2729	0.0218	0.3479
Belgium	0.4717	0.4646	0.3619	0.1312	0	0.2504	0.2227	0.0224	0.3089
Cyprus	0.7205	0.9049	0.3508	0.0548	0	0.1871	0.1442	0	0.2896
Estonia	0.7991	0.8841	0.2558	0.0606	0	0.1639	0.0597	0	0.1500
Finland	0.7410	0.8772	0.3009	0.1519	0	0.2519	0.0490	0	0.1361
France	0.4647	0.4642	0.3552	0.1346	0	0.2520	0.2127	0.0295	0.3039
Germany	0.6900	0.9199	0.3696	0.1129	0	0.2442	0.1637	0	0.2888
Greece	0.6179	0.7759	0.3776	0.1346	0	0.2827	0.1423	0	0.2746
Ireland	0.3747	0.0918	0.4355	0.0091	0	0.0353	0.5745	0.7998	0.4207
Italy	0.7452	0.9075	0.3128	0.0976	0	0.2226	0.1116	0	0.2322
Luxembourg	0.4863	0.4034	0.3706	0.1582	0	0.2718	0.2708	0.0383	0.3412
Malta	0.5154	0.5221	0.3683	0.2162	0	0.3427	0.2131	0	0.3478
Netherlands	0.3480	0.1722	0.3733	0.0878	0	0.2267	0.4395	0.4413	0.3909
Portugal	0.7645	0.9262	0.2859	0.0900	0	0.1921	0.1327	0.0026	0.2268
Slovenia	0.7817	0.9015	0.2779	0.0740	0	0.1779	0.0585	0	0.1992
Spain	0.8128	0.9535	0.2646	0.0682	0	0.1939	0.0878	0	0.1840
Mean	0.5993	0.7021	0.3757	0.1176	0	0.2442	0.1857	0.0037	0.3015
Chi-sq. (KW)	2057.82[***]			287.32[***]			1320.79[***]		

Note: Variables' description in Table A1 of Appendix A.

Abbreviations: FD, financial debt; KW, Kruskal–Wallis test; SD, standard deviation.

[*]Significant at 10%.

[**]Significant at 5%.

[***]Significant at 1%.

Source: Own elaboration from the OSIRIS database.

reduces the cost of debt, specifically if the judicial efficiency is higher than the minimum. Thirdly, the reduction of the cost of debt is greater when both judicial efficiency and the level of the non-bank debt are higher. Finally, as regards control variables, all variables show results according to the literature and the previous studies, except the ROA which is insignificant.

Additionally, Table 4 shows the results of Models 1–3 substituting ROL for the Inv_duration. We can observe that the results of Models 4–6 are similar to those obtained in Models 1–3. Thus, we can assert that both the qualitative and quantitative proxies may be used to analyze the incidence of judicial efficiency and the cost of debt in the euro zone.

6.3 | Robustness analysis

To demonstrate the robustness of the obtained results, we perform additional estimations considering alternative variables, samples, and estimation methods. The results are reported in Table 5. Panel 1 refers to robustness for the H1, panel 2 to H2.1, and panel 3 for the H2.2. and H2.3. The models are named with a number referring to the panel and a letter (from A to H) that corresponds to each of the following robustness analyses and are shown in the respective column heading.

For brevity, all models were re-estimated considering only the ROL as explanatory variable.[10]

Firstly, we have considered an alternative dependent variable computing the cost of financial debt (Debtcost) as financial expenses in t divided by financial debt in the t, instead of the average between $t-1$ and t (Medhioub & Boujelbene, 2023). The results of the re-estimation of the models are shown in Column A, Models 1A, 2A, and 3A, and have similar signs and significance to those initially obtained.

Secondly, since the evaluation of judicial efficiency could be influenced by past information, we include ROL lagged by one period (Zhu et al., 2020). The results of the re-estimation indicate that in all models (Models 1B, 2B, and 3B, Column B, Table 5), ROL lagged is negative and significant al 1%.

Thirdly, as an alternative proxy of judicial efficiency, following Lepore et al. (2018), we use the Disposition Time (DT). According to the EU Justice Scoreboard (2023), DT measures the length of judicial proceedings, that is, the estimated time (in days) needed to resolve civil and commercial cases in court (at first instance). It is computed as the number of unresolved cases divided by the number of resolved cases at the end of a year multiplied by 365 (days). A higher value indicates a lower judicial efficiency, so we expect a positive relation with the cost of debt. The data have been obtained from the European Commission for the Efficiency of Justice (CEPEJ) Evaluation

TABLE 3 Judicial efficiency (ROL), debt structure, and the debt cost in euro area.

	Model 1		Model 2		Model 3	
	β	S.E.	β	S.E.	β	S.E.
Rule of Law (ROL)	−1.8836***	0.3912	−1.8915***	0.4126	−1.6549***	0.4010
Bankdebt	-	-	−0.3738	0.3147	-	-
ROLxBankdebt	-	-	0.1401	0.2215	-	-
Bonds	-	-	-	-	0.5828	0.4265
ROLxBonds	-	-	-	-	−0.0032	0.3061
Non-BankPdebt	-	-	-	-	0.4856	0.4012
ROLxNonBankPdebt	-	-	-	-	−0.6536**	0.2847
Leverage$_{t-1}$	−8.2192***	0.3559	−8.2446***	0.3563	−8.2208***	0.3565
Tangibility$_{t-1}$	−2.0214***	0.4268	−1.9902***	0.4273	−2.0275***	0.4270
Z-Altman$_{t-1}$	−0.2334***	0.0632	−0.2341***	0.0632	−0.2325***	0.0632
ROA$_{t-1}$	0.1051	0.3779	0.1045	0.3779	0.0578	0.3777
Size (log)	−0.4302***	0.0939	−0.4345***	0.0940	−0.4411***	0.0940
Age	−0.1343**	0.0573	−0.1306**	0.0574	−0.1334**	0.0573
Interest rate	0.3711***	0.0483	0.3708***	0.0487	0.3592***	0.0486
GDP per capita	0.0065**	0.0031	0.0067**	0.0032	0.0069**	0.0031
Industry-year	Yes		Yes		Yes	
Constant	22.8386***	4.1084	22.8441***	4.1163	22.6947***	4.1096
Observations	13,550		13,550		13,550	
Firms	1487		1487		1487	
Adj. R-squared	0.5298		0.5298		0.5307	

Note: D.V.: Cost of debt (%). Estimation method: linear panel regression with fixed effects. Variables' description in Table A1 of Appendix A.
*Significant at 10%.
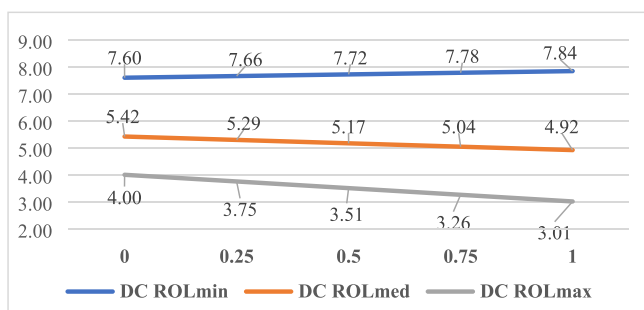**Significant at 5%.
***Significant at 1%.

FIGURE 1 Moderating effect of the non-bank debt in the relationship between ROL and debt cost (DC).

Report (2022).[11] The results shown in Column C of Table 5 (Models 1C, 2C, and 3C) indicate that the DT is positive and significant in all models, that is, a greater judicial inefficiency leads to a higher cost of debt. Moreover, the non-bank private debt is negative and significant, while the interaction between DT and non-bank private debt is positive and significant, according to the inverse relationship between DT and judicial efficiency.

Fourthly, the distribution of the sample shows that observations from two countries (France and Germany) account for approximately 50% of the total number of firms, which could bias the results. Following Shah et al. (2017), Bussoli and Marino (2018), and Zhu et al. (2020), we exclude French and German firms from the sample. The results shown in Column D of Table 5 (Models 1D, 2D, and 3D) confirm previous estimations about the variables of interest. Thus, the results of the regressions show that they are not affected by the sample composition.

Fifthly, to address one of the possible sources of endogeneity related to the year-to-year dependence on the cost of debt, we include the 1-year lagged dependent variable as the explanatory variable. In order to estimate this dynamic panel data, we use the generalized moments (GMM) proposed by Arellano and Bond (1991), which are the most commonly used techniques (Shah & Xiao, 2023). The results shown in Column E of Table 5 (cont.), Models 1E, 2E, and 3E, indicate that the impact of ROL remains negative and significant in all models.

Sixthly, another possible source of endogeneity is reverse causality. To control for this question, we employed the instrumental variable (IV); the two-stage least squares (2SLS) approach. Following Kapopoulos and Rizos (2024), we used the budget allocated to judiciary obtained from the CEPEJ website as an instrument. We argue that a larger budget contributes to improving judicial efficiency

TABLE 4 Judicial efficiency (Inv_duration), debt structure, and the cost of debt in euro area.

	Model 4		Model 5		Model 6	
	β	S.E.	β	S.E.	β	S.E.
InvDuration (InvDur)	−0.4000***	0.1335	−0.42662***	0.1490	−0.3292**	0.1430
Bankdebt	-	-	0.3640	0.4278	-	-
InvDurxBankdebt	-	-	0.0556	0.1238	-	-
Bonds	-	-	-	-	0.2957	0.5443
InvDurxBonds	-	-	-	-	0.1032	0.1631
Non-BankPdebt	-	-	-	-	0.4943	0.5510
InvDurxNonBankPdebt	-	-	-	-	−0.2783*	0.1598
Leverage$_{t-1}$	−8.2341***	0.3822	−8.2562***	0.3826	−8.2408***	0.3827
Tangibility$_{t-1}$	−1.8692***	0.4619	−1.8336***	0.4626	−1.8607***	0.4620
Z-Altman$_{t-1}$	−0.2902***	0.0712	−0.2896***	0.0712	−0.2924***	0.0711
ROA$_{t-1}$	−0.1637	0.3951	−0.1617	0.3951	−0.2038	0.3947
Size (log)	−0.4637***	0.1024	−0.4686***	0.1024	−0.4755***	0.1024
Age	0.0645	0.0796	0.0661	0.0798	0.0746	0.0796
Interest rate	0.3900***	0.0556	0.3908***	0.0565	0.3796***	0.0556
GDP per capita	0.0104***	0.0034	0.0106***	0.0034	0.0104***	0.0034
Industry-year	Yes		Yes		Yes	
Constant	13.7067***	3.8728	13.8826**	3.8777	13.2486**	3.8731
Observations	12,379		12,379		12,379	
Firms	1481		1481		1481	
Adj. R-squared	0.5385		0.5385		0.5396	

Note: V.D: Cost of debt (%). Estimation method: linear panel regression with fixed effects. Variables' description in Table A1 of Appendix A.
*Significant at 10%.
**Significant at 5%.
***Significant at 1%.

(Voigt, 2016), while it is unlikely to be directly related to the cost of corporate debt. Specifically, we considered the logarithm of the budget per inhabitant of the country and year.[12] This variable satisfies the criteria for an instrument to be valid. That is, *judicial budget* is significant when correlated with the *judicial efficiency* indicator (relevance criteria) and not with the dependent variable and the regression residual (exclusion criteria).[13] The results of the second stage of IV regressions regarding the variable of interest are presented in Table 5 (cont.) Models 1F, 2F, and 3F, and are similar to those of the initial models.

Seventhly, another issue is the potential self-selection of firms in countries with more judicial efficiency (Chakraborty, 2016). To further address these concerns, we used propensity score matching (PSM). We created a dummy variable, *High_JudEfi*, that has the value 1 if a firm is in a country at or above the sample median for *judicial efficiency* and 0 otherwise (Ahsan, 2013). We used nearest-neighbor matching without replacement to match firms based on the leverage, tangibility, size, and age variables. We obtained a matched sample of 11,500 firm-year observations. The results of the propensity score matching indicate that the firms in the matched sample present similar values of the variables used. The *t*-statistics indicate that, for all variables, the mean differences between the treated and the control samples are not statistically significant (unreported, available upon request). The

results of the re-estimation of the models for the matching sample are similar in sign and significance to those of the initial models (see Models 1G, 2G, and 3G in Table 5 [cont.]).

Finally, the set of explanatory variables includes variables at the firm level and variables at the country level (as the proxies of judicial efficiency). For this reason, we have re-estimated the models using a multi-level mixed-effects regression. This modeling technique is appropriate given that the study is examining cross-national samples in which the firms are "nested" within countries (Gerwanski, 2020; Gu et al., 2022). The results of tare reported in column H of Table 5 (cont.), Models 1H, 2H, and 3H, are similar to those obtained in the initial models.

In summary, the results confirm our initial estimations and they are robust. Specifically, in all re-estimations of the three models, ROL is negative and significant. Likewise, in all re-estimations of Model 3, the significance of the interaction with non-bank private debt is maintained.

6.4 | Discussion of results

The results obtained regarding the incidence of judicial efficiency on the cost of debt offer support to the arguments stemming from H1. Thus, when creditors can easily proceed with contract enforcement

TABLE 5 Judicial efficiency and the cost of debt in euro area; robustness analysis.

Alternative variable (sample)	(A) Debtcost		(B) ROL$_{t-1}$		(C) Disposition Time (DT)		(D) (Excluding Germany and France)	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Panel 1. Robustness H1								
	Model 1A		Model 1B		Model 1C		Model 1D	
Rule of law	−2.0431***	0.5472	-	-	-	-	−1.5825***	0.4150
Rule of law$_{t-1}$	-	-	−1.8101***	0.3710	-	-	-	-
Disposition time	-	-	-	-	0.3919**	0.1706		
Controls	Yes		Yes		Yes		Yes	
Observations	13,486		13,550		11,957		6860	
Firms	1487		1487		1366		742	
Adj. *R*-squared	0.4873		0.5299		0.5289		0.5046	
Panel 2. Robustness H2.1								
	Model 2A		Model 2B		Model 2C		Model 2D	
Rule of law (ROL)	−2.2265***	0.5774	-	-	-	-	−1.8140***	0.4360
Rule of law$_{t-1}$	-	-	−1.9005***	0.3922	-	-	-	-
Disposition time (DT)	-	-	-	-	0.5630**	0.2335	-	-
Bankdebt	−0.7506*	0.4368	−0.4429	0.3194	0.0772	0.2697	−0.2191	0.2962
ROLxBankdebt	0.3489	0.3087	-	-	-	-	0.3612	0.2242
ROL$_{t-1}$xBankdebt	-	-	0.1963	0.2234	-	-	-	-
DTxBankdebt	-	-	-	-	0.3003	0.2706	-	-
Controls	Yes		Yes		Yes		Yes	
Observations	13,486		13,550		11,957		6,860	
Firms	1487		1487		1366		742	
Adj. *R*-squared	0.4875		0.5299		0.5290		0.5048	
Panel 3. Robustness H2.2 and H2.3								
	Model 3A		Model 3B		Model 3C		Model 3D	
Rule of law (ROL)	−1.8821***	0.5607	-	-	-	-	−1.355***	0.4253
Rule of law$_{t-1}$	-	-	−1.5902***	0.3831	-	-	-	-
Disposition time (DT)	-	-	-	-	0.3400*	0.1923	--	
Bonds	0.0983	0.5887	0.5755	0.4311	0.7363*	0.4136	0.2330	0.4003
ROLxBonds	−0.2084	0.4249	-	-	-	-	−0.3647	0.3123
ROL$_{t-1}$xBonds	-	-	−0.0123	0.3080	-	-	-	-
DTxBonds	-	-	-	-	0.0110	0.3984	-	-
Non-BankPdebt	0.8302	0.5615	0.5192	0.4102	−1.3348***	0.3360	0.1810	0.3789
ROLxNonBankPdebt	−0.9202**	0.3996	-	-	-	-	−0.7668***	0.2936
ROL$_{t-1}$xNonBankPdebt	-	-	−0.6626**	0.2886	-	-	-	-
DTxNonBankPdebt	-	-	-	-	1.1993***	0.3394	-	-
Controls	Yes		Yes		Yes		Yes	
Observations	13,486		13,550		11,957		6,860	
Firms	1487		1487		1366		742	
Adj. *R*-squared	0.4876		0.5308		0.5304		0.5060	

(Continues)

Estimation method	(E) GMM		(F) IV (2SLS)		(G) PSM		(H) Multilevel regression	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Panel 1. Robustness H1								
	Model 1E		Model 1F		Model 1G		Model 1H	
Rule of law	−2.2777***	0.8914	−1.4560*	0.8690	−1.6559***	0.4366	−0.5356*	0.3207
Controls	Yes		Yes		Yes		Yes	
Observations	12,056		8,407		11,500		13,550	
Firms	1464		1414		1472		1487	
Adj. *R*-squared	-		-		0.5192		-	
Wald Chi² test	3097.65***		961.72***		-		1837.85***	
Panel 2. Robustness H2.1								
	Model 2E		Model 2F		Model 2G		Model 2H	
Rule of law (ROL)	−2.0749***	0.8223	−4.2182*	2.2205	−1.6968***	0.4624	−0.6161*	0.3398
Bankdebt	0.1212	0.5831	−4.4211**	2.0981	−0.2316	0.3595	−0.8569***	0.2749
ROLxBankdebt	0.1943	0.4132	3.4016**	1.6388	0.0754	0.2499	0.3087	0.1906
Controls	Yes		Yes		Yes		Yes	
Observations	12,056		8407		11,500		13,550	
Firms	1464		1414		1472		1487	
Adj. *R*-squared	-		-		0.5191		-	
Wald Chi² test	2441.94***		938.85***		-		1861.34***	
Panel 3. Robustness H2.2 and H2.3								
	Model 3E		Model 3F		Model 3G		Model 3H	
Rule of law (ROL)	−1.8589**	0.7949	−2.0018**	0.9733	−1.4994***	0.4463	−0.5225*	0.3128
Bonds	−0.9787	0.8413	−1.8305*	0.9386	0.4984	0.4785	1.3769***	0.3780
ROLxBonds	0.3208	0.6016	1.8675**	0.7563	0.0688	0.3394	−0.0744	0.2626
Non-BankPdebt	0.3330	0.7188	1.3438*	0.8026	0.4716	0.4581	1.0828***	0.3812
ROLxNonBankPdebt	−0.8433*	0.5150	−1.0495*	0.6269	−0.6783**	0.3225	−0.9101***	0.2618
Controls	Yes		Yes		Yes		Yes	
Observations	12,056		8,407		11,500		13,550	
Firms	1464		1414		1472		1487	
Adj. *R*-squared	-		-		0.5202		-	
Wald Chi² test	2448.17***		790.41***		-		1941.27***	

Note: V.D: Cost of debt (%), except in Model A, where we use an alternative dependent variable. Variables' description in Table A1 of Appendix A.

*Significant at 10%.

**Significant at 5%.

***Significant at 1%.

via the execution of guarantees, they are willing to grant financing at a lower cost (e.g., Hart & Moore, 1994, 1998). At the same time, inefficient law enforcement may engender opportunistic behavior on the part of borrowers, leading to creditors acting to increase interest rates (Marciano et al., 2019). In addition, the results are in line with the work carried out by Bae and Goyal (2009), Galli et al. (2017), and Álvarez-Botas and González (2021). The results emphasize the important role that the efficient functioning of judicial institutions can have in the development of the credit market.

When we analyze the moderating effect of debt structure (H2), the results regarding bank debt (H2.1) are in line with the arguments that point out that judicial system does not influence bank creditors when setting their prices because of their advantages in out-of-court proceedings (debt renegotiations), their better access to information and their long-term relationships with companies (e.g., Chemmanur & Fulghieri, 1994; Garrido, 2012; Roberts & Sufi, 2009). In the case of public debt (H2.2), the obtained results could be due to the lack of incentives (free rider problem). These creditors (Ben-Nasr et al., 2021; Denis & Mihov, 2003) may have to claim their debts also in courts due to their dispersion and the low individual volume they bear. Finally, the results show that, in the case of non-bank private debt (H2.3), creditors anticipate greater problems in the event of litigation for insolvency and an efficient judicial system helps them to

improve their financing conditions for companies in terms of lower debt costs. This would be justified by the fact that non-bank debt creditors do have an incentive to reclaim their debts because their individual volumes of debt are higher than those of bondholders. At the same time, they do not have the bank skills out of court renegotiation. In addition, this is one of the scarce studies that consider non-bank private debt since most of the previous work focuses on bank versus public debt. Therefore, it is not possible to compare the results obtained with the outcome of previous research.

7 | SUMMARY AND CONCLUSIONS

In the framework of law and finance literature, our research focuses on the importance of efficient contract enforcement for credit markets, and specifically for the cost of debt. The interest in analyzing this relationship increased in recent years with several theoretical and empirical studies and policymakers recognizing the impact of well-functioning institutions, including the judiciary, on economic outcomes. However, in order to achieve economic growth and development, efficient credit markets and access to finance at a reasonable cost are indispensable. In this respect, the judicial system is one of the factors that can incentivize this efficiency. The arguments that lead us to raise the hypothesis of the study are based on the findings that financial entities in countries characterized by a weak legal system face more difficulties in controlling for firms' risk. Consequently, they reduce the volume and maturity of the loan or apply a higher interest rate. Therefore, it is predicted that in countries where the judicial system is efficient, allowing for the prompt recovery of invested capital in the event of debtor's default, lenders are expected to reduce the cost of financing by charging a lower interest rate (H1). They can allow for this, given that in the context of an efficient judicial system, they do not need to apply the premium that would compensate for the legal risk.

In addition, we analyze the moderating effect of debt structure in this relationship. Specifically, we predict that the incidence of judicial efficiency on debt cost differs depending on the proportion of each debt type in the debt structure. We predict that a higher weight of bank debt does not affect the relationship between judicial efficiency and the cost of debt (H2.1), while a higher weight of public debt (bonds) enhances the negative relationship between efficiency and cost of debt (H2.2). For the non-bank private debt, we have not had a prediction since the hybrid composition of this debt (H2.3.).

The results of the analysis of the cost of financial debt for 1487 publicly traded firms from 16-euro area countries between 2011 and 2021 (13,550 observations) indicate that higher Rule of Law as well as lower judicial proceedings in the country, both associated with higher efficiency of the judicial system, reduce the interest rate applied to financing transactions. Therefore, firms may benefit from lower costs of debt if they are located in countries where a well-functioning judiciary gives users greater certainty. Our results confirm that an efficient judicial system affects the cost of firms' financing.

In addition, the relationship between debt cost and judicial efficiency is partially moderated by the weight of the non-bank private debt in the debt structure of the firms. Specifically, in countries with higher judicial efficiency, the firms with more non-bank private debt obtain lower costs of debt. However, neither bank debt nor public debt moderates the effect of judicial efficiency on debt cost. This novel result represents the main contribution of the study and reveals the importance of considering a firm's debt structure. To the best of our knowledge, this is the first study that analyzes the moderating effect of debt structure in the relationship between judicial efficiency and debt cost. Thus, this paper can serve as a basis for further research in this area.

Therefore, judicial efficiency can affect the cost of debt for firms located in the same country differently depending on their debt structure. This is relevant because debt structure is an important element of a firm's financial strategy. Recent research investigated the impact of the institutional environment, including the functioning of the judiciary, on the level of leverage and debt maturity. Nevertheless, little attention has been given to the debt structure in terms of bank versus non-bank, specifically non-bank private debt.

The results have important practical implications for both the participants of the financial markets and policymakers. As far as firms are concerned, the result leads to the conclusion that companies located in countries with poor functioning of the judiciary have a competitive disadvantage in terms of the cost of financing compared to those that are in countries with better judicial systems. The negative consequences of more expensive access to financing result from the fact that when firms have to pay higher interest rates, they tend to reduce their use of external resources, which may limit their development and growth. For lenders operating in an efficient legal environment including contract enforcement, the system provides confidence that the opportunistic behavior of borrowers is lower and that the capital invested in case of debtor's default will be recovered. Consequently, the exposure of financial institutions to risks is reduced.

The results of our research may have important practical implications in the context of public policies. The functioning of justice and its impact have been part of long-standing political debates in Europe. The study shows that improvements in the functioning of the judiciary create a favorable environment for lending transactions, improving firms' access to external financing. As such, it provides support for public policies with evidence of the positive effects of investments in improvements in the length of judicial proceedings, confirming the social benefit of public money spent. At the same time, the study shows that none of the aspects of efficient justice, neither quantitative nor qualitative, should not be underestimated. Although the evaluation of justice and court performance can be carried out at different levels, this reveals the need for further work to develop judicial efficiency indicators that would balance court efficiency and quality.

The main limitation of the study lies in available information. The firms' financial statements do not allow for a more precise calculation of the cost of debt, since charges resulting from all financial operations are included in the income statement under the heading of financial expenses on an aggregated basis. Therefore, it is not possible to know exactly the financial cost of banking transactions, security issuances, or other debt. In this respect, other researchers have relied on databases provided by financial institutions or bond markets.

Although this allows for consideration of the interest rate applicable to a particular transaction, this introduces a certain bias in sample selection, and, additionally, does not consider the firm's debt structure.

A possible extension of the work could consist of separately analyzing the cost of debt raised from different creditors, which requires more detail on the financial expenses item in the annual accounts of the companies. Given current financial reporting standards, companies are not required to provide this type of data. A change in accounting regulations would be desirable in order for companies to provide this type of detailed information. Likewise, it would be interesting to have more detailed information on the creditors that provide private non-bank debt.

CONFLICT OF INTEREST STATEMENT

The authors have no competing interests to declare that are relevant to the content of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author.

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ENDNOTES

[1] To consider only non-financial firms, we excluded firms with codes 64, 65, and 66 of NACE Rev.2, corresponding to financial services, insurance and pension funds and activities auxiliary to financial services (NACE Rev.2: European statistical classification of economic activities).

[2] This sample is used in the models where a proxy for judicial efficiency is ROL. In the models where explanatory variable is duration, the sample was reduced to 12,379 observations and 1481 firms, since the data is available only until 2020.

[3] The distribution of the final sample by countries is presented in Table A2 of the Appendix.

[4] This ratio is widely used by academics, although they divide the financial expenses by the average of the total debt, instead of the financial debt (e.g., Minnis, 2011; Liu et al., 2018; Wang et al., 2020; Badertscher et al., 2023).

[5] An alternative proxy is the credit spread over corporate bonds (e.g., Boubakri & Ghouma, 2010). Nevertheless, this proxy is not the most appropriate in the case of European companies, even listed ones, in which, unlike the American ones, bank debt predominates over the public debt.

[6] Detailed documentation of the WGI and full access to the underlying source data available at https://databank.worldbank.org/metadataglossary/worldwide-governance-indicators/series/RL.EST. See also Kaufmann et al. (2010).

[7] For details on Doing Business methodology, see the website: https://archive.doingbusiness.org/en/methodology/enforcing-contracts

[8] Most of the studies consider only bank debt over total debt as a proxy of debt structure (e.g., Boubaker et al., 2018; Asamoah et al., 2022; Boubakri & Saffar, 2019; Ben-Nasr et al., 2021).

[9] We included the interaction between industry and year dummies with the aim to estimate the models with fixed effects.

[10] We report only the results of explanatory variable. Estimations for all the variables are available upon request.

[11] Since the data are updated on a biannual basis, for missing data we have imputed the previous year's values. Moreover, in the period 2010–2020, there are not data for Belgium or Ireland and only for 2010 for Cyprus. The sample is reduced to 11,957 observaions. DT has a similar proposal than the duration of Doing Bussines, but both are constructed by a different methodology. The correlation between both variables is about 0.60.

[12] These data are not available for Portugal and only for 2020 for Spain and Luxemburg. Moreover, the CEPEJ database reports data only from 2014 and updated biannually. We have imputed the figure of the previous year for the missing data. The sample is reduced to 8407 observations.

[13] Other authors have used alternative instruments. For instance, Shah et al. (2017) used the crime rate and Zhu et al. (2020) used the number of judges per 100,000 populations. In our dataset, these variables meet the criteria for relevance but do not satisfy the exclusion criteria, since these are correlated with the dependent variable, as well as the regression residual.

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APPENDIX A

TABLE A1 Sample selection process.

Process steps	No. of deleted observations	No. of observations
Initial sample: 1629 non-financial active firms belonging to 19 euro zone countries, with financial information in the OSIRIS database, non-negative equity, and financial debt and financial expenses.		19,548
Minus observations of Latvia and Lithuania because they adopted the euro in 2014 and 2015, respectively.	420	19,128
Minus observations of the year 2010 to compute the lagged variables	1,594	17,534
Minus observations of Slovakia for less than 50 observations in the period	36	17,495
Minus micro-firm observations (income and total assets <2 million euros)	448	17,050
Minus observations with missing values of any variable used in the econometric models	2,407	14,643
Minus observations with the cost of debt over 100%, below the third percentile, and above the 97th percentile for their respective countries	1,093	13,550
Final sample: 1487 firms of 16 euro zone countries		13,550

Source: Own elaboration from OSIRIS database.

TABLE A2 Sample distribution by country (2011–2021).

Country	No. of observations	% Over total
Austria	429	3.17
Belgium	717	5.29
Cyprus	324	2.39
Estonia	125	0.92
Finland	816	6.02
France	3713	27.40
Germany	2977	21.97
Greece	1004	7.41
Ireland	255	1.88
Italy	1172	8.65
Luxembourg	228	1.68
Malta	107	0.79
Netherlands	581	4.29
Portugal	301	2.22
Slovenia	73	0.54
Spain	728	5.37
Total	13,550	100

Source: Own elaboration from the OSIRIS database.

TABLE A3 Description of variables.

Variable	Definition	Previous studies
Dependent variable		
Cost of debt (%)	Financial interest expense in year t divided by the average financial debt of the company in years t and $t-1$.	Fabbri (2010), Bliss and Gul (2012), Chui et al. (2016), Magnanelli and Izzo (2017), and Regenburg and Seitz (2021)
Explanatory variable: Efficiency of the judicial system		
Rule of Law	Assesses perceptions of agents' confidence in rules of society, quality of contract enforcement, property rights, police, and courts. The index ranges from −2.5 to 2.5.	Padilla and Requejo (2000), Laeven and Majnoni (2005), Chen et al. (2016), Chui et al. (2016), Meng and Yin (2019), and Álvarez-Botas and González (2021)
Inv_Duration	Duration is the time needed in years to settle a dispute counted from the moment the claimant brings the claim to the courts until the time of payment. The inverse is computed. Inverse duration is computed by subtracting from the maximum duration of the countries (rounded to 5) the duration of each country.	Fabbri and Padula (2004), Jappelli et al. (2005), Bae and Goyal (2009), Chemin (2010), Fabbri (2010), Shah and Shah (2016), Galli et al. (2017), and Moro et al. (2018)
Moderating variables: debt structure		
Bankdebt	Bank debt divided by financial debt	Johnson (1997), Rauh and Sufi (2010), Boubaker et al. (2018), Boubakri and Saffar (2019), Ben-Nasr et al. (2021), and Asamoah et al. (2022)
Bonds	Bonds debt divided by financial debt	Johnson (1997) and Rauh and Sufi (2010)
Non-BankPdebt	Non-bank private debt divided by financial debt	Johnson (1997) and Rauh and Sufi (2010)
Control variables		
Leverage$_{t-1}$	Financial debt divided by total assets	Fabbri (2010), Goss and Roberts (2011), Chen et al. (2016), Galli et al. (2017), and Magnanelli and Izzo (2017)
Tangibility$_{t-1}$	Property, plant, and equipment divided by total assets.	Fabbri (2010) and Bliss and Gul (2012)
Z-Altman$_{t-1}$	Altman (1968) Z score calculated as follows: 1.2 (working capital/TA) + 1.4 (retained earnings/TA) + 3.3 (EBIT/TA) + 0.6 (market value of equity/book value of total debt)	Goss and Roberts (2011) and Chen et al. (2016)

TABLE A3 (Continued)

Variable	Definition	Previous studies
	$+$ 0.99 (net sales/TA). Higher value indicates lower probability of insolvency. TA: total assets	
ROA_{t-1}	Ratio between earnings before interest and taxes (EBIT) and total assets	Goss and Roberts (2011), Bliss and Gul (2012), Chen et al. (2016), and Chui et al. (2016).
Size	Natural logarithm of total assets.	Fabbri (2010), Goss and Roberts (2011), Bliss and Gul (2012), Chen et al. (2016), Chui et al. (2016), and Magnanelli and Izzo (2017)
Age	Difference between the date of the financial data and the date of incorporation of the company in the official register.	Fabbri (2010) and Bliss and Gul (2012)
GDP per capita	Ratio of the total value of all final goods and services generated over a year by the country's economy to the number of its inhabitants in that year. In thousands of euros	Fabbri (2010), Chen et al. (2016), Chui et al. (2016), and Galli et al. (2017)
Interest rate (%)	Euro-denominated revolving loans and overdrafts, convenience, and extended credit to euro area non-financial corporations	Laeven and Majnoni (2005), Goss and Roberts (2011), and Chui et al. (2016).
Industry-year	*Dummies* corresponding to the interaction between 11 industries and years 2011 to 2021.	Fabbri (2010), Goss and Roberts (2011), Chen et al. (2016), and Álvarez-Botas and González (2021)

Source: All accounting data of the firms, as well as the age, year, industry, and GDP, are obtained from the OSIRIS database. Rule of law from World Bank's WGI database available at https://databank.worldbank.org/databases/rule-of-law. Duration is obtained from the Doing Business database available at https://archive.doingbusiness.org/en/data/exploretopics/enforcing-contracts.
Source: Own elaboration.

TABLE A4 Evolution of the rule of law in the euro zone countries between 2011 and 2021.

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average	Median
Austria	1.81	1.86	1.84	1.94	1.85	1.80	1.84	1.90	1.90	1.80	1.79	1.85	1.84
Belgium	1.44	1.46	1.46	1.55	1.49	1.43	1.36	1.38	1.37	1.36	1.33	1.42	1.43
Cyprus	1.07	1.10	1.04	1.08	1.04	0.72	0.89	0.75	0.75	0.57	0.64	0.88	0.89
Estonia	1.18	1.16	1.20	1.37	1.33	1.23	1.29	1.24	1.27	1.37	1.43	1.28	1.27
Finland	1.95	1.95	1.96	2.13	2.09	2.05	2.07	2.08	2.05	2.07	2.06	2.04	2.06
France	1.44	1.44	1.41	1.46	1.40	1.39	1.44	1.43	1.40	1.32	1.29	1.40	1.41
Germany	1.63	1.68	1.65	1.85	1.79	1.62	1.61	1.63	1.61	1.55	1.61	1.66	1.63
Greece	0.54	0.39	0.47	0.37	0.28	0.14	0.07	0.14	0.18	0.32	0.35	0.30	0.32
Ireland	1.76	1.73	1.72	1.76	1.76	1.50	1.42	1.45	1.39	1.49	1.53	1.59	1.53
Italy	0.49	0.43	0.44	0.42	0.31	0.39	0.35	0.27	0.30	0.24	0.27	0.36	0.35
Luxembourg	1.83	1.80	1.82	1.91	1.87	1.76	1.74	1.81	1.79	1.78	1.79	1.81	1.80
Malta	1.29	1.34	1.33	1.19	1.14	1.00	1.15	1.05	0.95	0.91	0.86	1.11	1.14
Netherlands	1.82	1.86	1.83	1.98	1.94	1.89	1.80	1.79	1.77	1.75	1.74	1.83	1.82
Portugal	1.00	1.04	1.05	1.12	1.13	1.07	1.14	1.14	1.13	1.18	1.13	1.10	1.13
Slovenia	1.05	1.01	1.00	1.00	0.97	1.08	1.03	1.06	1.12	1.07	1.03	1.04	1.03
Spain	1.18	1.04	1.03	0.97	0.91	1.00	1.06	1.01	1.03	0.90	0.88	1.00	1.01
Average	1.34	1.33	1.33	1.38	1.33	1.25	1.27	1.26	1.25	1.26	1.23	1.29	1.27
Median	1.36	1.39	1.37	1.41	1.37	1.31	1.32	1.31	1.32	1.34	1.31	1.34	1.34

Source: Own elaboration from the World Bank database (http://info.worldbank.org/governance/wgi/).

TABLE A5   Evolution of the duration (in years) of legal proceedings in the euro zone countries between 2011 and 2020.

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average	Median
Austria	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Belgium	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38
Cyprus	2.01	2.01	2.01	2.01	3.01	3.01	3.01	3.01	3.01	3.01	2.61	3.01
Estonia	1.16	1.16	1.16	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.22	1.25
Finland	1.03	1.03	1.03	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.24	1.33
France	1.22	1.22	1.22	1.08	1.08	1.08	1.08	1.22	1.22	1.22	1.16	1.22
Germany	1.08	1.08	1.08	1.08	1.26	1.31	1.37	1.37	1.37	1.37	1.24	1.29
Greece	2.82	3.01	3.12	3.56	4.33	4.33	4.33	4.69	4.69	4.69	3.96	4.33
Ireland	1.41	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.74	1.78
Italy	3.32	3.32	3.25	3.25	3.25	3.07	3.07	3.07	3.07	3.07	3.17	3.16
Luxembourg	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Malta		1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.24	1.38
Netherlands	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41
Portugal	2.38	2.38	2.38	2.38	2.38	2.07	2.07	2.07	2.07	2.07	2.23	2.23
Slovenia	3.53	3.53	3.53	3.48	3.48	3.18	3.18	3.18	3.18	3.18	3.35	3.33
Spain	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
Average	1.74	1.76	1.76	1.80	1.92	1.87	1.88	1.91	1.91	1.91	1.85	1.88
Median	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.40	1.39	1.39	1.40	1.40

Source: Own elaboration from the World Bank database (https://databank.worldbank.org/source/doing-business).

TABLE A6   Descriptive statistics of control variables (2011–2021).

Variable	Average	Median	*SD*
Leverage$_{t-1}$	0.2629	0.2485	0.1568
Tangibility$_{t-1}$	0.2460	0.1936	0.2186
Z-Altman$_{t-1}$	1.6215	1.6409	1.0153
ROA$_{t-1}$	0.1065	0.1080	0.1040
Size (log total assets)	13.1882	12.2594	2.2373
Age	56.37	38.00	49.20
Interest rate (%)	3.0718	2.3183	1.5984
GDP per capita (thousands of euros)	34.98	34.86	13.08

Note: Variables description in Table A1 of Appendix A.
Abbreviation: SD, standard deviation.
Source: Own elaboration.

TABLE A7   Sample distribution by industry (2011–2021).

Sector	No. of observations	%	Sector	No. of observations	%
Agriculture and livestock	456	3.37	Hospitality	250	1.85
Industry	6371	47.02	Information and communication	1922	14.18
Water, gas, and electricity	538	3.97	Real estate activities	883	6.52
Construction	479	3.54	Professional services	680	5.02
Trade	962	7.10	Other services	515	3.80
Transport	494	3.65	Total	13,550	100

Source: Own elaboration from the OSIRIS database.

TABLE A8 Correlation matrix and variance inflation factor (VIF).

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
VIF Model 1	–	1.33	–	–	–	–	1.25	1.14	1.47	1.29	1.12	1.08	1.34	1.25
VIF Model 2	–	1.34	–	1.16	–	–	1.25	1.14	1.48	1.29	1.25	1.08	1.34	1.26
VIF Model 3	–	1.34	–	–	1.29	1.14	1.26	1.14	1.49	1.29	1.36	1.08	1.34	1.26
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Cost of debt	1													
2. Rule of law	−0.01**	1												
3. Inv_duration	−0.03***	0.87***	1											
4. Bankdebt	0.02***	−0.10***	−0.10***	1										
5. Bonds	0.02***	0.02**	0.01	−0.46***	1									
6. Non-BankPdebt	−0.05***	0.10***	0.08***	−0.66***	−0.19***	1								
7. Leverage$_{t-1}$	−0.25***	−0.13***	−0.12***	−0.08***	0.10***	0.08***	1							
8. Tangibility$_{t-1}$	−0.04***	−0.11***	−0.16***	0.06***	−0.03***	0.00	0.21***	1						
9. Z-Altman$_{t-1}$	0.04***	0.20***	0.14***	0.09***	−0.11***	−0.06***	−0.38***	0.05***	1					
10. ROA$_{t-1}$	0.01	0.10***	0.07***	−0.00	0.01	0.00	−0.08***	0.14***	0.41***	1				
11. Size (log)	−0.07***	0.11***	0.13***	−0.34***	0.37***	0.15***	0.11***	0.02**	−0.03***	0.11***	1			
12. Age	0.02***	0.12***	0.09***	−0.03***	0.06***	0.00	−0.07***	0.09***	0.10***	0.05***	0.19***	1		
13. Interest rate	0.21***	−0.38***	−0.50***	0.11***	−0.06***	−0.02***	0.09***	0.20***	0.00	0.08***	−0.15***	−0.06***	1	
14. GPD per cap.	−0.02***	0.36***	0.32***	−0.05***	0.01	0.08***	−0.07***	−0.09***	0.06***	0.02***	0.16***	0.06***	−0.36***	1

Note: Description of the variables in Table A1 of Appendix A.

*Significant at 10%.

**Significant at 5%.

***Significant at 1%.