



Capital structure and institutional status in the European Union

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Abstract

This study analyses the financing of firms in the EU countries during the 2010–2018 period from the perspective of the potential influence of the institutional environment. Our model includes not only country-specific but also firm-level and macroeconomic factors. We find that a significant portion of the variation in firms' leverage is explained by institutional factors, both legal and financial. Moreover, our results reveal that capital structure, in terms of leverage, has an inverse relationship with the distance to (institutional) frontier score, suggesting the existence of an institutional gap in the EU. Regarding the economic impact of the institutional effects, four institutional factors can be highlighted as the most relevant: (i) the level of financial development, (ii) the concentration of the banking system, (iii) the strength of the legal system or economic freedom, and (iv) the degree of financial intermediation.

Keywords Leverage · Institutional environment · Legal factors · Firm-level factors · Macroeconomic factors · Panel data methodology

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1 Introduction

Prior research has underlined the need to consider the role of country-level factors along with firm-specific factors in determining capital structure (e.g., Rajan and Zingales 1995; Demirgüç-Kunt and Maksimovic 1999; Antoniou et al. 2008; Alves and Francisco 2015). An effective institutional environment is relevant to the extent that it has a direct influence on economic growth (King and Levine 1993; Demirgüç-Kunt and Maksimovic 1998; Levine and Zervos 1998). First, it provides mechanisms to alleviate market imperfections, thus reducing the costs of firms' external finance. Second, it grants credibility to firms in their efforts to control opportunistic behaviour by corporate insiders. As we expect to find varying degrees of institutional development across countries, we should also assume cross-country differences in firms' ability to secure external funding. Expanding on the aforementioned studies, this article focuses on the influence of the institutional environment on the financing choices of European Union (EU) firms, given its relevance for economic growth. The main purpose of this research is to analyse the role of institutional factors in the financial policies of EU firms, while also applying standard theories on capital structure, which mainly focus on tax or agency factors. By so doing, we seek to link the degree of institutional development of EU countries with the quality of the financial policies being applied, and thereby show that institutional factors really matter. Using data that we have collected on firms and key institutions, we attempt to fill this gap in the research and confirm the relevance of incorporating institutional factors into regression models of capital structure in EU firms.

The EU provides a good testing ground to examine the role played by the institutional setting in financing choices since it is a conglomerate of 28 countries aiming to achieve convergence to a common legal framework established by its members.¹ Despite this aim, EU countries still display varying degrees of institutional development, which probably influences their financial policies and economic growth (Casagrande and Dallago 2021). Thus, our first objective is to assess the relative importance of the impact of EU institutions on firms' capital structure (in terms of leverage), without explicitly accounting for any other factors.

Recent research indicates that capital structure theory is portable across both developing and developed countries although notable differences persist between them, which are likely explained by institutional factors (Booth et al. 2001; Beck et al. 2008; Gungoraydinoglu and Öztekin 2011). Moreover, Acemoglu et al. (2006) point out that countries' economic growth initially follows a distance to frontier model based on investment and the use of existing technologies, before changing to an innovation model once they have reached the development frontier. They also note the importance of the institutional environment in influencing the progress of the economic growth. We build on this idea and posit that there may be marked differences in leverage between firms from the worst and the best institutional environments in EU countries, that is, between firms in countries that are far from or close

¹ The UK is included in the analysis as this country officially left the EU on 31 January 2020.

to the frontier or regulatory best practice. Thus, the distance to frontier gives rise to an institutional gap across EU countries. A low-quality legal system in developing countries—in terms of the bureaucracy of starting a business, the protection of minority investors or the costs of contract enforcement, among other issues—could lead firms to be more indebted. This is due to the fact that financial investors are more difficult to defraud in situations of low institutional quality than external shareholders (Demirgüç-Kunt and Maksimovic 1999; Fan et al. 2012). After controlling for firm-specific effects and some key macroeconomic factors, a second objective of this study is to examine whether companies from the EU countries with the worst institutional environment, that is, those far from the frontier, tend to be more indebted than their counterparts operating in the best institutional environment, which are close to the frontier. In other words, we posit that the wider the institutional gap, the higher the leverage.

Neither the firm-specific nor the country-level variables in themselves seem to explain the whole story of capital structure. Thus, to assess the relative influence of both types of effects our model includes a mix of these variables which have been defined for both firms and countries of the EU. Furthermore, the analysis differentiates between (i) institutional factors directly related to the legal environment, such as the existence of a bankruptcy code or the degree of enforcement of the law, and (ii) institutional factors capturing the influence of the financial system, such as banking sector concentration or stock market development. Hence, a third objective of the study is to determine the effects of the two categories of institutional features on capital structure, taking into account firm-level characteristics. We are aware of the problem of multicollinearity among these institutional variables and the lack of time variation for some of them, thus our results should be taken with caution.

The main contributions of this paper to the literature can be summarized as follows. First, as suggested by Fan et al. (2012), we explore the capital structure of EU firms considering only the institutional differences among countries; that is, we only include country dummies in our regression models. In this way, we gain evidence on the need to introduce institutional effects into a capital structure model. Unlike other papers also focused on the EU, such as Giannetti (2003), Bancel and Mittoo (2004), Mc Namara et al. (2017), and Casino-Martínez et al. (2019), this study expands the analysis to the whole set of countries of the EU. We thereby introduce into the analysis wider-ranging institutional variation among countries, along with an exhaustive view of the EU environment. Second, we explore the relationship between distance to the optimal institutional frontier and capital structure. This allows us to test a challenging new hypothesis for the EU, which posits that countries facing a larger institutional gap—that is, those that are farther from the optimal level—are associated with more leveraged firms. If true, this would be clear evidence of the firms' financing choices being constrained by the institutional status of the EU countries. It thus reinforces prior research by Fan et al. (2012), who contend that a poor legal system should lead to more indebted firms. It would also show that efforts to improve institutions and financial markets can help firms expand their finances and, as stated by Rajan and Zingales (1998), be a catalyst of economic growth. Third, we unbundle two categories of institutional factors, namely *legal* and *financial* factors, and explicitly assess their separate effects on the capital structure of EU companies. Unlike

prior research, we explore the influence of these factors separately to mitigate potential statistical problems and improve the understanding of the estimates (see La Porta et al. 1997). In addition, we analyse their economic impact on leverage. We also allow for firm-specific effects as they can also be relevant and diverge significantly between countries. Lastly, we enhance the efficiency of our econometric approach as we test not only for the heteroskedasticity of the residuals, as is standard, but also for potential clustering problems due to the country or sector grouping of the sample. In addition, we use the Hausman-Taylor estimator and other panel data methods to test for potential bias in the coefficients caused by some time-invariant factors. Potential endogeneity problems are also checked.

The rest of the paper proceeds as follows. Section 2 discusses the theoretical background on the relationship between institutional factors and capital structure and draws some hypotheses of interest. Section 3 explains the models of analysis and the relevant variables to be included, while Sect. 4 presents the sample and a descriptive analysis of the variables. Section 5 reports the main results of the analysis and Sect. 6 offers various robustness tests. Finally, Sect. 7 concludes.

2 Literature review and hypotheses

Our research builds on the groundbreaking works of Booth et al. (2001) and Fan et al. (2012), who analyse firms' financing choices across countries in order to explore the cross-sectional variation related to institutional factors. By so doing, they compare the capital structure in emerging and developed countries around the world.² One important feature of their findings is that firms in developing economies, to the extent that they must deal with weaker institutional environments, tend to borrow more than those in developed countries.

As far as EU countries are concerned, they are all governed by the same general system of rules, although each one has its own legal system at local level, which gives rise to an institutional gap across countries. Based on this idea, we suggest that firms in EU countries that are far from the frontier, that is, far from the optimal institutional benchmark, are more constrained in their ability to secure external financing, particularly equity, than firms in other countries close to the frontier. Thus, the existing institutional gap across EU countries could affect firms' financing choices. For example, countries with a high level of institutional quality, that is, those which are close to the frontier, have stronger institutions and also more mature financial markets, resulting in investors selecting more equity and less debt. The reason behind this is that equity investors enjoy relatively more protection and

² Noteworthy contributions to this field of research over the last two decades include the papers by Bancel and Mittoo (2004), De Jong et al. (2008), Kayo and Kimura (2011), Lucey and Zhang (2011), Öztekin (2015), Shah et al. (2017), and Azofra et al. (2020). It is also worth mentioning similar research by Giannetti (2003) and Casino-Martínez et al. (2019) focusing on a small group of European countries. In addition, some related studies have focused on European small and medium-sized enterprises (SMEs); notable examples include Psillaki and Daskalakis (2009), Jõeveer (2013), Mc Namara et al. (2017) and Kenourgios et al. (2020).

are better informed. On the contrary, countries with poor institutional quality face corruption in the application of the law by politicians and civil servants, as well as corporate insiders. This can result in more leveraged firms as financial investors (debt holders) are more difficult to defraud than external equity investors (Fan et al. 2012; Alves and Francisco 2015).

In summary, EU countries displaying a lower level of institutional quality are expected to be associated with more indebted firms. Keeping this in mind, we define the following hypothesis:

Hypothesis 1 Companies from EU countries with a larger institutional gap are expected to be more leveraged than their counterparts in countries with a smaller institutional gap.

Moving on, we examine some relevant legal factors that influence the capital structure of firms. According to La Porta et al. (1997, 1998) and Bae and Goyal (2009), country law and the quality of its enforcement determine the rights of investors and therefore their readiness to finance firms. Consequently, the capital structure of firms may critically depend on the legal system. Furthermore, institutional factors will influence financing decisions to the extent that they can alter the costs and benefits at certain leverage ratios (Öztekin 2015). Keeping all this in mind, we focus on five relevant legal institutional factors commonly used in empirical research (Gungoraydinoglu and Öztekin 2011; Giannetti 2003; Fan et al. 2012). First, as discussed above, firms operating under corrupt institutions are expected to be associated with higher leverage. In line with Demirgüç-Kunt and Maksimovic (1999), debt holders can monitor firms and maybe change contract provisions if necessary. In case of default, creditors are typically better protected than outside shareholders. Therefore, agency costs borne by financial creditors are expected to be lower than those of external shareholders, particularly in a corrupt environment. Thus, debt should be higher than equity if firms are operating in an environment where the public sector or a firm's managers are more likely to be corrupt.

As a second factor, the strength or quality of the legal system, measured in terms of economic freedom, should foster firms' access to equity funds, thus lessening the demand for debt. The economic freedom of a country captures the independence of economic agents from government and the lack of barriers to financing. As increasing leverage has traditionally been used to mitigate overinvestment costs produced by firms' insiders, economic freedom can lessen the need to take on more debt and therefore reduce the bankruptcy risk. In short, better legal mechanisms for doing business give equity investors more confidence, thus increasing equity funds instead of debt.

Third, the enforcement of debt contracts guarantees the reliability of laws and regulations for financial creditors, thus influencing the availability of debt to firms. Ex-ante contractability is based on the confidence that law will be enforced so that creditors will have access to firms' collateral in case of default (Fan et al. 2012). Thus, the enforcement of law is as necessary as the law itself. Nevertheless, the existence of good regulation on the enforcement of debt contracts could

also discourage firms from increasing their leverage, as they perceive greater difficulties in negotiating with creditors if a non-compliance of contract occurs.

Similarly, as a fourth factor, the existence of a bankruptcy code can boost firms' leverage as creditors feel more confident in their ability to recover their loans (Öztekin 2015; Mc Namara et al. 2017). From the borrowers' perspective, a well-defined bankruptcy regulation can also incentivize leverage as they rely on having out-of-court negotiation power to reorganize instead of liquidating the firm. In short, if both creditors and firms can rely on a well-founded bankruptcy law, then debt contracts are expected to be readily made.

Lastly, strong creditor rights will lead to more leveraged firms as financial institutions (creditors) are likely to be willing to finance firms if they feel better protected. Nevertheless, some spillover effects of the creditor rights on other contracts, as reported by Demirgüç-Kunt and Maksimovic (1999), could change the relationship between creditor rights and leverage. For instance, if a bank lends money to a company in which it participates also as a shareholder, then the bank could be interested in raising the debt regardless of its creditor protection. Furthermore, powerful creditor rights could discourage borrowers from increasing their debt as they stand to be strongly penalized in the event of a premature liquidation (Shah et al. 2017). From an agency perspective, strong creditor rights would also increase managers' risk aversion, as they may perceive more leverage as a major threat to their own jobs and benefits (Acharya et al. 2011; Cho et al. 2014). Thus, the net effect may be an empirical matter.

Keeping in mind all these considerations, our next hypothesis is defined as follows:

Hypothesis 2 Leverage is expected to be positively related to corrupt institutions, enforcement of debt contracts, and better bankruptcy codes. In contrast, leverage is expected to be negatively related to efficient legal systems. Moreover, it could be positively or negatively related to creditor protection.

As for institutional financial factors, they also have an important effect on the capital structure of firms. We focus on four elements capturing relevant features of the financial system which can influence the capital structure of firms, and which have been widely used in the literature (Demirgüç-Kunt and Maksimovic 1999; Booth et al. 2001; De Jong et al. 2008; Fan et al. 2012). First, bank concentration can affect the financing choice of firms. Findings from different studies on bank market power and firm financing are not entirely consistent (Carbó-Valverde et al. 2009; Mol-Gómez-Vázquez et al. 2019). A high bank concentration can result in a lack of competition and therefore high loan interest rates that can discourage firms from leverage (Giannetti 2003). However, a high level of bank concentration should provide financial institutions with more room to manoeuvre due to the economies of scale they can gain, driving up leverage. As stated by Petersen and Rajan (1995), creditors are likely to internalize the benefits of assisting firms if the level of market competition is low as creditors expect to share in the future surplus of the firm. This would serve to increase leverage.

Second, firms in mature stock markets are subject to more scrutiny, thus giving the financial institutions incentives to lend as it would be less risky. That said, mature stock markets could ensure the supply of more liquidity and better information to (equity) investors, who may risk more by investing in equity as they would feel better protected (Giannetti 2003; Jöeveer 2013). Moreover, as indicated by Demirgüç-Kunt and Maksimovic (1999), there is an incentive for firms in mature stock markets to diversify, thus prompting them to replace debt with new equity. As a result, mature or capitalized stock markets could negatively contribute to firms' leverage.

Third, the liquidity of financial institutions can be crucial for firms to increase leverage. The greater the degree of financial intermediation, the greater firms' access to financing (Demirgüç-Kunt and Maksimovic 1999). Likewise, Fan et al. (2012) point out that the larger the deposits of the financial intermediaries, the greater the availability of funds to finance firm investment.

Lastly, the development of the financial system will improve credit availability to firms as financial institutions will have more quality information and can allay their concerns about adverse selection and moral hazard, which give rise to agency costs of lending. Accordingly, firms will get more financing from financial institutions. According to Demirgüç-Kunt and Maksimovic (1999), financial institutions can easily monitor borrowers in a developed financial system as they can achieve economies of scale in accessing the appropriate information, thus increasing lending.

According to the previous rationale, our third hypothesis is formulated as follows:

Hypothesis 3 Bank concentration and the liquidity and development of the financial system are expected to be positively related to firms' leverage, whereas stock market capitalization is expected to be negatively related.

3 Methodology and relevant variables

3.1 Implemented econometrics

To test the above hypotheses, we develop various regression models where the dependent variable is leverage and the explanatory variables of interest are (i) institutional variables and (ii) firm-level variables. The tests are particularly focused on institutional variables. Additionally, we include some macroeconomic control variables. The estimates of these models entail some restrictions which limit the validity of the results. First, some institutional variables have time-invariant values in their respective countries for all observations throughout the sample period. Accordingly, we a priori opt for pooled OLS regressions as an estimation method instead of panel data methodology. Notwithstanding, to lessen heteroskedasticity problems, standard errors of coefficients have been corrected with Huber–White robust estimators. Likewise, as an alternative, we obtain estimates using clustering procedures. Unlike the Huber–White estimator, the clustered estimator allows for within-group correlation, that is, it relaxes the common condition that the observations be independent of one another for the regressions not to yield biased estimates. Moreover, panel data

regression methods such as random-effects and Hausman–Taylor estimators are also applied as a support. They allow us to include time-constant variables in the models to evaluate potential problems of biased coefficients due to the usual correlation between the regressors and the residual in OLS estimates.

Second, legal, and financial institutional variables appear to be highly correlated, so they are introduced into the models separately to allay multicollinearity problems. This facilitates comparisons and interpretations of results. As indicated by Wooldridge (2020), multicollinearity is not a serious problem although it makes it difficult to uncover the partial effect of each variable, which is reflected in the individual t statistics. Likewise, Lindner et al. (2019) pointed out that multicollinearity does not introduce bias into the results nor violate assumptions necessary for regression models to work. In a way, this is the procedure followed by La Porta et al. (1997) when they removed their *GDP per capita* control variable from their regression model as it was highly correlated to the *rule of law* variable of interest.

Third, as some prior research has pointed out, inverse causality between firms' leverage and certain institutional-financial variables could be the source of endogeneity problems which can produce biased and inconsistent coefficients (Demirgüç-Kunt and Maksimovic 1999; Fan et al. 2012). Conversely, some authors argue that institutional-financial variables are really exogenous as firms' leverage cannot affect them (Giannetti 2003). Nevertheless, we implement some robustness tests to address this issue, including static and dynamic panel models.

Lastly, to mitigate concerns about outlier bias, all firm-level variables have been winsorized.

3.2 Dependent variable

For our dependent variable, denoted *leverage*, we use a common definition of the leverage of a firm; namely, the ratio of total financial debt to the sum of net worth and total financial debt. It is thus a debt ratio based on book value and interest-bearing debt (as in Rajan and Zingales 1995; Giannetti 2003; Hovakimian and Li 2012). For robustness purposes, other measures will also be applied. Data on all firms' financial variables are collected from the database ORBIS, which is described in detail below.

3.3 Firm-level explanatory variables

Based on previous empirical literature, we incorporate into the models some recurrent firm-specific variables to control for these relevant effects (Rajan and Zingales 1995; Fama and French 2002; Leary and Roberts 2005; Flannery and Rangan 2006; Frank and Goyal 2009; Öztekin 2015). We define growth opportunities, denoted *growth*, as the difference in total assets divided by total assets of the previous year. We also proxy growth opportunities as the market-to-book ratio, denoted *M/B ratio*, which is defined as the market value of total assets divided by the book value of total assets. This ratio is particularly appropriate when market data are available. The profitability of the firm, denoted *profit*, is expressed as the quotient of operational net

income and total assets, that is, it is a proxy of the general performance of the firm. Industrial sector leverage, denoted *sector_lev*, captures the leverage of the industrial sector to which the firm belongs and is defined as the average sector indebtedness for each country and year.³ We also incorporate the variable *size*, indicating the size of the firm in terms of assets, which is defined as the natural logarithm of total assets. Lastly, we consider the *tangibility* of the firm, which is measured as the proportion of the total assets that are tangible fixed assets. This variable represents the capacity of the firm to offer guarantees for borrowing.

3.4 Institutional variables (legal)

We have collected data on five relevant legal institutional variables, which have been widely used in the literature. First, based on Djankov et al. (2008) we introduce a proxy for the existence of an explicit bankruptcy code, denoted *bankruptcy*, which equals 1 if an insolvent firm is likely to undergo a reorganization proceeding, and 0 otherwise. For robustness, we incorporate two alternative measures. One is the recovery rate, which is called *Resolving Insolvency—Recovery rate (cents on the dollar)* by the World Bank Group (Doing Business), from where we have sourced the data.⁴ Additionally, following Consolo et al. (2018), we built a composite indicator called *ifi* (insolvency framework indicator), which aggregates four relevant factors related to the insolvency process.⁵ The data used to construct this composite indicator are collected from the World Bank Group (Doing Business).

Second, we use a corruption index, denoted *corruption*, based on one provided by Transparency International and expressed as the abuse of entrusted power for private gain. It captures the perception of corruption in the public sector by combining different sources of corruption-related data, and ranges from 0 to 100, with larger values indicating less corruption. For simplicity, we have reversed the index so that higher values indicate more corruption.

Third, *credit_rights* is a joint index aggregating several creditor rights related to different advantages for creditors in firm reorganization, access to the distribution of the proceeds of a bankrupt firm, etc. (see La Porta et al. 1998). These advantages are summarized in four items which add 1 to the index if they are present, and 0

³ Average sector indebtedness is calculated as the average of total debt to total assets of the firms in the sector. Industry sectors are ordered in 9 groups, according to the EU's standard classification of economic activities NACE Rev. 2 (Regulation (EC) No. 1893/2006 of 20 December 2006).

⁴ The recovery rate is recorded as cents on the dollar recovered by secured creditors through judicial reorganization, liquidation, or debt enforcement (foreclosure or receivership) proceedings. The calculation considers the outcome: whether the business emerges from the proceedings as a going concern or the assets are sold piecemeal.

⁵ The four factors are (i) the cost of resolving insolvency, (ii) the strength of legal rights in getting credits, (iii) the time needed to enforce contracts, and (iv) the cost of enforcing contracts. The indicator is estimated as the simple average of these four factors after being standardized and considering that the second one (strength of legal rights) has an opposite effect to the others.

otherwise, meaning the index ranges from 0 to 4.⁶ Data have been sourced from Djankov et al. (2008).

Fourth, the variable *enforcement* captures the level of enforcement of debt contracts, with higher values indicating more stringent enforcement. Following Djankov et al. (2008), a combination of data on time, cost, and the potential disposition of the assets (liquidation or reorganization) are employed to estimate a variable capturing the efficiency of debt enforcement. Data on this variable are taken from Djankov et al. (2008).

Lastly, the strength or efficiency of the legal system is proxied by the variable *freedom* which includes 12 factors grouped into four general features: (i) rule of law (property rights, government integrity, judicial effectiveness); (ii) government size (government spending, tax burden, fiscal health); (iii) regulatory efficiency (business freedom, labour freedom, monetary freedom); (iv) open markets (trade freedom, investment freedom, financial freedom). This index varies between 0 and 100, where 100 means the highest level of economic freedom. The data for this variable have been obtained from The Heritage Foundation.

3.5 Institutional variables (financial)

Four institutional variables, capturing the financial development of the countries, have also been incorporated into the models. First, the concentration of the banking system, denoted *bank_concen*, which is measured by the combined assets of the five largest credit institutions as a proportion of total banking sector assets. The data for this variable are provided by the European Central Bank.

Second, the degree of financial intermediation of a country, denoted *deposits*, is proxied by the country's currency and deposits (liquid liability) to Gross Domestic Product (GDP). The data used to build this variable are taken from Eurostat, the Statistical Office of the EU.

Third, we use a financial development index, denoted *financial_dev*, as a joint index of different measures of financial development. This index was built by Svirydenka (2016), who prepared an International Monetary Fund Working Paper about a new broad index of financial development based on financial institutions and financial markets. It includes relevant financial institutions such as banks, insurance companies, mutual funds, and pension funds. As for financial markets, it includes stock and bond markets. Financial development is defined as a composite of depth (that is, size and liquidity of markets), access (ability to access financial services), and efficiency (financial services provided and activity of capital markets). The index ranges from 0 to 1, with higher values indicating a higher level of financial development. The corresponding data are sourced from the International Monetary Fund.

⁶ These four items are: (i) the country imposes restrictions, such as creditors' consent or minimum dividends to file for reorganizations; (ii) secured creditors are able to gain possession of their security once the organization petition has been approved (or automatic stay); (iii) secured creditors are ranked first in the distribution of the proceeds from the disposal of the assets of a bankrupt firm; and (iv) the debtor does not retain the administration of its property pending the resolution of the reorganization.

Lastly, a proxy for the stock market capitalization, denoted *stock_market*, is calculated as the stock market capitalization to GDP where market capitalization is the share price times the number of shares outstanding. The data to estimate this variable were sourced from the World Bank.

3.6 Control macroeconomic variables

Three relevant macroeconomic variables are included in the models to control for this type of effect. All of them vary over time and across countries although they are invariant for all the firms in each year and country. Our first variable refers to the capital formation, denoted *capital_form*, and is defined as the annual gross capital formation as a percentage of GDP. Our second variable, denoted *gdp_growth*, is defined as the growth rate of real GDP per capita. Lastly, our third variable is the fluctuation in the Consumer Price Index, representing *inflation*. It is calculated as the annual rate of change in the Consumer Price Index. Data on macroeconomic variables *capital_form*, *gdp_growth*, and *inflation* are collected from the World Bank.

Definitions, notations, and sources for all the variables are summarized in Table 7 (Appendix).

4 Data and descriptive analysis of the variables

4.1 Sample

Firms' financial data are sourced from the database ORBIS, which is managed by Bureau van Dijk Electronic Publishing. ORBIS is a growing database (75% increase in three years) which currently contains financial information for around 365 million companies and other entities all over the world (March 2020). Out of the total units, 78,472 are listed companies. ORBIS reports on 116 million companies in Europe. For our sample, we used a version updated in October 2019 (code number 188004), from which we have collected data for non-financial listed and unlisted firms from the whole European Union—that is, the 28 countries at the time—for the nine-year period spanning 2010–2018. We have discarded financial and insurance firms, utilities, and the like from the sample, as they have specific financial policies that could distort the estimates. Firms are required to fulfil two conditions: (i) they must audit and prepare consolidated accounts, and (ii) they must have total assets above 43 million euros in at least one of the sample years. The large size of these firms guarantees better quality data and comparability.

The collected data forms an incomplete panel as not all the firms report information for every year in the sample period, thus helping to mitigate survivorship bias. Observations with inconsistent data or lack of critical information to build the variables have been removed from the sample. In the end, our sample contains financial information on 25,582 firms with a total of 156,709 observations from the 28 countries of the EU. Of the total sample, 16% are listed companies while 84% are unlisted. Details of the distribution, including information on the mean debt ratios

and the average distance to frontier score⁷ for each country, are displayed in Table 8 (Appendix). As shown in this table, 15 countries are considered closer to the frontier (above the average) and 13 are farther away from the frontier (below the average), with the Netherlands being the closest to the average. Furthermore, four countries—namely, the Czech Republic, Estonia, Malta, and Slovenia—contribute fewer than 200 observations, which is a weakness of our study. As for how the data are distributed annually, Table 9 (Appendix) breaks up the total observations into two columns according to the institutional status or regulatory performance of the countries. The best-performing countries contribute 72% of observations to the whole sample, while the worst-performing countries contribute the remaining 28%. In addition, Table 10 (Appendix) displays the distribution of the pooled sample by industrial sector. As shown, Sector 8, real estate, professional services, and the like, accounts for 42.1% followed by Sector 2, manufacturing, with 20.5% and Sector 4, retail trade and the like, with around 12%. As in Jõeveer (2013) and Mc Namara et al. (2017), we have analysed the representativeness of our sample distribution by comparing industry data from each country with similar data from Eurostat. Overall, estimated correlations for the nine industrial sectors are reasonably high, thus supporting the representativeness of our sample.⁸

4.2 Descriptive analysis

Summary statistics of the dependent and explanatory variables are reported for all the countries in Table 1. They are also divided into two groups according to the level of regulatory performance of the countries in terms of the distance to frontier score, namely best- and worst-performing countries. To mitigate the effect of outliers, all firm-level variables are winsorized at 0.5% in each tail of the distribution.

As displayed in Panel A, the dependent variable *leverage* differs notably between the two groups: 36% for the best-performing group and close to 41% for the worst-performing group. Differences in leverage between the two groups of countries support our argument that firms in countries with lower levels of regulatory performance tend to be more leveraged. Figure 1, below, displays the debt ratio of the EU firms in our sample, separately for the groups of best- and worst-performing countries, as well as for the sample as a whole, throughout the period of analysis 2010–2018. As can be seen, the debt ratio of the worst-performing group surpasses the debt ratio of the best-performing group in all the years analysed.

Reinforcing the previous idea, Fig. 2 plots the mean of *leverage* for the whole set of countries according to their level of institutional quality. The fact that the

⁷ As explained below in detail, the distance to frontier score is a normalized indicator, computed by the World Bank (Doing Business 2018), which expresses the average institutional quality of a particular country. The higher the score, the better its institutional quality.

⁸ Out of the 28 countries, 18 countries present correlations above 0.50, and almost all of them are statistically significant. Only one country, Romania, displays a very low coefficient of 0.012. Eurostat data are from 2016 (Annual enterprise statistics for special aggregates of activities NACE Rev 2).

Table 1 Descriptive statistics of variables

Variables	Total						Best						Worst					
	Mean		SD		Min		Max		Obs		Mean		SD		Min		Max	
	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Max
<i>Panel A: Financial variables</i>																		
Leverage	0.3743	0.272	0.000	0.990	145,142	0.3627	0.275	0.000	0.989	108,228	0.4082	0.259	0.000	0.989	36,914	0.4082	0.259	0.989
Growth	0.0798	0.273	−0.552	2.293	127,622	0.0847	0.271	−0.552	2.293	91,913	0.0673	0.277	−0.553	2.293	35,709	0.0673	0.277	2.293
M/B ratio	1.4748	1.088	0.325	8.557	24,545	1.5430	1.132	0.325	8.557	18,882	1.2474	0.890	0.325	8.557	5,663	1.2474	0.890	8.557
Profit	0.0565	0.089	−0.375	0.497	155,775	0.0589	0.094	−0.375	0.497	112,277	0.0503	0.076	−0.375	0.497	43,498	0.0503	0.076	0.497
sector_lev	0.5808	0.072	0.353	0.750	156,709	0.5672	0.072	0.353	0.750	113,021	0.6161	0.060	0.353	0.750	43,688	0.6161	0.060	0.750
Size	11.9420	1.400	9.187	17.292	156,709	11.9436	1.441	9.187	17.292	113,021	11.9381	1.290	9.187	17.292	43,688	11.9381	1.290	17.292
Tangibility	0.3051	0.265	0.000	0.974	155,830	0.3048	0.273	0.000	0.974	112,212	0.3059	0.242	0.000	0.974	43,618	0.3059	0.242	0.974
<i>Panel B: Macroeconomic variables</i>																		
capital_form	21.06	3.62	10.20	37.40	252	21.76	3.57	14.60	37.40	135	20.24	3.52	10.20	37.40	117	20.24	3.52	37.40
gdp_growth	1.89	2.86	−9.00	24.00	252	2.27	2.92	−3.60	24.00	135	1.46	2.75	−9.00	24.00	117	1.46	2.75	24.00
Inflation	1.46	1.47	−2.10	6.10	252	1.45	1.29	−1.10	5.00	135	1.46	1.66	−2.10	5.00	117	1.46	1.66	5.00
<i>Panel C: Institutional-legal variables</i>																		
Bankruptcy	0.36	0.48	0.00	1.00	225	0.33	0.47	0.00	1.00	135	0.40	0.49	0.00	1.00	90	0.40	0.49	1.00
Corruption	35.71	14.73	8.00	64.00	196	29.40	12.10	8.00	52.00	105	42.99	14.17	15.00	64.00	91	42.99	14.17	64.00
credit_rights	2.04	0.98	0.00	4.00	216	2.07	1.10	0.00	4.00	126	2.00	0.78	1.00	3.00	90	2.00	0.78	3.00
Enforcement	64.20	17.65	35.00	90.50	225	68.63	16.93	35.00	90.50	135	57.56	16.69	42.90	89.90	90	57.56	16.69	89.90
Freedom	69.08	5.62	53.20	81.30	252	71.53	4.67	62.30	81.30	135	66.25	5.30	53.20	76.40	117	66.25	5.30	76.40
<i>Panel D: Institutional-financial variables</i>																		
bank_concen	0.6116	0.177	0.262	0.973	250	0.592	0.182	0.291	0.923	135	0.6343	0.168	0.262	0.973	115	0.6343	0.168	0.973
Deposits	1.9105	2.015	0.572	13.127	252	1.4682	0.738	0.619	5.404	135	2.4210	2.769	0.572	13.127	117	2.4210	2.769	13.127
financial_dev	0.57	0.18	0.26	0.89	224	0.604	0.194	0.26	0.89	120	0.52	0.156	0.292	0.806	104	0.52	0.156	0.806
stock_market	0.4784	0.384	0.025	1.900	251	0.564	0.393	0.025	1.439	135	0.3786	0.349	0.046	1.900	116	0.3786	0.349	1.900

The distribution of countries in best and worst regulatory performance groups is based on the average of the distance to frontier score. Size is calculated as the logarithm of total assets. Table 7 in the Appendix provides definitions of all the variables

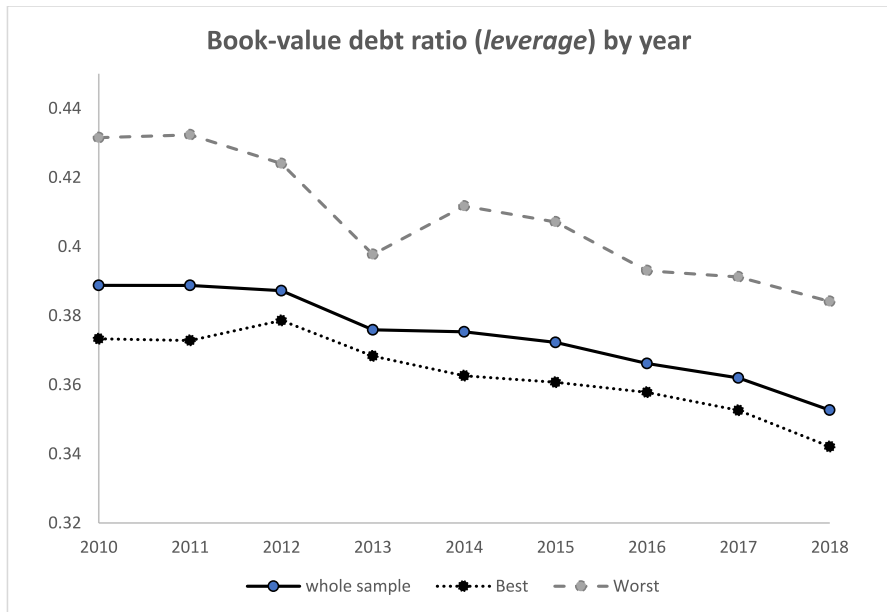


Fig. 1 Average book-value debt ratio over the 2010–2018 sample period in constant 2010 US dollars. The figure shows the evolution for the whole sample, and separately for best and worst regulatory performance countries

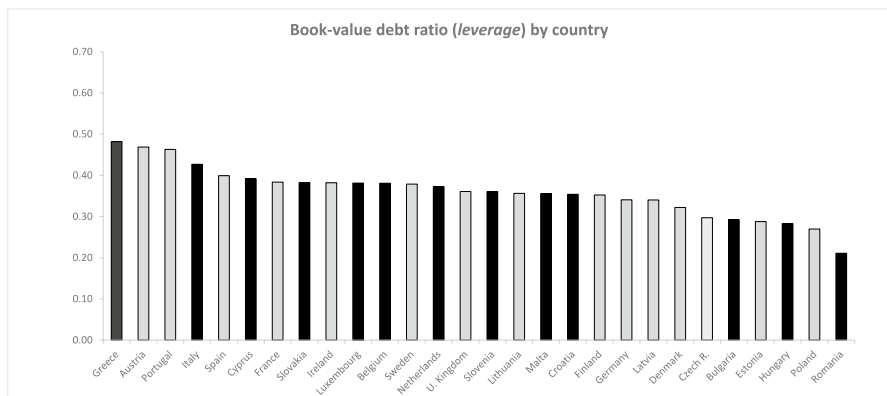


Fig. 2 Average book-value debt ratio (*leverage*). The figure shows the leverage for firms in each country for the 2010–2018 period. The countries are ordered by their leverage. The darker colour identifies the worst regulatory performance countries

European countries appear scattered in the chart is evidence that other elements such as agency costs or macroeconomic factors influence firms' leverage.

Some other differences in firm-level variables in Table 1 are worth mentioning. As shown in Panel A, asset growth is higher for the best-performing group than for the worst-performing group (8.4% and 6.7%, respectively). Regarding the

market-to-book ratio, the best-performing group registers 54% more market value than book value, while the equivalent figure for the worst-performing group is around 25%. Industrial sector leverage is higher for the worst-performing countries than their best-performing counterparts (61% and 56%, respectively). Lastly, the figures for profitability and tangibility are similar in the two groups.

The values of the macroeconomic variables (Panel B) seem relatively close in the two groups of countries, except for the growth rate of real GDP per capita, *gdp_growth*, which is higher for the best-performing subsample. Regarding the institutional-legal variables (Panel C), the variables *enforcement* and *freedom* register higher mean values in the best-performing group, whereas the opposite is true for the variables *bankruptcy* and *corruption*. In relation to the institutional-financial variables (Panel D), it is worth highlighting that the variables *financial_dev* and *stock_market* show higher figures in the best-performing group, whereas the variables *bank_concen* and *deposits* show lower figures.

To complement the analysis of the relationships between variables, we compute a correlation matrix, which is shown in Table 2. Panel A displays correlations including firm-level and macroeconomic variables. Panel B shows correlations comprising firm-level and country-legal variables. Lastly, Panel C reports correlations with firm-level and country-financial variables.

In addition, we perform a mean difference test to check for statistical differences between the two subsamples of countries, in line with one of the objectives of the study. Results are shown in Table 3, indicating significant statistical differences in the variables between the two groups, except for size and tangibility for the firm-level category, and bankruptcy and creditor rights for the institutional category. Additionally, the variable inflation does not display a statistically significant difference between the two groups.

5 Results

5.1 Firms' financing and country-specific effects

According to Fan et al. (2012), regressing a model that only includes numerous key institutional variables is equivalent to estimating a model solely comprising country dummy variables. If we accept this premise in the EU environment, a large proportion of the variation in leverage could be explained by country dummies alone, given the important nature of institutional differences. Accordingly, to assess the potential contribution of country-level variables alone to firms' financial policies, we run the following pooled model:

$$\text{lev}_{it} = X'_{it}\beta + u_{it} \quad (1)$$

where lev_{it} is the mean leverage for any country and year t ; i represents any of the 252 observations (9 years multiplied by 28 countries); X is a country-dummy vector, and β indicates the associated coefficients; lastly, u_{it} is the residual of the

Table 2 Correlation matrix

	Leverage	Growth	M/B ratio	Profit	sector_lev	Size	Tangibility	capital_form	gdp_growth	Inflation
<i>Panel A: Firm-level and macroeconomic variables</i>										
Leverage	1.000									
Growth	0.011 (0.000)	1.000								
M/B ratio	-0.200 (0.000)	0.144 (0.000)	1.000							
Profit	-0.162 (0.000)	0.106 (0.000)	0.234 (0.000)	1.000						
sector_lev	0.225 (0.000)	-0.020 (0.000)	-0.033 (0.000)	0.002 (0.336)	1.000					
Size	0.071 (0.000)	0.018 (0.000)	-0.060 (0.000)	-0.004 (0.108)	0.021 (0.000)	1.000				
Tangibility	0.179 (0.000)	-0.046 (0.000)	-0.139 (0.000)	-0.057 (0.000)	-0.072 (0.000)	0.033 (0.000)	1.000			
capital_form	-0.014 (0.000)	0.007 (0.014)	0.021 (0.001)	-0.002 (0.343)	0.095 (0.000)	0.066 (0.000)	0.045 (0.000)	1.000		
gdp_growth	-0.058 (0.000)	0.056 (0.000)	0.040 (0.000)	0.059 (0.000)	-0.156 (0.000)	0.008 (0.001)	0.027 (0.000)	0.263 (0.000)	1.000	
Inflation	0.001 (0.872)	-0.010 (0.001)	-0.014 (0.032)	0.007 (0.004)	-0.057 (0.000)	-0.026 (0.000)	-0.007 (0.007)	-0.109 (0.000)	-0.213 (0.000)	1.000
<i>Panel B: Firm-level and institutional-legal variables</i>										
Leverage	1.000									
Growth	0.011 (0.000)	1.000								

Table 2 (continued)

	Leverage	Growth	M/B ratio	Profit	sector_lev	Size	Tangibility	Bankruptcy	Corruption	credit_rights	Enforcement	Freedom
M/B ratio	−0.200 (0.000)	0.144 (0.000)	1.000									
Profit	−0.162 (0.000)	0.106 (0.000)	0.234 (0.000)	1.000								
sector_lev	0.225 (0.000)	−0.020 (0.000)	−0.033 (0.000)	0.002 (0.336)	1.000							
Size	0.071 (0.000)	0.018 (0.000)	−0.060 (0.000)	−0.004 (0.108)	0.021 (0.000)	1.000						
Tangibility	0.179 (0.000)	−0.046 (0.000)	−0.139 (0.000)	−0.057 (0.000)	−0.072 (0.000)	0.033 (0.000)	1.000					
Bankruptcy	0.082 (0.000)	−0.031 (0.000)	−0.065 (0.000)	−0.077 (0.000)	0.270 (0.000)	0.030 (0.000)	−0.116 (0.000)	1.000				
Corruption	0.077 (0.000)	−0.032 (0.000)	−0.191 (0.000)	−0.059 (0.000)	0.213 (0.000)	−0.031 (0.000)	−0.071 (0.000)	0.638 (0.000)	1.000			
credit_rights	−0.036 (0.000)	0.030 (0.000)	0.116 (0.000)	0.059 (0.000)	−0.267 (0.000)	−0.052 (0.000)	0.032 (0.000)	−0.686 (0.000)	−0.401 (0.000)	1.000		
Enforcement	−0.036 (0.000)	0.047 (0.000)	0.151 (0.000)	0.027 (0.000)	−0.303 (0.000)	−0.041 (0.000)	0.023 (0.000)	−0.416 (0.000)	−0.666 (0.000)	0.486 (0.000)	1.000	
Freedom	−0.087 (0.000)	0.042 (0.000)	0.178 (0.000)	0.071 (0.000)	−0.347 (0.000)	−0.006 (0.000)	0.065 (0.000)	−0.707 (0.000)	−0.862 (0.000)	0.672 (0.000)	0.752 (0.000)	1.000
	Leverage	Growth	M/B ratio	Profit	sector_lev	Size	Tangibility	bank_concen	Deposits	financial_dev	stock_market	
<i>Panel C. Firm-level and institutional-financial variables</i>												
Leverage	1.000											
Growth	0.011 (0.000)	1.000										

Table 2 (continued)

	Leverage	Growth	M/B ratio	Profit	sector_lev	Size	Tangibility	bank_concen	Deposits	financial_dev	stock_market
M/B ratio	-0.200 (0.000)	0.144 (0.000)	1.000								
Profit	-0.162 (0.000)	0.106 (0.000)	0.234 (0.000)	1.000							
sector_lev	0.225 (0.000)	-0.020 (0.000)	-0.033 (0.000)	0.002 (0.336)	1.000						
Size	0.071 (0.000)	0.018 (0.000)	-0.060 (0.000)	-0.004 (0.108)	0.021 (0.000)	1.000					
Tangibility	0.179 (0.000)	-0.046 (0.000)	-0.139 (0.000)	-0.057 (0.000)	-0.072 (0.000)	0.033 (0.000)	1.000				
bank_concen	0.004 (0.000)	-0.015 (0.000)	-0.050 (0.000)	-0.005 (0.000)	0.021 (0.000)	-0.015 (0.000)	0.075 (0.000)	1.000			
Deposits	-0.009 (0.000)	0.031 (0.000)	0.032 (0.000)	0.015 (0.000)	-0.205 (0.000)	0.034 (0.000)	-0.046 (0.000)	-0.131 (0.000)	1.000		
financial_dev	0.045 (0.000)	0.031 (0.000)	0.150 (0.000)	-0.008 (0.000)	0.027 (0.000)	-0.018 (0.000)	-0.105 (0.000)	-0.291 (0.000)	0.359 (0.000)	1.000	
stock_market	-0.043 (0.000)	0.058 (0.000)	0.204 (0.000)	0.014 (0.000)	-0.230 (0.000)	-0.034 (0.000)	-0.006 (0.000)	0.149 (0.000)	0.380 (0.000)	0.446 (0.000)	1.000

P values of significance in brackets. Table 7 in the Appendix provides definitions of all the variables

Table 3 Mean difference tests for best- and worst-regulatory performance countries

Variables	Best	Worst	Difference (<i>P</i> value)
<i>Panel A: Financial variables of firms</i>			
Leverage	0.3627	0.4081	−0.0454 (0.000)
Growth	0.0847	0.0673	0.0174 (0.000)
M/B ratio	1.5430	1.2474	0.2956 (0.000)
Profit	0.0589	0.0503	0.0086 (0.000)
sector_lev	0.5672	0.6161	−0.0489 (0.000)
Size	11.9436	11.9381	0.0055 (0.485)
Tangibility	0.3048	0.3059	−0.0096 (0.482)
<i>Panel B: Macroeconomic variables</i>			
capital_form	21.7615	20.2427	1.5188 (0.000)
gdpgrowth	2.2711	1.4624	0.8087 (0.025)
Inflation	1.4489	1.4650	−0.0161 (0.931)
<i>Panel C: Institutional-legal variables</i>			
Bankruptcy	0.3333	0.4000	−0.0667 (0.310)
Corruption	29.4000	42.9890	−13.5890 (0.000)
credit_rights	2.0714	2.0000	0.0714 (0.599)
Enforcement	68.6333	57.5600	11.0733 (0.000)
Freedom	71.5333	66.2538	5.2795 (0.000)
<i>Panel D: Institutional-financial variables</i>			
bank_concen	0.5923	0.6344	−0.0421 (0.061)
Deposits	1.4682	2.4210	−0.9528 (0.000)
financial_dev	0.6036	0.5233	0.0803 (0.001)
stock_market	0.5641	0.3786	0.1855 (0.000)

The distribution of countries in best and worst regulatory performance groups is based on the average of the distance to frontier score. Table 7 in the Appendix provides definitions of all the variables

model, which is assumed to be independent and identically distributed. Robust (Huber–White) OLS regression results are reported in Table 4.⁹

The table shows estimates for the variable *leverage*, as defined above. The dummy for Austria is randomly dropped from the regression for multicollinearity reasons. Accordingly, statistically significant coefficients must be interpreted as the effect of any other country on leverage relative to the discarded country.

As shown in Table 4, the *F*-test for the joint significance of the regressors verifies the validity of the model. All country dummies yield significant coefficients, except those of Greece and Portugal, presumably because they display similar mean leverage to Austria. Moreover, the *R-squared* statistic is 69%, a large enough value

⁹ The Huber-White OLS estimator is robust to some types of misspecification such as heteroskedasticity.

Table 4 Leverage and country-level effects

Austria	–
Belgium	– 0.0847 (– 10.05)***
Bulgaria	– 0.1640 (– 11.78)***
Croatia	– 0.1145 (– 10.62)***
Cyprus	– 0.0764 (– 7.68)***
Czech Republic	– 0.1880 (– 7.22)***
Denmark	– 0.1284 (– 10.78)***
Estonia	– 0.1786 (– 10.79)***
Finland	– 0.1133 (– 12.68)***
France	– 0.0826 (– 9.95)***
Germany	– 0.1265 (– 13.93)***
Greece	0.0153 (1.20)
Hungary	– 0.1812 (– 16.66)***
Ireland	– 0.0902 (– 7.55)***
Italy	– 0.0386 (– 3.51)***
Latvia	– 0.1278 (– 13.00)***
Lithuania	– 0.1102 (– 8.96)***
Luxembourg	– 0.0976 (– 5.83)***
Malta	– 0.1139 (– 8.96)***
Netherlands	– 0.1046 (– 7.36)***
Poland	– 0.1978 (– 20.69)***
Portugal	– 0.0007 (– 0.04)
Romania	– 0.2402 (– 14.19)***
Slovakia	– 0.1736 (– 3.68)***
Slovenia	– 0.0981 (– 3.56)***
Spain	– 0.0662 (– 6.92)***
Sweden	– 0.0866 (– 9.37)***
United Kingdom	– 0.1048 (– 11.21)***
constant	0.4658 (56.76)***
Observations	252
F-statistic	54.21
P value	0.0000
R-squared	0.6942

The dependent variable is the book-value debt ratio (*leverage*), as defined in Table 7 (Appendix). Robust (Huber–White) OLS regression coefficients with *t*-statistics in brackets. Regression uses country and year mean values of the dependent variable. For each country, a dummy variable captures the effect on leverage with respect to Austria, the omitted variable. Significance at levels of 1%, 5%, and 10% indicated by ***, **, and *, respectively. The *F*-statistic tests the null hypothesis that all coefficients of the explanatory variables are equal to zero

to confirm our observation that, when only the country dummies are considered, the model fits well and explains a substantial proportion of the variation in firms' financing. These findings thus support the inclusion of institutional factors among the determinants of EU firms' financing. Overall, results support what has been documented in previous research for different settings (e.g., Booth et al. 2001; Gun-goraydinoglu and Öztekin 2011), but in this case in the EU.

5.2 Firms' financing and distance to frontier

As discussed above, we examine the relationship between leverage and distance to frontier in each country. According to Doing Business (2018), the *distance to frontier* score benchmarks economies with respect to regulatory best practice across the entire set of 41 indicators divided into 10 topics. First, individual indicators are normalized using the linear transformation (worst- y)/(worst-frontier), where *worst* and *frontier* represent, respectively, the worst and best performance, with y being a particular indicator. In a second step, the individual indicator scores for each economy are aggregated through simple averaging. This index calculates the average institutional quality of a particular country, such that the higher the index value, the better the institutional quality of the country in question.

Hypothesis 1, which addresses this issue, is tested by regressing the following model:

$$\text{lev}_{it} = X'_f \beta_f + X'_m \beta_m + D_c \lambda_c + u_{it} \quad (2)$$

where lev_{it} is the (book-value) leverage for the i th company in any country and year t ; X_f is a vector of firm-specific variables; X_m is a vector of country-macroeconomic characteristics, and β represents the coefficients associated with the explanatory variables. D_c (*distance to frontier*) is the distance of the economy to the frontier, and is scored on a scale from 0 to 100, with 0 being the worst performance and 100 the frontier. λ_c is an associated coefficient, and u_{it} is the residual of the model, which is assumed to be independent and identically distributed.

As indicated above, our variable of interest in model (2) is *distance to frontier*, which indicates the institutional quality of a country. Robust OLS regression results from Eq. (2) are reported in Table 5. Section 6 on robustness will also consider panel data methodology. Consistent with Hypothesis 1, we focus on the coefficient estimates of the variable *distance to frontier*, λ_c , although controlling for firm-level and country-macroeconomic variables. Column I reports the regression of a baseline model including only firm-specific variables. Column II extends the previous regression to include macroeconomic variables. Columns III and IV display similar results when considering *M/B ratio* instead of *growth* as a proxy for growth opportunities. As reported, the *R-squared* statistic fluctuates between 12 and 17%.

As for the variable *distance to frontier*, its coefficient turns out to be negative and statistically significant in all specifications, as expected. In line with our hypothesis, it means that EU firms from countries with the worst institutional performance appear to be more indebted than those from the best-performing countries. Furthermore, firm-level variables show significant coefficients in all regressions and their

Table 5 Leverage, firm-level effects, and distance to frontier

	I	II	III	IV
Growth	0.0409 (13.39)***	0.0415 (13.57)***		
M/B ratio			−0.0247 (−16.65)***	−0.0252 (−16.85)***
Profit	−0.4841 (−48.43)***	−0.4835 (−48.48)***	−0.2619 (−15.31)***	−0.2559 (−14.96)***
sector_lev	0.8916 (83.52)***	0.9011 (83.16)***	0.6840 (34.28)***	0.6657 (32.70)***
Size	0.0133 (26.80)***	0.0137 (27.69)***	0.0279 (37.83)***	0.0276 (37.13)***
Tangibility	0.1996 (67.20)***	0.2011 (67.80)***	0.1256 (19.96)***	0.1285 (20.34)***
Distance to frontier	−0.0007 (−3.72)***	−0.0007 (−3.49)***	−0.0040 (−44.87)***	−0.0035 (−10.02)***
capital_form		−0.0033 (−12.50)***		0.0018 (4.08)***
gdpgrowth		−0.0004 (−1.01)		−0.0037 (−5.21)***
Inflation		0.0017 (2.56)***		−0.0051 (−4.28)
Constant	−0.2935 (−15.43)***	−0.2438 (−12.51)***	−0.0782 (−2.49)**	−0.1300 (−3.86)***
Observations	117,476	117,476	23,990	23,990
F-statistic	2,714.11	1,876.97	929.92	629.91
P value	0.0000	0.0000	0.0000	0.0000
R-squared	0.1234	0.1249	0.1734	0.1749

The dependent variable is the book-value debt ratio, calculated as total financial debt divided by net worth plus total financial debt. Distance to frontier score is the gap between an economy and the frontier. As an alternative to the variable *growth*, the explanatory variable *M/B ratio* is incorporated in Columns III and IV. Macroeconomic variables are included only in regressions II and IV. Robust OLS regression coefficients with *t*-statistics in brackets. Significance at levels of 1%, 5%, and 10% indicated by ***, **, and *, respectively. The *F*-statistic tests the null hypothesis that all coefficients of the explanatory variables are equal to zero. Table 7 in the Appendix provides definitions of all the variables

effects on leverage are consistent with prior literature (Rajan and Zingales 1995; Booth et al. 2001; De Jong et al. 2008). Thus, in Columns I and II, growth opportunities, industry debt ratio, size, and tangibility show positive effects, whereas profitability yields a negative impact on leverage. The results in Columns III and IV are similar, with the exception of growth opportunities expressed in terms of the market-to-book ratio, which displays a negative effect.

Furthermore, pooled OLS regressions using the clustered estimator for all specifications of Table 5 yield similar coefficient estimates and so they are not reported.¹⁰ In addition, all estimates of Table 5 also hold when industrial sector dummies are included in the models (not reported). Overall, our results for the EU are consistent with those previously reported by Fan et al. (2012) and Shah et al. (2017), both of

¹⁰ All the non-reported results are available from the authors on request.

which analyse the impact of the quality of the institutional environment on firms' financing and find a negative relationship.

5.3 Effects of institutional factors on leverage

We focus now on testing Hypotheses 2 and 3, which assess the influence of institutional factors on firms' leverage. Institutional variables are categorized in two groups, (i) legal and (ii) financial. To this end, we regress the following model:

$$\text{lev}_{it} = X'_f\beta_f + X'_{il}\beta_{il} + X'_{if}\beta_{if} + u_{it} \quad (3)$$

where lev_{it} is the (book-value) leverage for the i th company in any country and year t ; X_f is a vector of firm-specific variables; X_{il} is a vector of institutional-legal variables, and X_{if} is a vector of institutional-financial variables. β represents the coefficients associated with the explanatory variables, and u_{it} is the residual of the model, which is assumed to be independent and identically distributed.

Three institutional-legal variables are time-invariant, as reported in Table 7. They are *bankruptcy*, *credit_rights*, and *enforcement*. Consequently, we first regress Equation (3) using robust OLS estimates, as explained above. Regression results are reported in Table 6. The estimates are similar in Columns I and III, which include the institutional-legal variables, but substituting market-to-book ratio (*M/B ratio*) for growth in Column III. Likewise, Columns II and IV include the institutional-financial variables. Furthermore, in Column IV, we replace the variable growth opportunities, *growth*, with growth opportunities in terms of the market-to-book ratio. As shown, the *R-squared* statistic ranges between 12 and 18%.

The estimated coefficients for firm-specific variables, included in all regressions, are coherent with those previously obtained in Table 5 and with prior empirical literature in all scenarios, as shown in Table 6. Consistent with Hypothesis 2, in Column I the variables *corruption*, a proxy for a weak legal system, and *freedom*, which captures the strength or efficiency of the legal system, have statistically significant positive and negative effects, respectively.¹¹ As expected, having more corruption or inefficiency in the legal system contributes to firms being more indebted as financial creditors are harder to expropriate than equity investors. Moreover, *bankruptcy* and *enforcement*, proxies for a high quality of insolvency procedures and debt contract enforcement, respectively, turn out to be positive and statistically significant, as predicted. Lastly, *credit_rights* is positively related to leverage, as expected. Thus, a legal system that grants protection to creditors gives them the confidence to finance firms. Column III reports similar results, except for the variable *bankruptcy*, which yields a negative effect on leverage. However, we should bear in mind that this regression model (Column III) only includes firms with information on their market value, thus resulting in a smaller set of firms and presumably with noticeably different characteristics. To the extent that creditors and firms enjoy more transparency

¹¹ We thank an anonymous referee the suggestion to use the variable *rule of law* as an alternative to *freedom*. Results remain unchanged and so they are not reported.

Table 6 Leverage, firm and institutional effects

	I	II	III	IV
Growth	0.0389 (12.03)***	0.0402 (12.64)***		
M/B ratio			−0.0258 (−15.99)***	−0.0262 (−16.64)***
Profit	−0.4685 (−44.25)***	−0.4861 (−46.43)***	−0.2314 (−12.01)***	−0.2626 (−14.44)***
sector_lev	0.9079 (75.44)***	0.8824 (77.46)***	0.6415 (26.24)***	0.7076 (31.96)***
Size	0.0140 (26.40)***	0.0130 (24.89)***	0.0278 (32.08)***	0.0286 (35.92)***
Tangibility	0.2071 (65.03)***	0.2087 (67.06)***	0.1301 (17.55)***	0.1277 (18.46)***
Bankruptcy	0.0227 (8.61)***		−0.0089 (−1.95)**	
Corruption	0.0008 (6.79)***		0.0002 (0.79)	
credit_rights	0.0123 (10.73)***		−0.0071 (−3.70)***	
Enforcement	0.0011 (17.52)***		0.0009 (6.45)***	
Freedom	−0.0022 (−5.40)***		−0.0039 (−6.24)***	
bank_concen		0.0639 (11.41)***		0.1320 (12.71)***
Deposits		0.0079 (8.39)***		−0.0045 (−3.41)***
financial_dev		0.1686 (18.66)***		0.0598 (3.60)***
stock_market		−0.0331 (−11.87)***		−0.0311 (−5.59)***
Constant	−0.3622 (−11.30)***	−0.4882 (−45.19)***	−0.1432 (−2.79)***	−0.4928 (−30.24)***
Observations	103,398	107,581	18,847	20,794
F-statistic	1,528.61	1,811.03	403.76	587.64
P value	0.0000	0.0000	0.0000	0.0000
R-squared	0.1275	0.1284	0.1639	0.1844

The dependent variable is the book-value debt ratio (*leverage*), as defined in Table 7 (Appendix). As an alternative to the variable *growth*, the explanatory variable *M/B ratio* is incorporated in Columns III and IV. Columns I and III include institutional-legal variables. Columns II and IV include institutional-financial variables. Robust (Huber–White) OLS regressions are estimated, and *t*-statistics are given in brackets. Significance at levels of 1%, 5%, and 10% indicated by ***, **, and *, respectively. The *F*-statistic tests the null hypothesis that all coefficients of the explanatory variables are equal to zero. Table 7 in the Appendix provides definitions of all the variables

and protection, the relationship between financing and institutional variables could change. For robustness, two additional variables explained above were incorporated into the regressions consecutively (Columns I and III) to replace the variable *bankruptcy* (results not reported). First, the variable *recovery_rate* from the World Bank was introduced, followed by the variable *ifi*, a composite indicator based on the methodology proposed by Consolo et al. (2018). In both regressions, the coefficient results for these new variables, *recovery_rate* and *ifi*, remained qualitatively unchanged in Column I. In Column III, both regressions yield statistically non-significant coefficients for these alternative variables. The rest of the coefficient results stay qualitatively the same.

As for institutional-financial variables (Hypothesis 3), *deposits* and *financial_dev*, proxies for the degree of financial intermediation and the financial development of a country, respectively, show significant positive effects on leverage in Column II, as expected. Confirming Hypothesis 3, it can thus be seen that a liquid and mature financial system provides good conditions for firms to increase debt. Furthermore, *bank_concen*, a proxy for bank concentration in terms of the proportion of total banking sector assets, exhibits a significant and positive effect, as predicted. Hence, economies of scale and the potential interrelation with borrowers provided by bank concentration can result in higher capacity for managing and monitoring firms. As a result, firms could get more financing from banks. Lastly, *stock_market*, a proxy for stock market capitalization, has a negative and significant effect on leverage, as assumed. Despite banks' incentives for financing, given that firms provide better information, investors feel more protected and are encouraged to invest in equity due to the higher liquidity and development of the market, which reduces the agency costs of this option. Consequently, stock market capitalization contributes to reducing the firms' debt ratio. In Column IV, the regression model including institutional-financial variables shows the results after replacing the variable *growth* with another expressed in terms of the M/B ratio. As can be seen, results appear qualitatively unchanged except for the variable *deposits*, which displays a negative effect on leverage. This is probably due to the fact that this scenario only includes firms with available market value information. Thus, this smaller group of firms may opt for other sources of financing, such as international funds, making local financing from banks less relevant.

In addition, since the discrepancies between the results of Columns I and III, on the one hand, and between the results of Columns II and IV, on the other, can presumably be explained by these different scenarios, we run new regressions using only the smaller sample; that is, only firms with market value information. Thus, we compare results for the same dependent variable (book value leverage) and identical sample. The divergences previously identified also appear in the new regressions, that is, the variables *bankruptcy* and *deposits* show an unexpected negative effect on leverage in Columns III and IV of Table 6, while all the rest of the results remain unchanged (results are not reported).

Additionally, after incorporating industry dummies into all the models in Table 6, the results remain qualitatively unchanged (not reported). Likewise, when considering a dummy variable capturing whether or not the firm is listed (only in models I and II), results hold for all variables. Moreover, regression results (not reported) show a lower effect on leverage for listed firms compared to their unlisted counterparts. Lastly, results hold for all the variables after including time dummies in the regressions (not reported).

Overall, our findings for a sample of EU firms, obtained using a distinctive methodology, are in line with the prior empirical evidence regarding institutional-legal factors (Demirgüç-Kunt and Maksimovic 1999; De Jong et al. 2008; Fan et al. 2012) and in relation to institutional-financial development factors (Demirgüç-Kunt and Maksimovic 1999; Booth et al. 2001; De Jong et al. 2008).

Considering the possibility that observations are not necessarily independent within country or sector groups, we have also fitted all models in Table 6 using

cluster-robust standard errors within countries and within sectors (results not reported). Estimates for firm-level variables remain qualitatively unchanged in all cases. As for the institutional variables, regression results resemble those of Table 6 although some coefficient estimates turn out to be non-significant. Therefore, we assume that the clustering subsumes part of the institutional influence on firms' financing. The next section on robustness will consider panel data methodology.

To check for possible multicollinearity problems in the institutional variables, we perform a variance inflation factor (VIF) analysis of multicollinearity in Table 6. None of the estimates yield VIF values indicating that multicollinearity is a problem. Specifically, none of the institutional regressors included in Columns I–IV show a VIF statistic higher than 10 (results not reported).

To assess the economic impact of the institutional variables on firms' leverage, we look at the regressions reported in Columns I–IV (Table 6).¹² Four variables emerge as having the strongest effects (in absolute terms): *financial development index* (8.2%), *bank concentration* (6.2%), *economic freedom* (5.8%), and *deposits* (4.2%). According to these results, financial factors seem to have a relatively stronger influence on firms' leverage than legal factors.

6 Robustness tests

First, when testing the hypotheses about the institutional influence on firms' financing choice, leverage was defined in terms of book value and regression results were shown in Table 6. Now, following some previous studies, we use two alternative definitions of leverage: (i) total financial debt to total assets (see Alves and Francisco 2015; Öztekin 2015; Shah et al. 2017), and (ii) total financial debt to market value of assets (Frank and Goyal 2009; Fan et al. 2012; Öztekin 2015). Using these new definitions, the results relative to the first model (total financial debt to total assets) remain qualitatively unchanged in all scenarios of Table 6. Regarding the second regression (total financial debt to market value of assets), results generally resemble those previously found in all specifications of Table 6, except for the variables bankruptcy, creditor rights, and financial development relative to Columns I and II.

Second, as explained above, time-invariant variables (bankruptcy, creditor rights, and enforcement) hinder the implementation of panel data regression models such as *fixed effects*, which is based on the correlation between the regressors of the model and the unobservable heterogeneity of individuals. Therefore, assuming there is no such correlation, Equation (3) can be estimated using the *random effects* method to test Hypothesis 2, as it permits the inclusion of time-invariant variables. Thus, we run random effects regressions with robust standard errors (robust estimator) and with cluster-robust standard errors (clustered estimator). The results from both generally confirm previous findings (not reported). Likewise, assuming

¹² Following Kim et al. (1998), all else being constant, the economic impact of an institutional variable is measured in terms of a one standard deviation increase in the estimated coefficient of the variable in relation to the mean value of the dependent variable.

correlation between the regressors and the unobservable individual effects and keeping in mind that some variables are time invariant, we still can use the *Hausman-Taylor* estimator to test Hypothesis 2. Applying this procedure, Equation (3) has also been fitted using both robust and clustered estimators; results (not reported) remain qualitatively unchanged. As for Hypothesis 3, Equation (3) is now estimated by *random effects* using robust and clustered estimators. Results resemble those previously obtained.

Third, as indicated above, we check for potential problems of endogeneity caused by the inverse causality between firms' leverage and some institutional-financial regressors. To start with, all explanatory variables included in all models of Eq. (3) have been lagged 1 year in order to reduce their correlation with the residual. Robust OLS results obtained (not reported) remain qualitatively unchanged with respect to Table 6, whatever the specification used. Furthermore, we have implemented a two-stage least squares regression using alternatively (i) lagged institutional-financial variables as instruments for the institutional-financial variables and (ii) lagged firm-level variables and lagged institutional-financial variables as instruments for the institutional-financial variables. Results (not reported) are identical. Thus, both regression methods yield reasonable evidence that endogeneity is not a serious problem in our data. Moreover, following Çam and Özer (2021), we run a dynamic panel model to test our results and control for endogeneity problems due to the institutional-financial variables. We apply a two-step system-GMM panel data estimation as proposed by Arellano and Bover (1995) and Blundell and Bond (1998). Treating all the financial variables as exogenous—except the variable *deposits*, which can intuitively be considered as exogenous—the results resemble those obtained in Columns II and IV (not reported).

Fourth, estimates could be affected by the fact that the dependent variable is bounded between 0 and 1. We extend the range of variation by transforming it into a log-odds variable and calculate a new variable, denoted *loglev*, such that $\text{loglev} = \ln(\text{leverage}/1 - \text{leverage})$. Equation [3] relative to the institutional effects on leverage has been estimated again for all specifications and results stand qualitatively unchanged and so they are not reported.

Fifth, as the dependent variable takes a limited value of 0 in some observations, it can be considered censored at a lower limit and a Tobit regression should be appropriate to implement. In order to assess potential differences, Equation [3] has been estimated under this procedure and results remain qualitatively unchanged.

Lastly, in order to compare firm-level results for each country with the previous pooled regression results shown in Tables 5 and 6, and with some prior empirical literature, we have also run regressions of a baseline model—including only firm-level variables—for each country of the EU. Results are shown in Table 11 (Appendix). We report OLS regressions for the book-value debt ratio using (i) the Huber–White estimator, Panel A and (ii) the clustered estimator (by firm), Panel B. As shown in Table 11, results resemble those of the pooled models in Tables 5 and 6, although the variable *size* presents negative coefficients in five countries (Panel A). The Czech Republic and a few other countries account for a small number of observations, which has probably influenced the estimates. Results displayed in Table 11 generally support prior literature such as Giannetti (2003) and Fan et al. (2012), with

the variable *sector_lev* being the most clearly consistent, and the *growth* and *size* variables the least.

7 Conclusions

This study examines the effects of the institutional environment in the EU countries on firms' financing. We include in the analysis the 28 countries belonging to the EU throughout the period of research, 2010–2018. Assuming the need to consider other factors, our models control for firm-specific and some relevant macroeconomic factors as well.

Our findings show that a substantial portion of the variation in leverage is due to the diversity of the institutional environment in the EU. Specifically, our results indicate that leverage has an inverse relationship with the distance to (institutional) frontier score, that is, the lower the institutional quality of a country, the more indebted its companies are, and vice versa. Thus, our empirical evidence points to an institutional gap in the EU, which makes firms in countries with weaker institutional settings take on more debt as they face more information asymmetry problems, such as adverse selection and moral hazard costs, and equity investors perceive that they are given less protection than creditors. Assuming that a high-quality institutional environment helps firms to raise better financing, then improving institutional quality can result in greater economic growth.

Additionally, our results indicate that leverage is positively driven by a higher degree of both financial intermediation and financial development, and a higher level of banking concentration, but negatively related to the stock market capitalization. Furthermore, weaker laws (corruption) and a weaker legal system (economic freedom) seem to contribute to making companies more indebted. Some particular institutional factors such as bankruptcy, contract enforcement and creditor rights are found to be positively related to debt as they have a direct impact on debt holders' protection. Thus, when analysing the influence of the institutional environment on the capital structure of European firms, there is a need to distinguish between shareholders' and debtholders' protection, as distinct institutional factors can contribute to firms' leverage in a different way.

Finally, concerning the economic impact of the institutional effects, the factors that can be highlighted as the most relevant are (i) financial development, (ii) the concentration of the banking system, (iii) the strength of the legal system or economic freedom, and (iv) the degree of financial intermediation.

Appendix

See Tables 7, 8, 9, 10 and 11.

Table 7 Definition of variables

Dependent variable ^a		Calculation
Leverage (Book-value debt ratio)		$\frac{\text{total financial debt}}{\text{net worth} + \text{total financial debt}}$
Explanatory variables		
Notation	Description	Calculation
<i>Panel A: Financial variables (firm)^a</i>		
growth	Growth opportunities	$\frac{\text{total assets } t - \text{total assets } t-1}{\text{total assets } t-1}$
M/B ratio	Market-to-book ratio	$\frac{\text{asset market value}}{\text{asset book value}}$
Profit	Profitability	$\frac{\text{operational net income}}{\text{total assets}}$
sector_lev	Sector indebtedness	Average sector indebtedness for each country and year
Size	Size	ln (total assets)
Tangibility	Tangibility	$\frac{\text{tangible fixed assets}}{\text{total assets}}$
Notation	Description	Calculation and source
<i>Panel B: Macroeconomic variables</i>		
capital_form	Capital formation	Annual gross capital formation as a percentage of GDP. The World Bank Group (World Development Indicators)
gdp_growth	Gross Domestic Product growth	Growth rate of real GDP per capita. The World Bank Group (World Development Indicators)
Inflation	Variation in the Consumer Price Index	Annual rate of change in Consumer Price Index. The World Bank Group (World Development Indicators)
<i>Panel C: Institutional-legal variables</i>		
Bankruptcy	Bankruptcy code	A proxy for the existence of an explicit bankruptcy code, measured as a dummy variable equal to 1 if an insolvent firm is likely to undergo a reorganization proceeding, and 0 otherwise. Djankov et al. (2008)
Corruption	Corruption Index	An index ranging from 0 to 100, with larger values indicating more severe corruption. Transparency International
credit_rights	Creditor rights	An index aggregating different creditor rights, following La Porta et al. (1998). The index ranges from zero to four. Djankov et al. (2008)

Table 7 (continued)

Notation	Description	Calculation and source
Enforcement	Debt contract enforcement	Level of debt contract enforcement (a higher level of this measure indicates more stringent enforcement). Djankov et al. (2008)
Freedom	Index of economic freedom	Proxy of the strength of the legal system ranked on a scale of 0–100, where 0 indicates the lowest level of economic freedom and 100 the highest. The Heritage Foundation. ^b
<i>Panel D: Institutional-financial variables</i>		
bank_concen	Concentration of the Banking System	Shares of the 5 largest credit institutions in total assets. European Central Bank (Statistical Data Warehouse)
Deposits	Deposits	A proxy for the degree of financial intermediation of a country, measured as the country's currency and deposits (liquid liability) to GDP. Eurostat (ESA ^c 2010, item F.2)
financial_dev	Financial Development Index	This index summarizes how developed financial institutions and financial markets are in terms of their depth, access, and efficiency. It ranges from 0 to 1, with higher values indicating more financial development. Source: International Monetary Fund (Financial Development Index Database)
stock_market	Stock market capitalization	Stock market capitalization to GDP. The World Bank Group

^aData obtained from the database ORBIS

^bIt includes 10 items that are grouped into four broad categories designated as (i) rule of law, (ii) government size, (iii) regulatory efficiency, and (iv) open markets

^cEuropean System of Accounts

Table 8 Sample distribution by country and regulatory performance status

Country	Firms	Observations	Mean leverage	Distance to frontier score ^a
Austria ^b	442	2846	0.4686	78.78
Belgium	613	4026	0.3808	72.94
Bulgaria	39	246	0.2923	71.89
Croatia	81	550	0.3540	72.27
Cyprus	92	543	0.3916	72.33
Czech Republic ^b	25	115	0.2971	76.31
Denmark ^b	738	3470	0.3220	84.71
Estonia ^b	13	101	0.2877	80.70
Finland ^b	646	4185	0.3523	80.06
France ^b	1608	10,277	0.3835	76.30
Germany ^b	3930	25,295	0.3405	79.44
Greece	289	1886	0.4818	67.13
Hungary	114	739	0.2828	72.09
Ireland ^b	457	2247	0.3819	79.90
Italy	3558	22,230	0.4267	72.44
Latvia ^b	67	382	0.3402	80.01
Lithuania ^b	95	623	0.3563	79.95
Luxembourg	205	955	0.3811	69.38
Malta	25	174	0.3554	64.44
Netherlands	1888	11,623	0.3726	75.82
Poland ^b	711	4195	0.2697	77.35
Portugal ^b	294	1693	0.4629	76.49
Romania	52	309	0.2108	72.78
Slovakia	95	270	0.3824	75.12
Slovenia	20	137	0.3607	75.73
Spain ^b	1756	10,732	0.3992	77.22
Sweden ^b	1576	10,245	0.3787	81.99
United Kingdom ^b	6153	36,615	0.3608	83.36
Total	25,582	156,709		75.96

The variable *leverage* is the book-value debt ratio as defined in Table 7. The distance to frontier score captures the gap between an economy and the frontier. It is expressed on a scale from 0 to 100, with 0 being the worst performance and 100 the frontier

^aAverage of the distance to frontier score

^bCountries with an above-average distance to frontier score

Table 9 Distribution of observations by regulatory performance of the country

Year	Best	Worst	Total
2010	10,210	4084	14,294
2011	11,008	4380	15,388
2012	11,816	4652	16,468
2013	12,767	4825	17,592
2014	14,123	5333	19,456
2015	15,184	5761	20,945
2016	15,131	5717	20,848
2017	14,358	5509	19,867
2018	8424	3427	11,851
Total	113,021 [72%]	43,688 [28%]	156,709

The distribution of countries in the best and worst regulatory performance groups is based on the distance to frontier score

Table 10 Sample distribution by sector

	Number of firms	Percentage of total firms (%)
Sector 1: Agriculture, livestock, forestry, fishing, and mining and quarrying	569	2.22
Sector 2: Manufacturing	5245	20.50
Sector 3: Construction	1396	5.46
Sector 4: Wholesale and retail trade; repair of motor vehicles and motorcycles	3051	11.93
Sector 5: Transportation and storage	974	3.81
Sector 6: Accommodation and food service activities	419	1.64
Sector 7: Information and communication	1199	4.69
Sector 8: Real estate, professional, scientific and technical activities. Administration and auxiliary services and the like	10,769	42.10
Sector 9: Public administration and defense; mandatory social security. Education, health, and social services. Artistic and leisure activities and entertainment. Other services. Household activities as employers of household workers and producers of goods and services for their own use. Organization and organism activities abroad	1960	7.66
Total	25,582	100

The distribution of the sample by sectors is based on the European Union's standard classification of economic activities NACE Rev. 2 (Regulation (EC) No. 1893/2006 of 20 December 2006)

Table 11 Leverage and firm-level effects by country

Country	Growth	Profit	sector_lev	Size	Tangibility	Obs	R-sq
<i>Panel A: Huber–White robust OLS estimator</i>							
Austria	0.0400	−0.6416***	0.9661***	−0.0083**	0.1549***	1839	0.1239
Belgium	0.0755***	−0.4396***	0.9631***	0.0001	0.1865***	3349	0.0621
Bulgaria	−0.0162	0.4096**	0.8414***	0.0038	0.0564	201	0.1609
Croatia	0.0048	−1.0086***	0.7655***	0.0001	0.1299**	460	0.1607
Cyprus	−0.0951**	−0.2935**	0.7399***	0.0705***	0.0447	425	0.2106
Czech Republic	−0.1360	−0.4511	1.3026***	−0.0309	−0.0127	84	0.2591
Denmark	0.0792***	−0.4258***	0.7807***	−0.0047	0.2267***	2567	0.1389
Estonia	0.0604	−0.5232***	1.5241***	−0.1089***	0.4978***	88	0.1239
Finland	0.1191***	−0.6565***	0.7859***	0.0106***	0.3182***	3399	0.2767
France	0.0268**	−0.4525***	0.8741***	0.0169***	0.3234***	8282	0.1618
Germany	0.1229***	−0.6009***	1.0809***	0.0015	0.3008***	20,431	0.1426
Greece	−0.0794*	−0.6345***	1.0757***	0.0132***	0.1020***	1572	0.1060
Hungary	0.0751**	−0.4824***	0.4888***	−0.0391***	0.1873***	613	0.1743
Ireland	0.0514***	−0.4816***	0.9550***	0.0296***	0.2833***	1522	0.2060
Italy	0.0538***	−1.0237***	0.7116***	−0.0041***	0.1483***	18,159	0.0932
Latvia	0.0225	−0.9110***	0.5310***	−0.0214	0.1829***	312	0.1733
Lithuania	0.1242***	−1.1006***	0.8109***	−0.0294***	0.1195***	479	0.2029
Luxembourg	0.0735***	−0.1050	0.5632***	−0.0066	0.1909***	687	0.0619
Malta	0.0845**	−0.5655***	0.7846***	0.0355*	0.0802*	145	0.2859
Netherlands	−0.0270*	−0.3434***	0.5780***	0.0296***	0.3200***	4028	0.2075
Poland	0.0612***	−0.5766***	0.6531***	0.0144***	0.0309***	3268	0.0794
Portugal	0.0700*	−1.2491***	0.8473***	0.0252***	0.0100	1275	0.1189
Romania	0.2045***	−1.0861***	0.6133***	0.0055	0.0695	247	0.1865
Slovakia	0.1430	−0.7049*	1.2736***	0.0099	−0.0101	138	0.3397
Slovenia	−0.6783***	−1.4117***	0.8842***	0.0158	0.0714	117	0.5936
Spain	0.0447***	−0.9669***	0.9012***	0.0236***	0.1574***	8696	0.1175
Sweden	.04841***	−0.4919***	0.4746***	0.0069***	0.3167***	8316	0.2182
United Kingdom	0.0199	−0.2324***	0.9693***	0.0278***	0.1552***	26,777	0.1071
<i>Panel B: Clustered OLS estimator</i>							
Austria	0.0400	−0.6416***	0.9661***	−0.0083	0.1549***	1839	0.1239
Belgium	0.0755***	−0.4396***	0.9631***	0.0001	0.1865***	3349	0.0621
Bulgaria	−0.0162	0.4096	0.8414*	0.0038	0.0564	201	0.1609
Croatia	0.0048	−1.0086***	0.7655***	0.0001	0.1299	460	0.1607
Cyprus	−0.0951*	−0.2935*	0.7399***	0.0705***	0.0447	425	0.2106
Czech Republic	−0.1360	−0.4511	1.3026***	−0.0309	−0.0127	84	0.2591
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France	0.0268*	−0.4525***	0.8741***	0.0169***	0.3234***	8282	0.1618
Germany	0.1229***	−0.6009***	1.0809***	0.0015	0.3008***	20,431	0.1426

Table 11 (continued)

Country	Growth	Profit	sector_lev	Size	Tangibility	Obs	R-sq
Greece	−0.0794	−0.6345***	1.0757***	0.0132	0.1020	1572	0.1060
Hungary	0.0751*	−0.4824**	0.4888**	−0.0391***	0.1873**	613	0.1743
Ireland	0.0514**	−0.4816***	0.9550***	0.0296***	0.2833***	1522	0.2060
Italy	0.0538***	−1.0237***	0.7116***	−0.0041	0.1483***	18,159	0.0932
Latvia	0.0225	−0.9110***	0.5310**	−0.0214	0.1829**	312	0.1733
Lithuania	0.1242***	−1.1006***	0.8109**	−0.0294	0.1195	479	0.2029
Luxembourg	0.0735**	−0.1050	0.5632***	−0.0066	0.1909***	687	0.0619
Malta	0.0845**	−0.5655*	0.7846**	0.0355	0.0802	145	0.2859
Netherlands	−0.0270	−0.3434***	0.5780***	0.0296***	0.3200***	4028	0.2075
Poland	0.0612***	−0.5766***	0.6531***	0.0144**	0.0309	3268	0.0794
Portugal	0.0700*	−1.2491***	0.8473***	0.0252**	0.0100	1275	0.1189
Romania	0.2045*	−1.0861***	0.6133**	0.0055	0.0695	247	0.1865
Slovakia	0.1430	−0.7049*	1.2736***	0.0099	−0.0101	138	0.3397
Slovenia	−0.6783***	−1.4117**	0.8842**	0.0158	0.0714	117	0.5936
Spain	0.0447***	−0.9669***	0.9012***	0.0236***	0.1574***	8696	0.1175
Sweden	.04841***	−0.4919***	0.4746***	0.0069	0.3167***	8316	0.2182
United Kingdom	0.0199	−0.2324***	0.9693***	0.0278***	0.1552***	26,777	0.1071

The dependent variable is the book-value debt ratio (*leverage*) as defined in Table 7. Panels A and B show the regressions with Huber–White and cluster-robust standard errors, respectively. For brevity, *t*-statistics are not reported. Significance at levels of 1%, 5%, and 10% indicated by ***, **, and *, respectively

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

Declarations

Competing interests The authors have no financial or no-financial interests to disclose.

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